



MASSACHUSETTS
TECHNOLOGY
COLLABORATIVE

FY 2017 IMPACT REPORT



Investing in What's Next

Dear Reader,

During my first year in residence at MassTech, it's been wonderful to experience outcomes associated with MassTech supported projects: celebrating with PULSE@MassChallenge as they graduated their first accelerator class, awarding over \$200,000 to digital health startups; our grantee EforAll gaining national recognition from the Kauffman Foundation, receiving an Inclusion Challenge grant for their work to help "female entrepreneurs and entrepreneurs of color achieve higher rates of success"; and visiting the town of West Stockbridge with Gov. Baker and Lt. Governor Polito, hearing from small business owners about how expanded broadband connectivity is powering their operations and connecting them with customers.

These were just a few of the successes that occurred in FY2017; wins that were the result of the hard work of our employees and grantees, combined with the support from other government and business partners. We're extremely proud to have supported these initiatives and these amazing outcomes.

While these successes are gratifying, it's clear that we cannot rest on our laurels. As we entered Fiscal Year 2018, we have been working hard to keep the Commonwealth's #1 innovation ranking, especially given the rapid and fundamental changes occurring in the technology and innovation space.

One of my more enjoyable experiences is talking to the interesting teams of innovators, entrepreneurs, and accomplished business executives. I also continue to be impressed by how thoughtful our political leaders are in helping promote projects that will have lasting impact. The Baker-Polito Administration, the Massachusetts Legislature, our Board, and our MassTech team, are all focused on how best to *drive outcomes* across Massachusetts, including expanding opportunities in emerging regions and our Gateway Cities. This yearly recap has always been referred to as an 'annual report,' but I see it more as an 'impact report'; it's a way to not only summarize the actions we've taken over a fiscal year, but also to gauge whether our investments are bearing fruit and are living up to our expectations.

As you read through the report, I hope that you come away with a better sense of our agency's mission, the diverse set of projects we support across the Commonwealth, and the important focus areas that we believe will drive our innovation economy over the decades to come. This report highlights several Project Profiles which illustrate how we work with partners to initiate actions/investments that would not naturally take place on their own. Our newly updated website also highlights projects, events, and announcements that point to the impact our projects are having statewide on the innovation economy. Looking at MassTech's long history, it's clear that while the agency's mission has remained constant, activities and approaches have adapted



Timothy J. Connelly, Executive Director,
Massachusetts Technology Collaborative

with evolving technology and innovation priorities. Sectors such as advanced manufacturing, digital health, cybersecurity, and the Internet of Things (IoT) are reliant on cross-collaboration between several high-tech industries. These are areas of intersection where Massachusetts has a strong base of R&D infrastructure, talent, and technical expertise, factors which have fueled emerging cohorts of game-changing companies. Supporting these areas will be a growing focus of our project portfolio in the near term.

In the coming year, MassTech will continue to build on our foundation of public-private partnerships, helping bring together our world-class academic and research assets with our top companies. We're also committed to identifying new ways to bolster our talent pipeline, particularly in emerging sectors such as cybersecurity. Lastly, we will expand our new focus on business assistance, helping to connect in-state companies with critical business resources and state programs,

while also engaging out-of-state and international firms to help them establish a foothold in the Commonwealth.

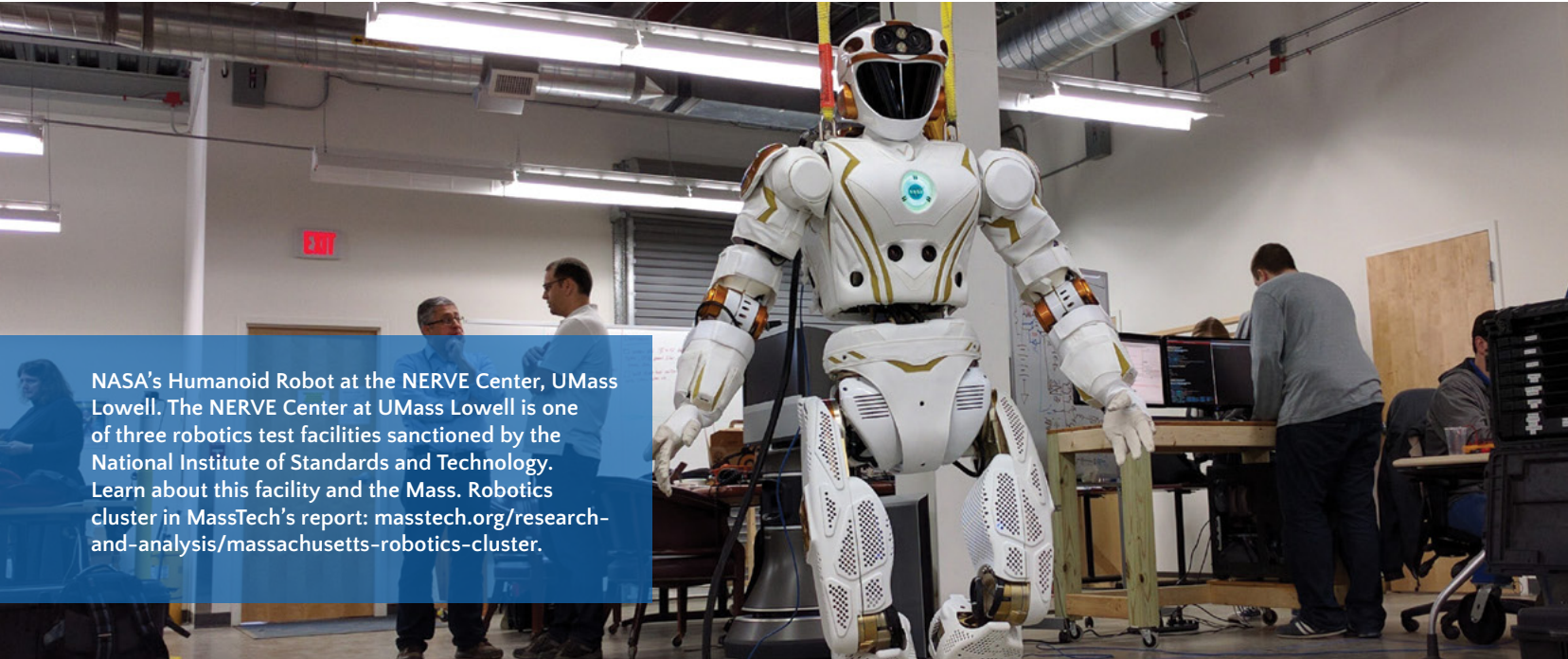
It's an exciting time to be a part of the Massachusetts innovation economy. Over this past year, one of the major refrains I have heard was that the Massachusetts tech sector is tackling the big, complex issues that are global in scale. That is the impact that matters. As we enter Fiscal Year 2018, I am committed to working with the Baker-Polito Administration, the Legislature, our Board, and the innovation community to continue our legacy of supporting game-changing, impactful innovations.

Sincerely,



Timothy J. Connelly, Executive Director

This Fiscal Year 2017 Impact Report, submitted pursuant to G.L. c. 40J, §8.



NASA's Humanoid Robot at the NERVE Center, UMass Lowell. The NERVE Center at UMass Lowell is one of three robotics test facilities sanctioned by the National Institute of Standards and Technology. Learn about this facility and the Mass. Robotics cluster in MassTech's report: masstech.org/research-and-analysis/massachusetts-robotics-cluster.

Massachusetts Technology Collaborative by the NUMBERS



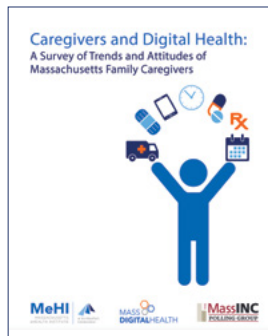
M2I2 Grants Fuel Next-Gen Tech

Launched the Massachusetts Manufacturing Innovation Initiative, awarding **\$16 million in capital** to companies and researchers to develop the next generation of manufacturing technologies.



Research Reports Launched

Launched two major research reports, including a **Robotics Cluster Report**, which characterized the strength and opportunity of the Massachusetts robotics ecosystem, and a new report on the **opportunities for digital health to support family caregivers**.



Launched Business Assist Program

Helped 60 companies through a new Business Assistance program designed to make state government friendlier to technology companies of all sizes.



Promoting Broadband Access

Helped **37 of the 45 unserved Massachusetts towns** access residential broadband solutions. Providing broadband access to an additional **1,257 premises in nine partially-served towns** through a public-private partnership.



Helping Mass. Healthcare Providers Access Millions in Incentive Payments

Helped Massachusetts healthcare providers access **\$43,849,147** in Medicaid digital health adoption incentive payments.



Furthering EHR Adoption

Helped **27 long-term post-acute care and behavioral health organizations** achieve adoption of electronic health records.



Promoting Digital Health Startups

Supported a first class of **31 promising digital health startups** through the creation of PULSE@MassChallenge.



Boosting Tech Internships

Helped approximately **100 local interns** find meaningful work at a Massachusetts technology startup.



Improving Healthcare Coordination across Mass.

Supported **8 community healthcare collaborations** working on **23 use cases** across **74 healthcare organizations**, driving stronger care coordination through technology.



Investing in Cutting-Edge R&D

Catalyzed the creation of PracticePoint @WPI to develop the next wave of smart, secure medical devices with a **\$5 million capital investment**.

WHO WE ARE



MASSACHUSETTS
TECHNOLOGY
COLLABORATIVE

Our mission is to support growth of the Massachusetts innovation economy, by strengthening the performance of individual firms and industry clusters in the Commonwealth.

The Massachusetts Technology Collaborative, or MasTech, is a unique state agency working to strengthen the Commonwealth's position as the leading hub for innovation and entrepreneurship. MasTech serves as a catalyst, convener, project manager, researcher, and partner within the technology community on behalf of state government, driving job growth and statewide economic impact.

We focus on:

- Cluster Development & Ecosystem Support;
- Talent Support & Workforce Development; and
- Business Assistance for Technology Firms.

Through our three major divisions - the **Innovation Institute**, the **Massachusetts eHealth Institute (MeHI)**, and the **Massachusetts Broadband Institute (MBI)** - **MasTech** is fostering innovation and helping shape a vibrant economy.

We develop meaningful collaborations across industry, academia and government which serve as powerful catalysts, helping turn good ideas into economic opportunity.

We accomplish this in three key ways, by:

- **FOSTERING** the growth of dynamic, innovative businesses and industry clusters in the Commonwealth, by accelerating the creation and expansion of firms in technology-growth sectors;
- **ACCELERATING** the use and adoption of technology, by ensuring connectivity statewide and by promoting competitiveness; and
- **HARNESSING** the value of effective insight by supporting and funding impactful research initiatives.

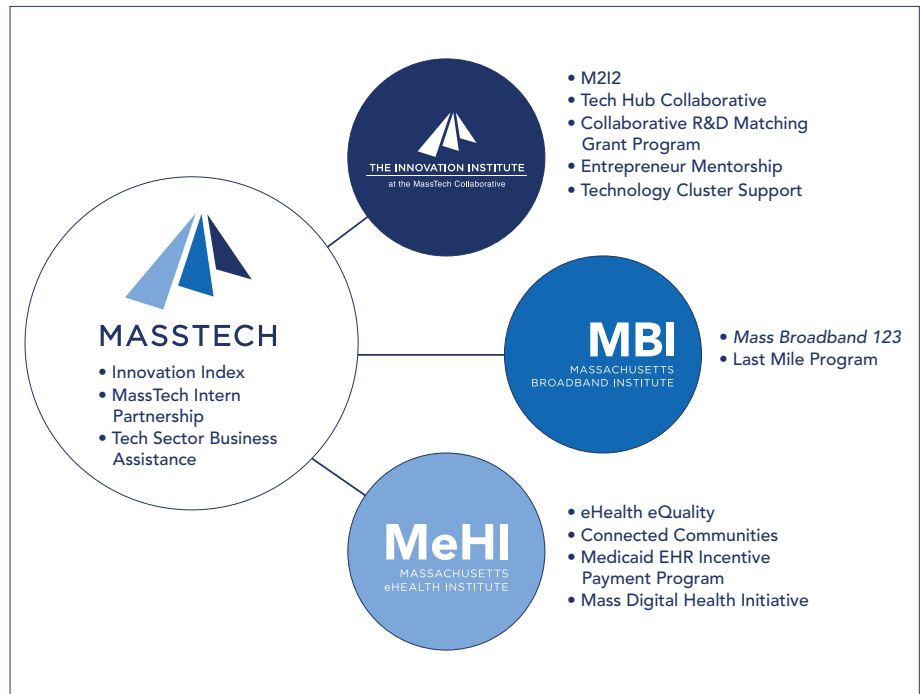
The Massachusetts Technology Collaborative's main office in Westborough, Massachusetts.

MassTech is composed of three major divisions, each with a unique mission that drives innovation and supports a vibrant economy across the Commonwealth.

The Innovation Institute at MassTech was created in 2003 to improve conditions for growth in the innovation economy by:

- Enhancing industry competitiveness;
- Promoting conditions which enable growth; and
- Providing data and analysis to stakeholders in the Massachusetts innovation economy that promotes understanding and informs policy development.

The Institute manages programs which support emerging sectors such as Big Data, Advanced Manufacturing, and Robotics, and takes on initiatives to support and develop a talented workforce for the Commonwealth, such as the Intern Partnership program, entrepreneur mentorship initiative, and the Global Entrepreneur in Residence (GEIR) Program.



The Massachusetts Broadband Institute at MassTech is working to extend high-speed internet access to homes, businesses, schools, libraries, medical facilities, government offices, and other public places across the Commonwealth.

The MBI managed the construction and rollout of *MassBroadband 123*, a 1,200-mile fiber-optic network that has delivered high-speed internet access directly to over 1,100 key facilities in more than 120 communities in Western and Central Massachusetts.

The Massachusetts eHealth Institute at MassTech, is the state's entity for health care innovation, technology, and competitiveness and is responsible for advancing the dissemination of health information technology throughout Massachusetts. This includes the deployment of electronic health records systems in all health care provider settings and connecting them through the statewide health information exchange, the Mass HIway.

MeHI oversees programs and makes investments which help accomplish these goals, and is the designated lead state agency for coordination of economic development programming to advance the Massachusetts Digital Health Initiative.



Lt. Governor Karyn Polito gets a hands on demonstration of interactive health technologies following the announcement of the Commonwealth's R&D grant for PracticePoint at WPI in April 2017. With the Lt. Governor were (from right), Peter Sherlock, SVP and COO, MITRE; Ann Klee, GE; Tim Connelly, MassTech; and WPI President Laurie Leshin.

Innovation Institute by the NUMBERS



Manufacturing Companies Supported

14 companies engaged by MassTech over the last six months to provide assistance and/or collaboration support under either the M2I2 program or for general manufacturing support, including three (3) large original equipment manufacturers (OEMs), four (4) start-ups, and seven (7) small/medium sized enterprises (SMEs). Of these, three have received M2I2 capital grants to date and five others have grant applications that are waiting for formal approval or are in the pipeline.



M2I2 Grants Fuel Next-Gen Tech

At the end of FY2017, the M2I2 program has **awarded \$16 million of the \$93 million** available for projects to match federal investments made under the Manufacturing USA program, helping fund tools and/or facilities for six Advanced Manufacturing Discovery or Education Centers located across the state (UMass Amherst, UMass Lowell, MIT, and MIT's Lincoln Laboratory), as well as equipment for two SMEs, one located in Billerica and one in Boston.



University, Community Colleges, and National Labs Engaged

10 universities, community colleges, or national labs engaged under the M2I2 program; of these, four have received grants and proposals are being discussed with the rest.



Launched Business Assist Program

60+ startups and tech companies in Massachusetts connected with MassTech's business support intake started in January 2017.

INNOVATION INSTITUTE

TECHHUB COLLABORATIVE

The 25-member TechHUB began FY'17 by working to define priority areas where the group could advance and help grow the Commonwealth's innovation economy. During the course of TechHUB sessions in FY'17, the group chose to focus on two new subject areas, business development and the Internet of Things, and will continue efforts on workforce and talent. The group met for five (5) in-person sessions and six (6) conference calls.

BUSINESS DEVELOPMENT/BUSINESS SUPPORT


Industry leaders and government officials within the TechHUB raised the idea of providing more business development support to technology companies starting, scaling, or relocating to Massachusetts. Unlike traditional business development services and programs offered by the Commonwealth, these business support services would help companies navigate the myriad state resources and incentives available to tech companies and provide personal connections to ecosystem partners.

First introduced as a concept in January 2017, MassTech has moved quickly to institute operating processes to provide support to startups and companies seeking personal connections, resources, referrals, and insight into the Commonwealth's innovation ecosystem. MassTech created an operations plan to develop and launch business support services, including devoting a full-time staff member to the effort, creating partnerships with other state agencies and tech organizations, aggregating resources available to tech companies, and integrating these into the refresh of the MassTech.org website and into division protocols.

R&D FUND PROGRAM

In April 2017, MassTech awarded a \$5 million matching grant to Worcester Polytechnic Institute (WPI) to support the launch of a new landmark healthcare research and product development initiative called PracticePoint at WPI.

MassTech continues to manage grants to high-impact R&D projects, including UMass-Amherst Data Science/Cybersecurity Collaborative Research and Education, Northeastern University's Advanced Nanomanufacturing Cluster for Smart Sensors and Materials, UMass Lowell's Printed Electronics Research Collaborative (PERC), Woods Hole Oceanographic Institution's Center for Marine Robotics, and the Massachusetts Open Cloud project.



A Baxter collaborative robot, made by Mass.-based ReThink Robotics, housed at Worcester Polytechnic Institute (WPI).

INTERNET OF THINGS

In January 2017, the TechHUB members identified the Internet of Things, or “IoT”, as a priority cluster in Massachusetts and have sought to create a cluster development strategy for the sector. MassTech has taken the lead to conduct research on the IoT cluster in Massachusetts, including its strengths, weaknesses, and the opportunity it presents to promote and grow the state’s innovation economy. MassTech developed an IoT Cluster and Opportunity report in June 2017.

THE MASSACHUSETTS MANUFACTURING INNOVATION INITIATIVE (M2I2)

As part of the Commonwealth’s ongoing commitment to the Manufacturing USA program put forth by the federal government, MassTech oversees the M2I2 program which provides capital grants for projects and discovery centers located within the Commonwealth’s borders in an effort to make a significant positive impact on the Massachusetts manufacturing sector. Over the last six months, M2I2 has engaged 14 companies, providing assistance and/or collaboration in the context of either M2I2 or general support for sustaining manufacturing here in the Commonwealth. To date, the M2I2 program has awarded \$16 million of the \$93 million available for projects under AFFOA (Advanced Functional Fabrics of America), American Institute for Manufacturing Integrated Photonics (AIM Photonics), NextFlex (flexible hybrid-electronics), and Advanced Robotics for Manufacturing (ARM) institutes.

The Fabric Discovery Center

The Fabric Discovery Center, funded by matching M2I2 grants and located at UMass Lowell’s Innovation Hub, was announced at the end of May. This was also the first collaboration in the nation between two Manufacturing USA Centers (AFFOA and NextFlex), and will be a center for both flexible electronics and textile/fabric development, fabricating textiles with an array of electronic and photonic properties. The facility will be an end-to-end fabric innovation ecosystem with capabilities ranging from resin compounding equipment, fiber extrusion lines, knitting, weaving, and textile finishing. Working side by side with industry, outcomes could include fabrics that monitor health, communicate with each other, or provide personal temperature comfort. Multiple companies, including Raytheon and S12 Technologies are partnering with UMass Lowell to develop products at the new fabric center. The Lowell Center will provide a foundation to help revitalize this Gateway City, formerly the core of textile manufacturing in New England.

The Defense Fabric Discovery Center, also announced in May 2017, will be constructed at MIT’s Lincoln Laboratory in Lexington and funded by M2I2 matching grants. That facility will focus on similar products for defense and national security.

The first Fabric Discovery Center to actually open its doors occurred in conjunction with the AFFOA Headquarters Grand Opening in June, again funded by cost share through M2I2. This center is focused on risk-reduction of manufacturing technologies where technology, prototyping, design and education are integrated in one center to accelerate product and manufacturing innovation. “As a state that was fundamentally all about fibers and textiles for years and years, this was an opportunity for us to grab back some of our heritage,” said Governor Charlie Baker, who attended the grand opening.

University of Massachusetts Amherst’s Institute for Applied Life Sciences (IALS)

MassTech oversaw M2I2 grants that helped enable the University of Massachusetts Amherst’s Institute for Applied Life Sciences (IALS) that opened in June. The four core facilities offer additive manufacturing, 3D metal and plastic printing, roll-to-roll manufacturing, device characterization, materials testing and computer modeling and design. M2I2 provided grants for the cleanroom and equipment for the roll-to-roll manufacturing capability. Large advanced manufacturers such as Saint-Gobain, as well as numerous smaller area companies such as Peerless Precision and Boyd Technologies, will use the facility to test new product concepts.

Advanced Manufacturing Speaking Engagements

MassTech was invited to speak at multiple industry, government and academic forums across the state and in Washington DC, taking advantage of these opportunity to publicize and advance the Commonwealth’s manufacturing agenda, including the following:

- Keynote speaker, The Southeast Massachusetts Advanced Manufacturing Forum, Taunton, MA , “A Vision for Advanced Manufacturing and Massachusetts”;
- Panel Moderator, LiveWorx 17, Boston, MA , “Industrie 4.0 Transformation in Manufacturing – Seize the Opportunity”;
- Keynote Speaker, Worcester Business Journal 2017 Manufacturing Summit, Worcester, MA, “A Vision for Advanced Manufacturing and Massachusetts”;
- Invited Lecture, Harvard Kennedy School, Cambridge, MA, “The Autonomous Vehicle Supply Chain and Massachusetts”;
- Invited Speaker, Spring 2017 AIM Photonics Roadmap Meeting, MIT/Cambridge, MA, “Manufacturing: A Confluence of Tools, Technology, and People” and “Manufacturing USA and Massachusetts”;
- Invited Presentation, NIST, Gaithersburg, MD, “Manufacturing USA and Massachusetts”;
- An invited speaker at the Manufacturing USA Summer Session, in Gaithersburg, MD, in August 2017 and at the FIO+LS Conference/ Frontiers in Optics and Laser Science, in Washington, DC in September 2017.

MASSTECH INTERN PARTNERSHIP

The MassTech Intern Partnership (MTIP) program connects talented students from Massachusetts' world-class universities to the diverse tech startup ecosystem. The MTIP program fosters these connections by providing stipends to Massachusetts technology companies with fewer than 100 employees, allowing them to hire Massachusetts college students as summer interns. Since the program began in 2013, it has enabled 194 companies across the state to hire more than 400 students for summer-long paid internships.

"Without this program, we probably would have only been able to afford one intern," noted Chris Mannion, Co-Founder of Hive Maritime, a summer 2016 participant company.

Instead, the MTIP program allowed Hive Maritime to hire two MIT students, Jeet Mohapatra and Lynn Yu, who were interested in data science and the startup economy. The two interns were instrumental in building databases, cleaning up datasets, and assisting the team in an environment where there is always more than enough work to go around.

Small business owners are not the only ones who benefit from the internships made possible by the MTIP Program. Student interns gain meaningful work experience and apply classroom concepts to real-world scenarios.

"Our interns get their hands in everything," said Sarah Haig, Co-Founder of Silverside Detectors, another summer 2016 participant company. "We start them out on tasks that they can handle, but by the end of their terms we've had interns get intimately involved in every aspect of making our product."

Annabel Lewis, the 2016 sponsored intern at Silverside Detectors agreed, and spoke highly of her internship experience. The job immediately differentiated itself from her last professional experience.

"I find that it's easier to focus here when I'm around people, and not trapped in a cubicle by myself," Lewis said.

In addition, Lewis was excited by the number of projects that were there for her on day one of her internship, which she attributed to a startup culture where there is constantly critical work to be done.

Many MTIP interns are exposed to the startup ecosystem in Massachusetts through co-working spaces such as Greentown Labs in Somerville and WeWork near South Station. Cuseum is one of the startup companies that operates out of WeWork. Alice Khabituyeva and Andrew Zhang, Cuseum's summer 2016 interns, noticed not only the plethora of businesses in the area, but how much support and goodwill there is within the local startup community. The camaraderie can be detected at WeWork, at community events, and around the city. Maybe soon, Khabituyeva, Zhang, or other MTIP-sponsored interns will have



Max Gerhardson & Tyler Campbell, interns at FloDesign Sonics in Wilbraham, were supported through the MassTech Intern Partnership program.

startups of their own in the state, given their high regard for the startup culture in the Boston area and their positive experiences working for one.

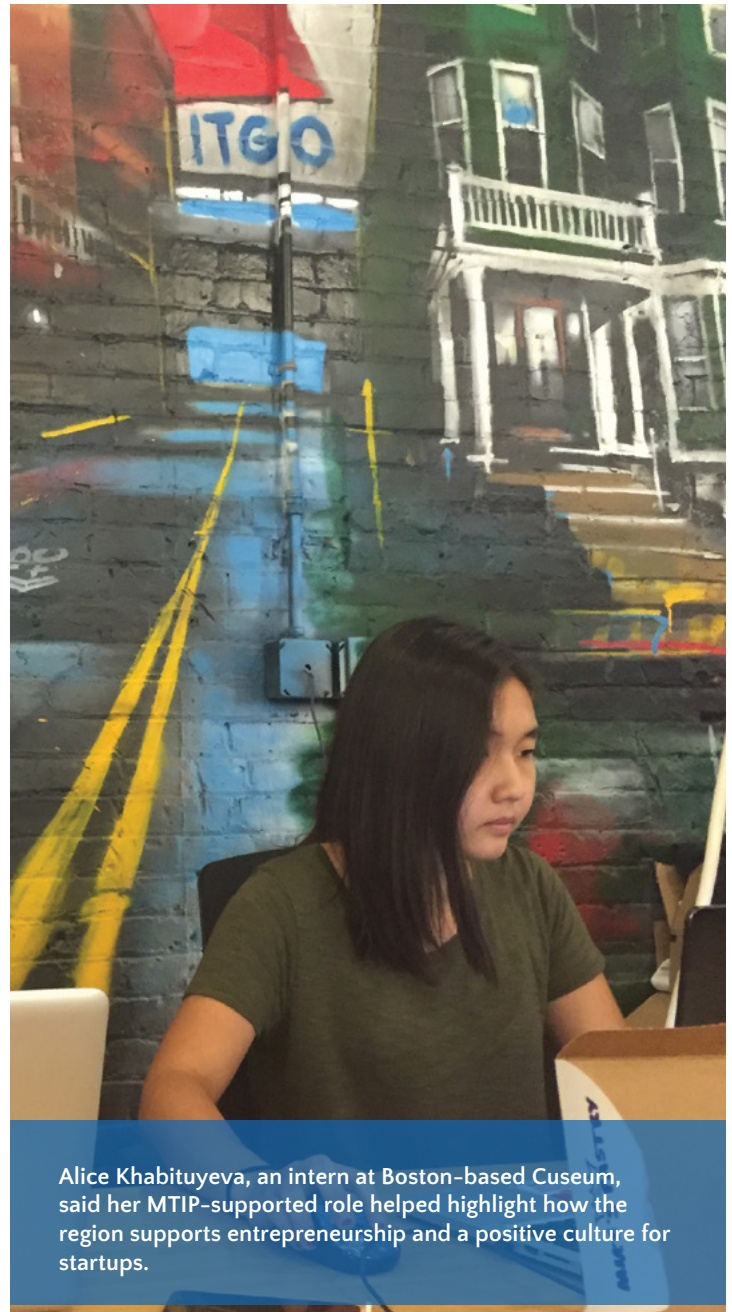
“Everyone knows everyone and there seems to be a lot of support for entrepreneurs starting a business and people involved in tech,” Khabituyeva remarked.

The MTIP Program introduces students to technology businesses and opportunities outside of Route 128 too.

FloDesign Sonics, based in Wilbraham, has been an MTIP participant company since the Program’s inception in 2013. Co-Founder and Executive Vice President Louis Masi and his team are constantly looking for new employees in Western Massachusetts, and many young people either grew up or went to school in the area and are looking for job opportunities close to home. FloDesign’s summer 2016 and summer 2017 interns Max Gerhardson and Tyler Campbell were elated to work for a cutting-edge company in the western part of the state. Gerhardson said it was inspiring to see the area developed, and Campbell added that this internship showed him a cross-section of the local economy he hadn’t seen before.

“This company shows us that there are opportunities for startups in Western Mass that I wasn’t aware of previously,” Campbell said.

The MassTech Intern Partnership Program supports small technology companies, and through internship opportunities, trains the next generation of entrepreneurs and technology experts to stay and grow in Massachusetts.



Alice Khabituyeva, an intern at Boston-based Cuseum, said her MTIP-supported role helped highlight how the region supports entrepreneurship and a positive culture for startups.

MASSACHUSETTS OPEN CLOUD: COLLABORATION MAKES BUSINESS SENSE IN CLOUD COMPUTING

In 2014, MassTech awarded the Hariri Institute at Boston University \$3 million in state capital funding to support a collaborative research project between industry and academia to build the Massachusetts Open Cloud, or MOC. The MOC is a public computing cloud that serves as a shared infrastructure for developing and running computationally intensive data applications.

Housed at the Massachusetts Green High Performance Computing Center in Holyoke, the MOC empowers researchers and companies to explore and develop novel Big Data and cloud computing solutions, helping keep the Commonwealth at the forefront of cloud computing innovation. The MOC project has leveraged investments from project partners and collaborators include MassTech and the MGHPC, as well as Boston University, Harvard, MIT, Northeastern, UMass, the U.S. Air Force, Brocade, Cisco, Intel, Lenovo, Two Sigma, and Red Hat.

Today, the MOC is used for research and education by its academic and industry partners, with over 300 students having worked on MOC-related projects. In classrooms and programs across BU, MIT, Harvard, Northeastern, and UMass, the MOC is being used to train the next generation of researchers and entrepreneurs in fields including data analytics, cybersecurity, and cloud computing.

The MOC is also driving innovation in collaboration with industry leaders. The North Carolina-based software firm Red Hat has established a collaboration with the MOC, and that experience had a positive impact on Red Hat's work in the region. It has also led to innovations around cloud security and cloud storage that have made their way into open-source software projects, innovations which will benefit all users and distributors of those projects.

In addition to its contributions to the MOC, this year Red Hat has made two major investments into the Commonwealth:

- In February 2017, Red Hat announced a \$5 million, five-year research and education agreement with Boston University to collaboratively advance research and education on open source and emerging technologies, including cloud computing, machine learning, automation, and big data. This effort will pair Red Hat researchers with the BU student and researcher community, helping to drive advancements for both, and greater economic outcomes for the Commonwealth.
- In June 2017, Red Hat opened a 40,000 square foot Open Innovation Lab and Executive Briefing Center in Boston's Seaport District, expanding its Massachusetts footprint and workforce, which already includes its largest Products and Technologies hub in Westford.



Attendees at the Massachusetts Open Cloud workshop at Boston University. The Massachusetts Open Cloud was the recipient of a MassTech R&D grant in 2013.

Red Hat and others benefit from the MOC as a shared platform to help solve challenging open source software problems in a cloud environment. At the opening event for the Seaport facility, Red Hat executive Paul Cormier highlighted that the Massachusetts Open Cloud provided pathways to greater company engagement across BU,

MIT, Northeastern, Harvard, and UMass, which drives new discoveries and research which add to its competitiveness. Cormier also indicated that Red Hat's collaboration with the MOC and BU help drive talent recruitment and development for the company.



Servers housed at the Mass. Green High-Performance Computing Center (MGHPCC) in Holyoke. MassTech helped fund the construction of the facility and has supported projects, such as the Mass. Open Cloud, which are housed at MGHPCC.

Massachusetts Broadband Institute by the NUMBERS



Facilitated Last Mile Direct Grants

\$16.61 million: Direct grants facilitated by the MBI and committed to unserved municipalities for the construction of municipally owned broadband networks, representing 46.3% of the unserved premises in the MBI programmatic geography.



Promoted Broadband Access

37 of 45: Unserved municipalities, at the close of FY'17, that the MBI had established or fostered a path forward for broadband connectivity within its programmatic geography.



Public-Private Solutions Supported

\$5.225 million: Total of the MBI executed grants to Charter and Comcast to provide service to six municipalities, representing 17% of the unserved premises in the MBI programmatic geography.



Added Premises Covered in Partially-Served Towns

1,257: Total premises covered under the MBI's **Broadband Extension Program, an increase of 168 over the initial agreement.** In August 2016, the MBI announced a grant to Comcast under the Broadband Extension program that would extend broadband connections to 1,089 premises in nine 'partially-served' communities in Western Mass. Later in FY'17, the MBI completed a reconciliation process with Comcast that revealed the project's footprint would extend residential broadband connections to 1,257 premises (rather than the lower amount that was contractually agreed to), representing an increase of 168 additional premises receiving coverage at no additional cost to Massachusetts taxpayers.

MASSACHUSETTS BROADBAND INSTITUTE

The mission of the MBI is to extend high-speed internet access to homes, businesses, schools, libraries, medical facilities, government offices, and other public places across Massachusetts, with a focus on the hard-to-serve areas of Western and Central Massachusetts. The MBI has two separate, but related, challenges to connectivity that it seeks to solve:

- (1) Expanding broadband service in communities where an incumbent cable provider offers broadband service but with limited coverage; and
- (2) Bringing broadband service to entirely unserved communities who lack any high speed internet access.

Those underserved municipalities (Group 1 above) and unserved communities (Group 2) total 54 municipalities in the MBI's programmatic geography.

In FY'17, the MBI and the Baker-Polito Administration have either shepherded existing projects or charted new solutions for 46 of the 54 towns.

During the past fiscal year two paths for unserved municipalities materialized:

- 1.) broadband networks built, operated, and owned by municipalities; and
- 2.) public-private partnerships between municipalities and existing private-sector broadband providers to construct networks.

In order to create partnerships with interested private sector broadband providers, the MBI published a request for proposals (RFP) in November 2016 designed to attract private companies to solve the Last Mile problem. During the ensuing review and execution phase, six (6) communities chose to pursue a partnership with an existing broadband provider. In this case, those providers were Charter, with five towns, and Comcast, with one community.

This project built off of the strength of the partnership the MBI created in the summer of 2016 with Charter, following the MBI's negotiation of a grant agreement with Charter to upgrade and extend its footprint in the towns of Hinsdale, Lanesborough, and West Stockbridge. Previously, these towns were considered unserved as the legacy system owned and operated by Time Warner (Charter's predecessor) did not allow for the capacity to deliver broadband-level internet as defined by the FCC (25 megabits per second download, 3 megabits per second upload). Additionally, the MBI built off of its previous grant agreement with Comcast to extend networks in nine (9) communities that were 'partially-served' by existing private networks, also known as broadband extension communities. That initial agreement was announced early in FY2017, in August 2016.

The MBI executed grants with Charter and Comcast at the end of FY'17 to cover the six communities, which are now moving forward with the cable franchising process in order to pave the way for deployment of broadband networks. The Commonwealth-funded grants that the MBI executed will help subsidize the cost of construction, given that the lack of population density in these unserved communities makes the economics of broadband deployment untenable. The six towns that are opting to partner with a cable provider constitute approximately 17 percent of the remaining unserved premises within the MBI's target geography. In addition to these solutions, five additional unserved towns are pursuing private partnerships outside of the MBI's RFP process, municipalities which constitute an additional 15.8 percent of the remaining unserved premises.

The MBI partnered with the Executive Office of Housing and Economic Development (EOHED) in FY'17 to create a grant program modeled off of the existing MassWorks municipal infrastructure program to facilitate municipal broadband projects in the target unserved communities. The MBI Board approved this partnership with EOHED, through which communities that are seeking a municipally-owned broadband network submit a formal application for a grant, drawn off of the Commonwealth's Last Mile bond authorization, a program called the Last Mile Infrastructure Grant Program. The application process is managed by EOHED with application review support provided by the MBI. The towns largely build their applications off of the experiences and knowledge gained through the Readiness Program that the MBI developed for towns during FY'16. The Readiness Program involved direct, hands-on interactions and analysis with the MBI engineers around the various sustainability considerations for a municipal network. Through the grant program, the town is responsible for securing the remainder of the necessary funding through local accounts and/or borrowing. The town is responsible for operational costs of the broadband network and service provision for its customers. As of the end of June 2017, 18 towns have been awarded grant funding through the Last Mile Infrastructure Grant Program or a previous program through the MBI, representing 46.3 percent of all unserved premises.

Over the past year, the MBI and the Baker-Polito Administration have identified active broadband solutions for approximately 87.6 percent of all of the unserved premises in Western and Central Massachusetts that constitute the MBI's programmatic geography.

WEST STOCKBRIDGE BENEFITS FROM INCREASED BROADBAND

Governor and Lt. Governor Hear About Impact of Expanded Connectivity on Small Businesses During May 2017 Tour

In early August 2016, as part of the relaunched Last Mile program, the MBI announced a grant to Charter Communications to upgrade and extend broadband connectivity in three unserved communities in Berkshire County - Hinsdale, Lanesborough, and West Stockbridge. Under the terms of the deal, the grant would help upgrade Charter's TV-only cable network in roughly 80-90 percent of existing households and businesses, helping bring an all-digital system capable of reaching broadband speeds (25 megabits per second for downloads & 3 megabits per second for uploads), more than the existing DSL network, which only reached a portion of the premises in each town. The deal also included the expansion of broadband to the remaining premises in the three communities, which will ensure high-speed connectivity to 440 additional homes by the February 2018.

As a follow up to that award, on May 16, 2017, the Baker-Polito Administration and the MBI arranged a visit to the Town of West Stockbridge to meet with small business owners and impacted residents to gauge the impact that increased connectivity has on their lives. The walking tour, which took place during Small Business Month in the Commonwealth, was led by Joe Roy, Jr., owner of The Floor Store and a member of the West Stockbridge Business Association. The Floor Store was the first of five businesses the Governor and Lt. Governor visited on the tour, which allowed Roy to highlight the impact that Charter's upgraded connections were having on his business and on the community overall.

"Each of the 36 client contracts we currently have open was negotiated online," said Joe Roy, Jr. "The new high-speed connection allows us to process those contracts more quickly and to send large files more dependably. It has also made it possible for folks to get television and telephone service over the internet and allowed second home owners to work remotely more reliably, allowing them to stay longer in West Stockbridge."

The Governor and Lt. Governor were also joined on the tour by State Senator Adam G. Hinds and State Rep. Smitty Pignatelli, Deputy Secretary Carolyn Kirk from the Executive Office of Housing & Economic Development, Charter executives, and leaders of the MBI.

While the full three-town project is not expected to finish until FY2018, the impact of the rolling upgrades were clearly apparent as the officials met with small business owners.



"Delivering high speed internet to our unserved towns is critical to the development of our local economies and is an important tool for all residents and communities, and we are pleased to tour West Stockbridge today to witness the Last Mile program's progress," said Governor Charlie Baker. "The Berkshires draw visitors from around the world, and these network upgrades will allow small businesses to better attract and engage with new customers to grow and succeed in the 21st century economy."

How the MBI's Grant is Helping Small Businesses in West Stockbridge

Below is a roundup of the impact that broadband expansion has had on several West Stockbridge businesses.

THE FLOOR STORE

Expanded Connectivity Powers Business Transactions

The expanded broadband availability critical to dependable business communication, as The Floor Store handles roughly 90% or its transactions over the internet. This includes communication via email and their website, sending online quotes, exchanging contracts, as well as managing receivables, orders, and billing.

SHAKER MILL TAVERN FAMILY SMOKE HOUSE

Investing in More Efficient Technology, Made Possible by Enhanced Connectivity

Jim Hallock, owner of the Shaker Mill Tavern Family Smoke House told the Governor and Lt. Governor about the challenges his restaurant faced before the new broadband was installed.

"Well...we had DSL. My whole computer system works on the internet. DSL was so random - we would have 100 people in the restaurant, all of a sudden [it] would go down. We would lose everything, we couldn't sell a thing to a customer and we couldn't move tickets."

Hallock went on to talk about the improvements day-to-day, but also to his monthly bottom line.

"Now, having broadband, there's no more interruptions," Hallock said. "There's also big savings....\$350 a month."

STONE HOUSE PROPERTIES

Helping Attract New Residents to the Region

Stone House Properties manages three real estate offices in The Berkshires, including one on Main Street in West Stockbridge.

Owners Randy Thunfors, Sheila Thunfors, and Suzanne Crerar and their real estate teams list available properties on their website, allowing them to market to buyers both near and far. Broadband is critical

when trying to market a home, particularly if the buyers are used to having the convenience of high-speed internet in their current home. Broadband connections are particularly important for families with school-age children or those looking to start a home-based business.

"Since we're in the sale of real estate, that's incredibly important," said Randy Thunfors. "It's one of the first questions we get now - 'do you have it?'"

NO. SIX DEPOT COFFEE ROASTERY, CAFE & GALLERY

Marketing Berkshires Products Online & Offering Customers Connectivity

This 3 1/2 year old restaurant depends on reliable internet to process credit card charges and for their online-based wholesale business, helping them execute both web sales and to expedite shipping. In addition to their whole roasted coffee and tea, No. Six Depot also sells locally-made products from around the region. In addition to helping with sales, the expanded broadband access also allows them to offer wireless connectivity to their customers, an important feature for café in the 21st Century.

Lisa Landry, co-owner of No. Six Depot, added: "It's an economic development thing, it really is. I think businesses will come here if they know they can rely on it."



Governor Baker and Lt. Governor Polito speak with the staff at Stone House Properties. Photos courtesy of the Mass. Governor's Office.

Massachusetts eHealth Institute by the NUMBERS



Engaged Prospective Digital Health Companies

Supported **12+** digital health companies looking to relocate to Massachusetts.



LTPAC Organizations Helped

27 Long-Term Post-Acute Care and Behavioral Health organizations completed all four milestones in the eQuality Incentive Program.



Supported Children's Behavioral Health

\$193,000 awarded to four EHR vendors to develop and implement interfaces to allow behavioral health organizations to automatically send required Child and Adolescent Needs and Strengths data to the state's reporting system.



Bolstered Provider Access

\$43,849,147 paid in Medicaid EHR Incentive Payments.



Funded Innovation Hubs

Awarded \$250,000 in grants to two digital health accelerators in Boston and Springfield.



Supported Digital Health Startups

Supported 31 digital health startups as a Champion through the PULSE@MassChallenge program; and **29 startups** through TechSpring.



Promoted Community Events

23 Events MeHI hosted, spoke at, or partnered on related to digital health (or Health IT) topics.



Fostered More Connected Communities

Supported 8 Connected Communities Implementation Grants working on **23 use cases and involving 74 healthcare organizations** across Massachusetts and across the care continuum.



Awards Paid to Community Grantees

\$791,837 paid to Connected Communities Implementation grantees and their collaborators.

MASSACHUSETTS eHEALTH INSTITUTE

MASS DIGITAL HEALTH INITIATIVE

In FY'17, MeHI advanced the goals of the Mass Digital Health Initiative, helping the Commonwealth become a stronger and more connected digital health ecosystem. Through the establishment of a Mass Digital Health Advisory Council and a Digital Health Marketplace Program, MeHI partnered with entrepreneurs, healthcare leaders, researchers, and executives to drive greater start-up entrepreneurship, stronger market dynamics, and more connectivity across partners.

The Digital Health Marketplace program supported both digital health entrepreneurs and customers in FY'17. This new program is a cornerstone of MeHI's efforts to grow and nurture the Commonwealth's digital health ecosystem under the direction of the Massachusetts Digital Health Initiative, launched by Governor Charlie Baker in January 2016. In FY'17, MeHI continued to support the Initiative with a variety of business development activities, including:

- \$250,000 in total funding for the Commonwealth's two primary digital health accelerators: PULSE@MassChallenge in Boston and TechSpring at Baystate Health in Springfield. With this funding, the two accelerators provided targeted support for over 60 digital health startups, helping them grow and compete;
- Development of an online Digital Health Marketplace, coupled with enhancing and improving the MassDigitalHealth.org community website, including maintenance of an ecosystem directory housing over 350 Massachusetts digital health companies;
- Designing and beginning implementation of a business development effort targeted at local, out-of-state, and international firms interested in relocating to Massachusetts. In FY'17, MeHI provided assistance to over a dozen companies interested in relocating to Massachusetts;
- Issuance of the first-ever survey of home-based caregivers' attitudes towards digital health technologies in Massachusetts. This report outlined the significant challenges that many caregivers face and how new technologies can help improve their quality of care and life; and
- Management support to the Governor's Digital Health Advisory Council to coordinate a shared strategy across the Baker-Polito Administration and private sector stakeholders around the direction of the Mass Digital Health Initiative.

Yiding Yu, MD, Founder & CEO of Twiage
at the PULSE@MassChallenge Finale.

CONNECTED COMMUNITIES

The Connected Communities team provided project resources, guidance, and project support to eight (8) grantees and their 63 community partners during FY'17. All of these grant projects are underway and include operational and clinical target outcomes designed to improve health outcomes for patients, reduce costs, and increase operational efficiencies for the participating organizations. These target outcomes include: reducing hospital readmissions, reducing the time it takes for a provider to make a patient referral to an external organization, and increasing the rate that a post-acute care provider has access to a patient's clinical information after they are discharged from a hospital. Seventy-five percent (75%) of the grantees have successfully completed testing of the technology involved in their projects and are actively integrating this technology into staff workflows. The projects are scheduled for completion in the second half of FY'18.

eHEALTH eQUALITY

Focused on the behavioral health (BH) and long-term and post-acute care (LTPAC) provider communities, this initiative supports providers who have not yet adopted interoperable electronic health record systems and connects them to the Mass Hlway. The eQuality Incentive Program (eQIP) was designed to support BH & LTPAC provider organizations through a milestone-based maturity model to integrate them into the statewide health IT infrastructure. Integration will help providers improve care coordination, ease transitions of care, and advance health care in Massachusetts. This will also enable them to align with the Commonwealth's healthcare reform efforts by positioning grantees to be better able to participate in Accountable Care Organizations (ACOs) and new models of care. At the close of FY'17, over 70 percent of the grantees had met all four of their milestones and over 90 percent made at least three milestones. By program end, MeHI will have distributed nearly \$2 million in eQIP grant funding to 38 grantees (24 BH and 14 LTPAC organizations) covering over 200 facilities across the Commonwealth.

CBHI/CANS

In October 2016, MeHI issued a grant solicitation for the Massachusetts Children's Behavioral Health Initiative (CBHI) interface development for Child and Adolescent Needs and Strengths (CANS) reporting. The grant program supports four qualified BH electronic health record (EHR) vendors in developing, testing, and implementing an HL7 interface that will leverage the Mass Hlway to automatically extract data from the EHR system, compile it according to the CBHI interface specification, and submit it to the Commonwealth's system.

Grantees are required to implement the interface at three unaffiliated BH organizations and provide those organizations with two years of related support service costs.

All BH clinicians serving MassHealth children and youth are required to use the standardized CANS tool at their organization and provide quarterly updates through the Commonwealth's Virtual Gateway reporting system. Allowing providers to directly and automatically upload the required reports will eliminate redundant work and improve the provider's ability to deliver necessary care to patients.

MEDICAID EHR INCENTIVE PROGRAM

In FY'17, 3,142 providers participated in the Medicaid Meaningful Use EHR Incentive Program for Program Year 2015 (PY15), and 3,083 participated for Program Year 2016 (PY16). To allow participants sufficient time to address complex new regulation and rule changes, MassHealth delayed the PY15 application deadline by four and a half months. As a result, the PY15 and PY16 deadlines both fell during FY'17, which halved the time available to process the PY15 validations compared to PY14. Through a series of process improvements, MeHI's application validation team was able to successfully double the validation completion rate. MeHI also added a Technical Assistance team to assist program participants with requests for additional information to ensure that participants could keep up and provide the requested information in the shortened timeframe. This team also provided program education, phone support, and other assistance to the participants. As a result, most PY15 participants (2,827) successfully completed their attestations and were eligible to attest again for PY16. In FY'17, a total of \$43,849,147 was paid in incentives. For FY'18, MeHI is working on the PY16 validations and educational preparations for PY17, including the introduction of Meaningful Use Stage 3.

PULSE@MASSCHALLENGE: ACCELERATING DIGITAL HEALTH INNOVATION THROUGH PARTNERSHIPS

PULSE@MassChallenge, the Commonwealth's Digital Health innovation lab, is located in Boston's Longwood Medical area. MassTech provided grant funding and strategic support, in partnership with private industry, to catalyze the creation of PULSE@MassChallenge in summer 2016. PULSE@ is designed to bring digital health innovators and the clinical community together to drive better and faster innovation, helping early-stage companies validate their products and accelerate their growth.

PULSE@ is a key outcome of the Mass Digital Health Initiative, a public-private partnership designed to accelerate the competitiveness of the Commonwealth's digital healthcare industry and improve healthcare for our residents through the use of high-impact technology. MassTech leads the state's participation in Mass Digital Health, which is also supported by the City of Boston, Massachusetts Competitive Partnership (MACP), and numerous industry and healthcare leaders.

PULSE@ is designed to bring digital health innovators and the clinical community together to drive better and faster innovation in healthcare. Program offerings includes a competitive startup program, mentoring, networking events, panel discussions, and co-working opportunities. PULSE@MassChallenge benefits from experiences and insights from both MassChallenge and TechSpring, the community innovation lab at Baystate Health in Springfield. A core element of the PULSE@ program model is collaboration. PULSE@ matches startups with industry partners to solve pressing healthcare challenges.

In January 2016, 31 startups entered a six-month accelerator program through PULSE@. Preliminary results and impact appear to validate the collaborative, partnership-driven program model. Ninety-four percent (94%) of the startups completed the program and at least 15 engaged in some form of pilot or implementation activity with one or more Champions. Several startups impacted real patient lives, helping them lose weight, plan for end-of-life, seek early diagnosis, or receive timely care. More impacted healthcare by saving millions of dollars annually by improving the efficiency and experience of delivering care, patient experience, and patient outcomes. Others developed digital diagnostics or medical devices that show tremendous potential, but are at earlier stages of deployment.



MassTech served as the front door to the Commonwealth for these 31 companies, providing regular office hours, organizing a 'Commonwealth Day' that delivered unprecedented access to state healthcare agencies, and offering strategic support and networking assistance. State leaders including Governor Charlie Baker, Housing & Economic Development Secretary Jay Ash, Speaker Robert A. DeLeo, Senate President Stanley C. Rosenberg, Senator Eileen Donoghue, and numerous representatives from the Executive Office of Health and Human Services all participated in PULSE@ programming in its first year. While PULSE@ is a global program, at the conclusion, 23 of the 31 companies were located in Massachusetts.

In June 2017, PULSE celebrated their first year by awarding the top participants in their first class with over \$200,000 in prizes. Over 600 members of the Mass Digital Health community, including Governor Charlie Baker, gathered at the Wilbur Theater to honor the first 31 participants in the PULSE@MassChallenge program. Before the awards were distributed, Governor Baker announced that PULSE@ MassChallenge would receive a second grant from MassTech of \$170,000 to provide support for a second program year, a testament to the program's early impact on the competitiveness of the Commonwealth's digital health industry.

Impact of PULSE@MassChallenge

FOUNDER BREAKDOWN

42%

FEMALE FOUNDED
STARTUPS

29%

OF STARTUPS WERE IN A
PREVIOUS MASSCHALLENGE
COHORT

EDUCATION OF COHORT

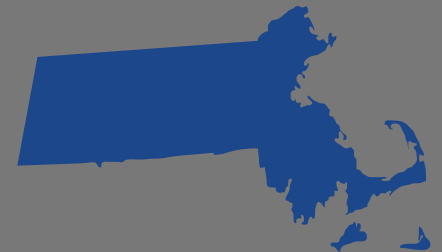
71% OF FOUNDERS
HAVE A MASTERS

35% OF FOUNDERS
HAVE AN MBA

16% OF FOUNDERS
ARE MDS

23% OF FOUNDERS
HAVE A PHD

LOCATION



23/31

BASED IN MA OR LOCATED
IN MA FOLLOWING
ACCEPTANCE TO PULSE

MassTech FY2017 Leadership Team

Timothy J. Connelly, Executive Director, Massachusetts Technology Collaborative
Philip F. Holahan, Deputy Executive Director and General Counsel, Massachusetts Technology Collaborative
Christopher Andrews, Chief Financial and Administrative Officer, Massachusetts Technology Collaborative
Patrick Larkin, Deputy Director, MassTech, and Director, Innovation Institute at MassTech
Maeghan Welford, Chief of Staff, Massachusetts Technology Collaborative
Ed Donnelly, Deputy Director, Massachusetts Broadband Institute at the Massachusetts Technology Collaborative
Laurance Stuntz, Director, the Massachusetts eHealth Institute at the Massachusetts Technology Collaborative

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***Designee: David Cedrone**, Associate Commissioner for Workforce Development, Strategy & Operations, Department of Higher Education, Commonwealth of Massachusetts

***Designee: Tye Brady**, Chief Technologist, Amazon Robotics

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*Denotes service for a portion of Fiscal Year 2017

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Deputy Director

Ed Donnelly, Massachusetts Broadband Institute

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DunkWorks at Woods Hole Oceanographic Institution, WHOI, supported by MassTech's \$5M R&D award to WHOI's Center for Marine Robotics. Photo Courtesy of WHOI.

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