MASSACHUSETTS STEM SUMMIT 2015

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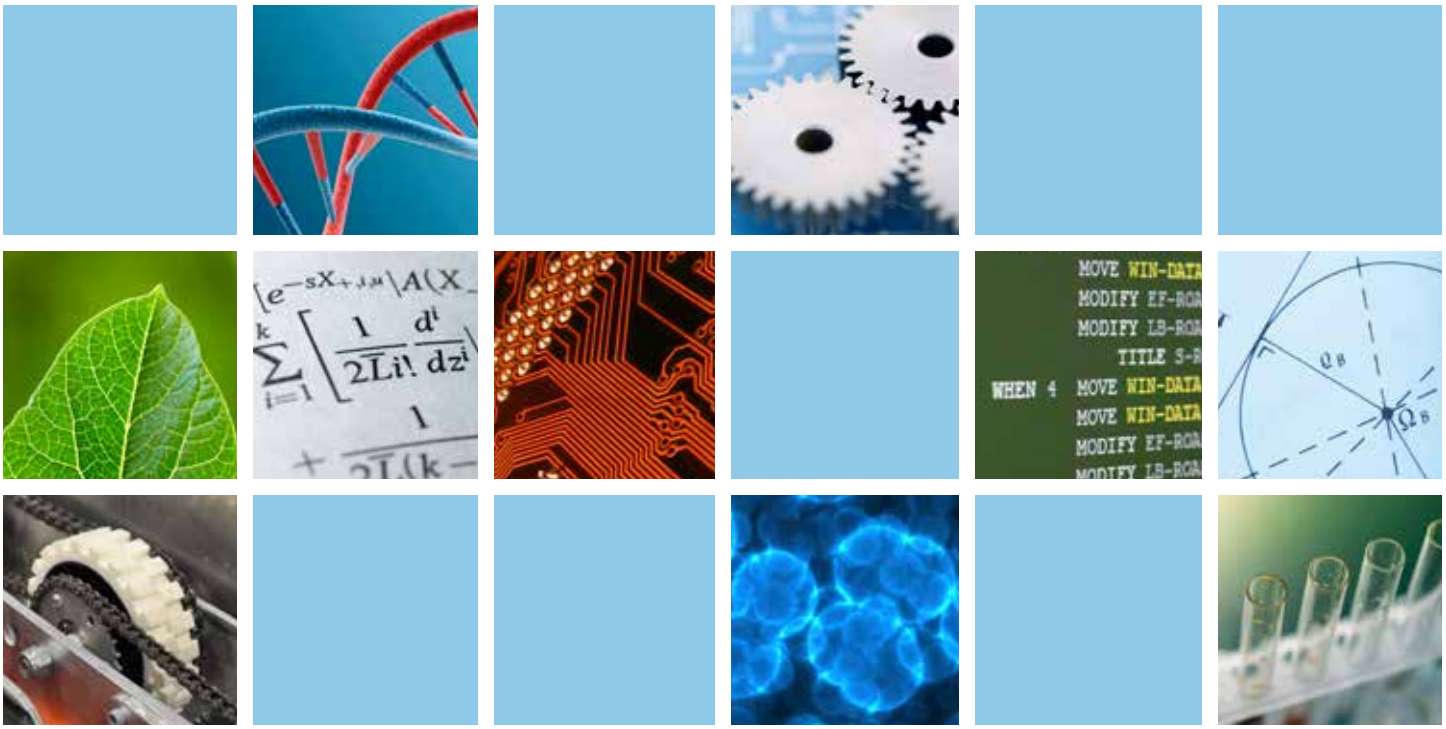

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Event Schedule

7:30am – 4:00pm Registration

7:30am – 9:30am Breakfast Buffet

8:00am – 4:00pm Exhibit Hall

8:45am – 9:30am Welcoming & Opening (Plenary Hall)

- **J. Lynn Griesemer**, Associate Vice-President, Economic Development, University of Massachusetts President's Office; Executive Director, UMass Donahue Institute

"A Student, a Teacher, and a Robot: The Story of Richbot 3000"

- **Heidi Riccio**, Principal/Director, Medford Vocational Technical High School
- **Hunter Raymond**, Student, Bunker Hill Community College
- **Richard Cormio**, Teacher, Medford Vocational Technical High School
- **Samuel Christy**, Teacher, Medford Vocational Technical High School

9:30am – 9:50am Break

9:50am – 11:00am AM Breakout I

- 10 Quick Wins for STEM Integration and Programming
- An Effective Professional Development Model for Training Science Teacher Leaders K-12
- Best Practice: Dennis-Yarmouth Regional High School Leading Global STEM Classroom™ Programs in MA
- Bridging the Gap Between Students and Employers: The NECC Laboratory Science Program
- Building Brains with Boxes!
- Building to STEM Plan 3.0: Beacons of Success and Leveraging National Connections
- Early Engagement and Growth for the STEM Professional
- Field Data is Awesome Data: How to Use Real Science to do Real Math
- Fusing STEM & Youth Development: A New Approach to Summer Learning
- Innovation in Biotechnology Education
- Proven Strategies in Fostering and Retaining STEM Students
- STEM in the Infant and Toddler Classroom
- Successful Models for Student Innovation and Entrepreneurship in High School
- Supporting the Rollout of the Revised MA STE Standards: A Partnership of Research and Practice
- The Effect of Mentoring: The Million Women Mentors Initiative

Event Schedule

11:00am – 11:20am Break

11:20am – 12:30pm AM Breakout II

- A Discussion with Massachusetts Education Commissioners: Statewide Programs that Support the STEM Plan
- Accept the Challenge: Design Meaningful Projects
- Breaking Down Barriers: Social and Cultural Contributors to Ensure STEM for All
- Developing Young Children's Numbersense and Mathematics Readiness through Sidewalk Math
- Exploring the Landscape of Engineering Education in Massachusetts
- Growing the STEM Workforce: Engaging Women & Underrepresented Minorities in Computer Science
- How Can the Arts Improve STEM Outcomes for Students?
- Impactful Teaching and Learning and Environmental Restoration through Citizen Science
- Integrating STEM Education Throughout a District or School
- Leveraging 2- and 4-Year Partnerships and Student Research to Foster Student Success in STEM
- Project-Based Learning + Real-World Manufacturing + Industry Mentors = Job-Driven STEM Education
- Science is Everywhere: In and Out of the Library
- STEM 2.0: Career Skills for a 21st Century STEM Worker
- STEM Education and Workforce in Northern New England: Report of the Councils
- What's the Flippin' Difference? The Implementation and Effectiveness of Flipped Learning

12:30pm – 1:15pm Luncheon Buffet

1:15pm – 2:15pm Luncheon Plenary (Plenary Hall)

- **Bryan Morry**, Executive Director, The Hall at Patriot Place presented by Raytheon
- **Kerri Murphy**, Oliver Ames High School, The Hall at Patriot Place 2015 Massachusetts STEM Teacher of the Year
- **Marty Meehan**, President, University of Massachusetts
- **Charlie Baker**, Governor, Commonwealth of Massachusetts

2:15pm – 2:35pm Break

2:35pm – 3:45pm PM Breakout

- A Conversation with Governor Baker's Workforce Skills Cabinet
- APPS FOR GOOD - Socially Responsible App Development in K-12 Curriculum
- Bringing Students into the Formative Assessment Process: Research Headlines, Resources and Tools
- Digital Resources for STEM Learning and Engagement: Young Children to Teens
- Engaging Elementary Education Majors in STEM: Investigations Impact Science Teaching Efficacy
- HS Engineering 4.0: Going from One Engineering Class to an Articulated 4-year Science/CVTE Program
- ITEST Projects in the Out of School Context: Diverse Practices to Reach Underrepresented Youth
- Local Nature and Young Children: A Natural Choice in Support of Learning
- Make a Joyful Noise: Young Children Explore Sound and Music
- Making STE(A)M: Integrating Project Based Learning and STEM Grades K-12
- STEM + M Partnerships
- Teaching Science to Learn Science
- Understanding the Middle School Science Fair Experience
- Where are the Middle Skill Jobs?
- Writing to Think: Using Notebook Writing to Guide Inquiry-Based Learning in Science

Plenary Speaker Bios

Governor Charlie Baker

Charlie Baker was inaugurated on January 8th, 2015 as the 72nd Governor of the Commonwealth of Massachusetts.

Elected in November of 2014 on a platform of making Massachusetts great for everyone, Governor Baker's arrival in the Corner Office continues a long, successful career in both the private sector and public service where he has worked hard to put the people of Massachusetts first.

Governor Baker is committed to making Massachusetts a truly great place to live, work, start a business and raise a family. As Governor, he has pledged to work toward a growing economy with family-sustaining jobs; ensure that schools across the Commonwealth provide opportunity for every child regardless of zip code; and make Beacon Hill a true partner with our local governments to create safer and thriving communities across Massachusetts.

Over the course of his career, Governor Baker has been a highly successful leader of complex organizations in business and in government. As a cabinet secretary under Governors William Weld and Paul Cellucci, Baker helped lead efforts to reform and modernize state government. During his time as Chief Executive Officer of Harvard Pilgrim Health Care, Baker turned a company on the brink of bankruptcy into the nation's highest ranked health care provider for six straight years.

As a member of the Weld and Cellucci Administrations in the 1990s, Baker helped turn a billion-dollar deficit into a surplus, create a half million jobs, and enact an ambitious education reform agenda. First asked to serve as Secretary of Health and Human Services in 1992, Baker led efforts to make Massachusetts' social service system more humane, cost-effective and responsive to the needs of the Commonwealth's residents. In 1994, Baker was appointed Secretary of Administration and Finance, overseeing a number of cost-saving reforms, modernizing state government and making it more efficient. Governor Baker was recognized for his leadership and innovation by the National Governors' Association in 1998 which rewarded him with the Distinguished Service Award.

As Chief Executive Officer of Harvard Pilgrim Health Care from 1999 to 2009, Baker led the company out of receivership to become the top healthcare plan in the country for member satisfaction and clinical effectiveness. During Baker's tenure, Harvard Pilgrim was named one of Boston Business Journal's "Best Places To Work" for seven years in a row.

Raised in Needham, Baker attended Massachusetts public schools and is a graduate of Harvard College. He went on to earn a Master's of Business Administration from the Kellogg Graduate School of Management at Northwestern University.

Governor Baker and his wife, Lauren, have been heavily involved in numerous civic and charitable endeavors. They live in Swampscott, and have three children: Charlie, AJ, and Caroline.

Samuel Christy

Samuel Christy began teaching at MVTHS in the Fall of 2014. Previously as co-owner of Machine Science, Sam worked with the youth of Boston and Cambridge promoting robotics and engineering for middle school students. After years of working with students as a part of his job, Sam decided to become a full time teacher. He is an active bicyclist and loves the outdoors. Sam resides in Cambridge with his wife and 3 children.

Richard Cormio

After a 30-year career working as an electrician, Rich returned to his alma mater, Medford Vocational Technical High School, to prepare future electricians for the workforce. Rich also teaches evening school for The Gould Construction Institute assisting third year electrical apprentices to prepare for their state licensure exam. Rich is a strong advocate for public school education, as evidenced by the fact that all three of his children graduated from Medford High School and two of them earned degrees from Framingham State University. A man who cherishes family time, Rich is married to the lovely Therese Cormio and they have one beautiful grandson, Tyler. Rich is a lifelong resident of Medford.

Lynn Griesemer

J. Lynn Griesemer, Ed.D., M.P.A. is the Associate Vice President for Economic Development at the University of Massachusetts and Executive Director of the UMass Donahue Institute. She is also an adjunct professor in the Public Policy and Administration program at UMass Amherst. Prior to joining the University, Dr. Griesemer was the Executive Director of the Northeast Regional Exchange, a seven-state, non-profit collaborative in education for New England and New York. At the University of Rhode Island, she also held a

faculty position and was the director of an education research and evaluation center.

Dr. Griesemer holds a bachelor's degree in mathematics from Cedar Crest College, a master's in mathematics education from the University of Tennessee, and a master's in public administration from the Kennedy School at Harvard University, where she was a Littauer Fellow. She received her doctorate in educational administration and curriculum from the University of Tennessee.

Since the formation of the University's five-campus system in 1991, Dr. Griesemer has worked closely with the UMass President's Office, managing several system-wide projects in economic development and related areas.

Marty Meehan

Martin T. Meehan, the 27th president of the University of Massachusetts, is the first undergraduate alumnus to lead the five-campus system. He was elected president after eight successful years as chancellor of the University of Massachusetts Lowell, where he led the campus on its rise to top-tier national university status, improving its performance in every sphere of activity.

President Meehan has an abiding belief in public higher education's power to transform lives, and believes that the University of Massachusetts drives social and economic progress in the Commonwealth.

A former member of Congress, President Meehan represented the 5th Congressional District of Massachusetts in the U.S. House of Representatives from 1993 to 2007. He also served as Massachusetts' deputy secretary of state for securities and corporations and was the first assistant district attorney of Middlesex County.

President Meehan graduated cum laude from UMass Lowell in 1978 with a degree in education and political science. He earned a master's degree in public administration from Suffolk University in 1981 and a juris doctor from Suffolk University Law School in 1986.

Bryan Morry

Bryan Morry rejoined The Kraft Group as Executive Director of The Hall at Patriot Place in 2007 during the venue's construction. He spent the previous two-plus years as the afternoon drive sports talk show host on the Score AM/FM in Providence, Rhode Island. He currently oversees all museum operations.

Before his radio stint, he was the editor of the Patriots official team newspaper, Patriots Football Weekly, from 1997-2005 where he covered the Patriots for the newspaper, Patriots.com and as part of the Patriots Football Weekly (PFW) television show. Bryan covered three Patriots Super Bowl victories for PFW and authored the coffee table book, *Patriots United — the New England Patriots World Championship Season*, following the surprising Super Bowl XXXVI win over the St. Louis Rams.

He is an officer of the board of directors of the International Sports Heritage Association (ISHA) as the secretary and chairs the group's communications committee while also serving on the MIAA's Endowment Committee.

Bryan graduated from Boston University in 1993 with a bachelor's of arts in journalism and has written for various local and national publications and websites.

Kerri Murphy

Kerri Murphy grew up in Abington and graduated from the University of Massachusetts Amherst with a bachelor's of science in operations engineering. She worked as a software and industrial engineer in various consulting and industry jobs for clients all over the U.S. Following in the footsteps of family members, she happily shifted to a career in education and coaching, and began teaching 8th grade Math in Milton. This is her sixteenth year teaching, currently at Oliver Ames High School in Easton.

Kerri was introduced to other STEM professionals at a STEM Advisory Board meeting at Raytheon's The Hall at Patriot Place and was influenced by Katherine Honey from the Southeastern STEM Network to pursue the creation of a STEM Education Team in Easton. In two years, the team has grown to 50+ members, including businesses, academia, government, parents, and recent alumni. The team, which now includes the 'A' for the Arts, capitalizes on their community connections to enhance academic performance and increase interest in STEAM fields, including a Pre-K to Grade 2 STEAM Family Night, sponsorship of five girls to attend the first Envision the Future Summer Program at Bridgewater State University, and sponsorship of the Science from Scientists program for all sixth graders in Easton. As Co-Chair of the STEAM Team, Kerri hosted a panel discussion at Oliver Ames in December with Congressman Joe Kennedy III and Marcy Reed, President of National Grid.

Ms. Murphy is passionate about her subject area and works to provide opportunities for her students to improve their understanding while applying it to situations outside of the classroom. Her students work in groups to collaborate and critique each other's work and are provided opportunities to preserve, reason, and problem solve with high order thinking tasks. She influences students in class and on the Math Team to participate in STEAM opportunities in the community and to learn more about STEAM majors and careers. Her goal is to develop connections with businesses and educators in the classroom for the benefit of the students and the growth of the U.S. economy.

Hunter Raymond

Hunter is a graduate of Medford Vocational Technical High School, Class of 2015. As a member of the Electrical department, he enrolled in a computer science elective, sponsored by TEALS, a Microsoft organization that bring computer science into high schools using software engineer mentors. It was a combination

of this class and his experience in the electrical technical area that sparked the idea of building the Richbot 3000.

Hunter is currently a student at Bunker Hill Community College, enrolled in the Computer/Gaming Simulation program and aspires to work in game development upon graduation. He lives in Medford with his mom, dad, and two sisters.

Heidi Riccio

Heidi Riccio is the Principal/Director of Medford Vocational Technical High School (MVTHS). She began her career in education in 1997 as a hospitality instructor at a vocational high school serving high needs populations. Since assuming leadership of MVTHS in 2013, Heidi has worked with her staff and the community on programs and initiatives to increase student access to learning in high tech fields such as robotics, engineering, biotechnology, and metal fabrication.

Heidi is currently pursuing a doctoral degree in Educational Leadership at Nova Southeastern University. She holds a master's of education from Fitchburg State University, a certificate of advanced graduate studies from Salem State University, and a certificate from the National Institute of School Leadership.

Heidi is married and a mother to three daughters, ages 12, 15, and 19. She resides in Salisbury, MA.

Breakout Sessions - AM Breakout I

10 Quick Wins for STEM Integration and Programming

Time: 9:50am – 11:00am
Room: Grand Ballroom Center
Strand: K-12 Ed

Nipmuc Regional High School leaders will provide attendees with the chance to learn 10 simple strategies to develop sustainable STEM programming and build a school-wide culture of STEM. Highlighting the steps taken by teachers and administrators at Nipmuc Regional High School, the session will demonstrate how all secondary schools can develop meaningful STEM programming that excites students, develop connections to the STEM community, provide opportunities to collaborate with colleges and universities, and partner students with STEM professionals. The audience will walk away from the session with 10 strategies that could be easily and inexpensively applied in schools of all sizes and characteristics.

SPEAKERS

John Clements, Principal, Nipmuc Regional High School
Mary Anne Moran, Associate Principal, Nipmuc Regional High School

An Effective Professional Development Model for Training Science Teacher Leaders K-12

Time: 9:50am – 11:00am
Room: Grand Ballroom South
Strand: K-12 Ed

In a new model of professional development, K-12 teachers across five school districts in the greater Boston area are working to become science teacher leaders. That is, reflective practitioners supporting their colleagues and enhancing science learning throughout their district. In year 1 of this two-year program, teachers examine best practices for science teaching, explore vertical articulation of curriculum, and develop a better understanding of the Science and Engineering Practices and NGSS at different grade levels. At the heart of the training is the sharing of videotaped lessons among teachers, who learn to observe colleagues' lessons, examine student work, and provide supportive feedback related to science content, practices, and pedagogy. Year 2 of the program is devoted to teachers taking on leadership roles in their districts that promote both their personal growth and district priorities, all while remaining in the classroom. During this session, program organizers will acquaint attendees with the model and the wide range of work that Fellows in the program are engaged in within their districts. Fellows will share their experiences in the program and share videotaped CCLS group sessions. Posters of projects conducted by year 2 Fellows will be available for viewing. K-12 classroom teachers and science administrators will all benefit from this presentation. Attendees will be given an opportunity to work together to discuss how elements of the program might be implemented in their own districts.

MODERATOR

Dianne Rees, Director of Science K-12, Braintree Public Schools

SPEAKERS

Arthur Eisenkraft, Director/COSMIC (Center for Science and Math in Context), UMass Boston
Laura Degelmann, Wipro SEF Fellow, Linden STEAM Academy, Malden Public Schools

Best Practice: Dennis-Yarmouth Regional High School Leading Global STEM Classroom™ Programs in MA

Time: 9:50am – 11:00am
Room: Meeting Room C
Strand: Digital Ed

Dennis-Yarmouth Regional High School (DYRHS) has been pioneering the innovative Global STEM Classroom™ collaboration program since 2011. The concept of the program was created by and implemented at DYRHS under the mentorship of Larisa Schelkin, the Founder and CEO of the Global STEM Education Center.

Every year, about 45 students in grades 8-10 participate in a variety of semester-long courses collaborating with students from different countries including England, France, Mexico, Norway, Russia, and Ukraine. In the session, DYRHS students will present their work done in the four courses: "My Blue Planet" course addresses the quality and availability of clean

drinking water around the globe; "The Space Exploration" course addresses scientific, technological, societal, and economic issues surrounding the near-Earth and deep space exploration and a possibility of establishing human settlements on other planets.; "The NASA's GRACE satellites and the Climate Change" course is dedicated to the Gravity Recovery and Climate Experiment (GRACE) program that allows precise observations of ice sheets and climate change from space.; "Nanotechnology" course focuses of the revolutionary technology of super-small particles and its application in electronics, renewable energy, and medicine.

The session will be a discussion of the program goals, methods, and results provided from the perspective of a teacher, an administrator, the program founder, and students who will share their authentic experiences in this unique and innovative program.

SPEAKERS

Julia Sigalovsky, Ph. D., Teacher, Dennis-Yarmouth Regional High School
Kenneth Jenks, Principal, Dennis-Yarmouth Regional High School
Larisa Schelkin, CEO & Founder, Global STEM Education Center, Inc
Amelia Rubin, 11th Grade, Dennis Yarmouth Regional High School
Alyssa Melendez, 11th Grade, Dennis-Yarmouth Regional High School
Jaida Lawrence, 9th Grade, Dennis Yarmouth Regional High School
Hennel Naquines, 10th Grade, Dennis-Yarmouth Regional High School
Harsh Patel, 10th Grade, Dennis-Yarmouth Regional High School
Sawer Adamaitis, 10th Grade, Dennis-Yarmouth Regional High School
Paula DeZouza, 12th Grade, Dennis-Yarmouth Regional High School
Drew Weinert, 10th Grade, Dennis-Yarmouth Regional High School

Bridging the Gap Between Students and Employers: The NECC Laboratory Science Program

Time: 9:50am – 11:00am
Room: Conference Room 210A
Strand: Higher Ed - 2-year

This session will provide an analysis of the strengths and challenges faced by the Laboratory Science Program at Northern Essex Community College. This program was developed as an alternative educational pathway for students interested in a shorter path to a career in the sciences. Curriculum was developed in close alignment with industry requirements for entry level lab technician skills. In particular, a mandatory externship requirement helps students bridge the gap between the classroom and the industry lab. As part of this session, the results of five years of student evaluations by industry externship supervisors will be presented as evidence of the effectiveness of the program curriculum and externship in preparing students for entry level work as laboratory technicians in regional industry. A discussion of currently tested strategies for recruitment will also be presented.

MODERATOR

Marguerite White-Jeanneau, Associate Professor and Laboratory Science Program Coordinator, Northern Essex Community College

SPEAKERS

Kimberly Waligora, Associate Professor, Northern Essex Community College
Kevin Mitchell, Associate Professor, Northern Essex Community College
Mike Cross, Associate Professor, Northern Essex Community College
Noemi Custodia-Lora, Executive Director of Lawrence Campus & Community Relations, Northern Essex Community College

Building Brains with Boxes!

Time: 9:50am – 11:00am
Room: Showcase Corner
Strand: Early Ed

Join us to investigate how to support young children's developing STEM skills using all kinds of boxes! Participants will explore how children's learning is grounded in hands-on experiences and gain understanding of how to engage children's curiosity through the use of inquiry science methods. Discussion of what STEM means in early childhood and the Massachusetts Science and Technology/Engineering Standards will be included. Much of the session will be devoted to playing with boxes and investigating how creative project-based experiences align with Massachusetts standards and guidelines, as well as Teaching Strategies GOLD Objectives for Development and Learning. Adaptations for mixed ages and different learning styles will also be discussed. Participants will receive a list of resources and useful handouts.

SPEAKERS

Joanna Doyle, Director of Training and Education, Clarendon Early Education Services, Inc.
Rosalina Pinto, All System Director, Clarendon Early Education Services, Inc.

Building to STEM Plan 3.0: Beacons of Success and Leveraging National Connections

Time: 9:50am – 11:00am
Room: Junior Ballroom
Strand: Policy

STEM Plan 3.0 is scheduled to be released at the 2016 STEM Summit. In preparation for this next revision, the STEM Council invites members of the STEM Community to participate in small group discussions to discuss how STEM Plan 2.0 has impacted the Pipeline, point to areas of local and statewide success in moving these goals forward, and connections to national STEM Plans and

agenda to leverage resources and opportunities. Participants in this session will engage in small group discussions that will be led by 6-sigma-like trained facilitators.

MODERATOR

Janet Nicholas, Director, Marketing Strategy and Planning, Dassault Systemes

SPEAKERS

Al Bunshaft, President and CEO, Dassault Systemes Government Solutions
Allison Scheff Little, Executive Director of STEM, MA Department of Higher Education

Early Engagement and Growth for the STEM Professional

Time: 9:50am – 11:00am
Room: Conference Room 210B
Strand: Career Awareness/Workforce Development

With a recovering economy, the market for STEM employees is becoming increasingly competitive and supply is often not able to meet demand. The challenge of attracting and maintaining potential talented employees can be more difficult in some geographic locations. This session discusses the multiple initiatives that General Dynamics Mission Systems has taken to attract and retain employees in the Berkshires of western Massachusetts.

This session will describe how General Dynamics collaborated with other local companies to engage talent through a county-wide internship program that allows interns an opportunity to learn about other companies within the county, participate in social and cultural activities as well as professional development activities in the region and to network with potential colleagues. Additionally, the company has introduced several programs that inspire interest in STEM at an early age including Annual High School Robotics Competition, Shadow Day/Facility Tours, After School Engineering Program, and DIGITS program.

General Dynamics believes that programs and opportunities that engage students' interest throughout their education and as they enter the workforce is an effective approach for recruiting young employees. Providing tools and mentoring programs for career development assists in retaining and growing the skills of that workforce. This session is an opportunity to share these processes and solicit best practices from other STEM professionals.

SPEAKERS

Beth Mitchell, Director of Engineering, General Dynamics Mission Systems
Brenda Burdick, Sr. Manager, Marketing and Public Relations, General Dynamics Mission Systems

Field Data is Awesome Data: How to Use Real Science to do Real Math

Time: 9:50am – 11:00am
Room: Meeting Room E
Strand: K-12 Ed

How can we make data more exciting for students (and ourselves)? By having them collect it themselves, as part of authentic citizen science projects! By connecting field-based data collection to in-class data analysis, students make the connection between all those points on a graph and the soil, water, trees, or bugs they just felt, saw, and explored. The data itself becomes more meaningful so the data analysis becomes more worthwhile. Instead of seeing graphing or analysis as a dry exercise, students begin to develop an understanding that data can tell us a story. If the data they collect is part of a larger conservation effort, students are often even more motivated to participate. This session will use programs developed by Mass Audubon as an example of how to engage students in real-world data collection, followed by real-world data analysis.

MODERATOR

Jennifer Feller, Education Manager, Drumlin Farm, Mass Audubon

SPEAKERS

Kris Scopinich, Director of Education, Mass Audubon
Adrienne Lennon, Teacher Naturalist, Joppa Flats Wildlife Sanctuary, Mass Audubon

Fusing STEM & Youth Development: A New Approach to Summer Learning

Time: 9:50am – 11:00am
Room: Meeting Room D
Strand: Out-of-School Time

Learn how Boston After School & Beyond and the Providence After School Alliance use targeted professional development to support collaborative teaching between STEM-focused community educators and middle school teachers within their summer learning programs. Bridging the gap between formal and informal education, both programs focus on integrating Next Generation Science Standards' science & engineering practices in order to promote overall program quality and social-emotional learning outcomes. Participants will gain a deeper understanding of the benefits and challenges of this model, explore strategies for optimizing results, and have an opportunity to ask participating educators about their experiences.

SPEAKERS

Ellen Dickenson, Program Director, Partnerships & STEM, Boston After School & Beyond
Ann Durham, Director of Quality Initiatives, Providence After School Alliance

Lydia Emmons, Director of College & Career Pathways, Sociedad Latina
Renee DiPippo, Outreach Specialist, Biomes Marine Biology Center

Innovation in Biotechnology Education

Time: 9:50am – 11:00am
Room: Junior Ballroom Prefunction
Strand: K-12 Ed

This session will discuss high school biotechnology education with educators and representatives of foundations, industry, and government. Brockton High School has developed an innovative, four-year non-vocational biotechnology pathway. Innovative teaching methods are used to increase literacy and cutting edge research tools are used to promote math skills and critical thinking.

The biotechnology pathway was designed to help students learn in a horizontally and vertically integrated thematic pathway. Toward that goal, ethical, social and political issues are weaved into the students' scientific explorations. Technical report writing, lab notebooks, lab reports, web-based student portfolios, and literary analysis are all methods used to enhance literacy skills.

We are transforming the qualitative approach to life sciences to one that is more quantitative. We will do this through our expanded use of digital probeware, reporter assays, bioinformatics and quantitative PCR. To the extent that we know, this will be the first time qPCR will be routinely utilized as a hands-on teaching tool in a high school classroom. This work will help our students enter post-secondary education and the workforce with greater mathematical reasoning, scientific practices, and content expertise.

MODERATOR

Jonathan Shapiro, Science Department Head, Brockton High School

SPEAKERS

David Mangus, Biotechnology Teacher, Brockton High School
Andy Martin, Program Coordinator, Youth CareerConnect, Brockton Area WIB
Nicole Otero, Biotechnology Teacher, Brockton High School

Proven Strategies in Fostering and Retaining STEM Students

Time: 9:50am – 11:00am
Room: Grand Ballroom North
Strand: Higher Ed - 4-year

In an ideal world, every undergraduate majoring in STEM would, in addition to their formal course load, engage in research, have a strong network of formal and informal mentors and advisors, volunteer for a variety of STEM outreach activities, and participate in a rich offering of STEM-related social events. The positive impact of these opportunities has well documented impacts on retention for STEM students in general and for underrepresented minority students in particular. This panel presentation will introduce successful model programs that provide such opportunities fostering engagement and improving retention of students in STEM.

Following the panel presentation, participants will engage with the stakeholders reflecting on the programs, their impact, and strategies for implementation and assessment.

The programs featured include:

- Wentworth Institute of Technology's RAMP precollege summer bridge program which familiarizes students with a college learning environment and forms a cohort of classmates from similar backgrounds providing a foundation of support for transition to campus in the fall.
- Holy Cross will share four interventions that have promoted persistence including a pre-college bridge program, a first-year research program, peer assisted learning in chemistry, and an extended-time course in calculus.
- UMass Boston will discuss the creation of the Student Success Center and the implementation of the Freshman Success Community, which have a tremendous impact on retention and achievement, especially for underrepresented minority students.
- UMass Amherst's STEM Ambassadors Program is a novel hierarchical mentoring program that provides students with formal and informal advising and mentoring opportunities along with a diverse suite of retention activities and events.

MODERATOR

Renee White, Dean of the College of Arts and Sciences, Simmons College

SPEAKERS

Arielle Arsenault-Benoit, Interim Director, STEM Ambassadors Program, UMass Amherst
Felicia Edwards, Associate Director, Student Success Center, UMass Boston
Erik Miller, Director, Center for Community and Learning Partnerships, Wentworth Institute of Technology
Kenneth Mills, Professor of Chemistry, College of the Holy Cross

STEM in the Infant and Toddler Classroom

Time: 9:50am – 11:00am
Room: Meeting Room B
Strand: Early Ed

This training is geared toward teachers who are looking to expand their current STEM offerings, as well as those who are interested in starting to bring STEM concepts to their younger children. The key concepts to be addressed are what does STEM encompass,

what does it look like with infants and toddlers, and how do you make it meaningful. We will discuss each branch and its role in the classroom. For example, technology is not just computers and iPads. It includes all of the tools that children use to explore their world, such as hand lenses, bug nets, pipettes, and tongs to name a few. Educators will participate in hands-on activities that include infant/toddler-safe recipes for sensory exploration and engineering concepts like block play, ramps, and pulleys. Participants will also examine children's literature to discover key STEM concepts within the story and how to transform those concepts into investigations. Participants will have opportunities to view videos and photos of infants and toddlers engaging in STEM. The organizing framework of Engage, Explore, and Reflect will also be discussed. There will be time for discussions as a large group, as well as some small group work. Participants will walk away with concrete activities to take back to their classrooms. Participants will also gain a deeper understanding of the ways in which they can incorporate STEM practices into their classroom with any age group but specifically with infants and toddlers.

SPEAKERS

Keira Durrett, Director, The Williston Northampton Children's Center
Charlene Cross, Toddler Teacher, The Williston Northampton Children's Center

Successful Models for Student Innovation and Entrepreneurship in High School

Time: 9:50am – 11:00am
Room: Meeting Room A
Strand: Innovation & Entrepreneurship

An individual's ability to innovate and act entrepreneurially is often the catalyst that drives enormous gains for society and cuts across all industries. Instilling these skills and attributes in high school students is critical to their future success and necessary to help solve current global challenges. This session presents two complementary and successful models: a classroom curriculum and an online collaboration. Attendees can share ideas and explore how these models and their rubrics may be leveraged to inspire the next generation of entrepreneurs and innovators.

At Georgetown High School in Massachusetts, innovation is critical to a required 9th grade course where students identify a problem and invent a product or service to solve the problem. Students design prototypes and then apply concepts of entrepreneurship to create a business plan to launch their product/service. Students gain feedback through online blogs and make video "infomercials" about their inventions for an end-of-course showcase.

Project Lead the Way's web-based "Innovation Portal" enables students, teachers, and mentors to build and collaborate on problem-solving projects, and then connect with opportunities offered by universities, businesses, and industry. This secure portal is available at no charge. Students upload information and invite others to comment on their work. The Portal includes a portfolio template, scored examples, and a research-based rubric. All are organized around a design process that opens participation to anyone and any project topic.

Join us as we explore how these two programs can engage your high school students in designing and implementing innovative solutions to real-world problems.

MODERATOR

Cora Beth Abel, President & CEO, MA State Science & Engineering Fair

SPEAKERS

Julie DeRoche, Director of Curriculum and Instruction, Georgetown Public Schools
Mark Schroll, Senior Director of Strategic Partnerships, Project Lead The Way

Supporting the Rollout of the Revised MA STE Standards: A Partnership of Research and Practice

Time: 9:50am – 11:00am
Room: Plenary Hall
Strand: Research & Practice

This is a critical time in K-12 science education, as the MA Department of Elementary and Secondary Education (ESE) moves forward with the adoption of the revised MA Science and Technology/Engineering (STE) standards. Districts and schools will be working to adjust programs and curriculum to reflect key changes in student expectations, particularly in regard to the inclusion of science and engineering practices, a focus on college and career readiness, and coherent progressions of learning across years. To support districts during this transition, ESE is bringing together a number of partners to support districts in developing implementation plans, sharing resources and curriculum that results in student learning called for in the revised STE standards. This panel discussion is targeted at K-12 educators, administrators, and policymakers, and aims to inform conversation about the rollout, adoption, and implementation of the revised MA STE standards. Panel members, including representatives from WGBH, the Museum of Science, Boston, and district leadership, will discuss strategies and initiatives already underway, how that is coordinated with ESE and other stakeholders, and what will be needed in future years.

MODERATOR

Rachel Connolly, Director of STEM Education, WGBH/PBS LearningMedia

SPEAKERS

Michael Fredette, Principal, East Longmeadow Public Schools
Lesley Kennedy, Manager, Teacher Professional Development, Museum of Science, Boston
Jacob Foster, Acting Director, STEM, MA Department of Elementary and Secondary Education
Clara Cahill, Senior Research Associate, Museum of Science, Boston

AM BREAKOUT I

The Effect of Mentoring: The Million Women Mentors Initiative

Time: 9:50am – 11:00am
Room: Grand Ballroom Prefunction
Strand: Career Awareness/Workforce Development

While women comprise 50% of the U.S. workforce, just 24% are in STEM fields, a statistic that has held constant for nearly the last decade. Statistics show that early access to mentors has a profound effect on the recruitment and retention of young girls and women in STEM fields. Million Women Mentors®, an initiative of STEMconnector®, is a national movement which supports the engagement of one million STEM mentors (male and female) to increase the number of girls and women from school age to work age continuum to persist and succeed in STEM programs and careers by the year 2018. By providing a central repository of mentors and girls serving STEM organizations, as well as extensive materials with strategies for successful mentoring, the hope is that all girls and young women interested in STEM will have access to the support and guidance needed to persist in science.

SPEAKERS

Jennifer Roecklein-Canfield, Team Lead, Southern New England Girls Collaborative Project
Sheila Boyington, President, Thinking Media; National Senior Advisor-STEMconnector®/Million Women Mentors®

Breakout Sessions - AM Breakout II

A Discussion with Massachusetts Education Commissioners: Statewide Programs that Support the STEM Plan

Time: 11:20am – 12:30pm
Room: Plenary Hall
Strand: Policy

The Commissioners will discuss programs underway that address the five goals of the Massachusetts STEM Plan: Increase student interest in STEM; Increase achievement among all Pre-K-12 students in order to prepare graduates to be civically and college and/or career ready; Increase the percentage of skilled educators who teach Pre-K-16 STEM; Increase the percent of students completing post-secondary degrees or certificates in STEM; STEM degrees and certificate attainment will be aligned with corresponding opportunity in STEM-related fields to match the state's workforce needs for a STEM talent pipeline.

MODERATOR

Laurie Leshin, President, Worcester Polytechnic Institute

SPEAKERS

Mitchell Chester, Commissioner of Elementary and Secondary Education
Carlos Santiago, Commissioner of Higher Education

Accept the Challenge: Design Meaningful Projects

Time: 11:20am – 12:30pm
Room: Grand Ballroom Center
Strand: K-12 Ed

Implementing an entire project-based learning unit that aligns with the curriculum frameworks can seem like a daunting task. How can you effectively and authentically bring STEM Problem-Based Learning (PBL) into your classroom? How can you simultaneously meet all the requirements for state testing? Experience an entire PBL unit from start to finish through a student lens: brainstorm, research, develop, and produce an alternative energy solution that connects to the "internet of things". In this session, you will learn how to structure an engaging interdisciplinary STEM project that can be easily adapted to your classroom curriculum. Walk away with documents, strategies and best practices that can be implemented immediately.

SPEAKERS

Heather Kohn, Math Teacher, Marlborough Public Schools
Paul Ciavola, English Teacher, Marlborough Public Schools
Sheldon Vigeant, Social Studies Teacher, Marlborough Public Schools
Scott Brown, Science Teacher, Marlborough Public Schools
Joanne D'Agostino, Engineering Teacher, Marlborough Public Schools

Breaking Down Barriers: Social and Cultural Contributors to Ensure STEM for All

Time: 11:20am – 12:30pm
Room: Junior Ballroom
Strand: K-12 Ed

Role models, hands-on projects, real-world applications. We know what it takes to create engaging STEM programming. Or do we? Why does the Commonwealth still face challenges reaching diverse populations and increasing their interest and achievement? How do we need to work together to support our students as STEM learners and as whole persons?

In this interactive and dynamic workshop, several case studies, addressing areas such as hip hop ed/youth culture, citizen science, culturally appropriate training for role models, will stimulate discussion and scrutiny of strategies that address social and cultural barriers in STEM for middle and high school students, particularly those in underserved and underrepresented populations. Participants will work in small thematic groups and then share out with the larger group. A Google document of all ideas will be created and shared with all participants.

We anticipate that strategies for inclusion will be applicable to the entire STEM learning ecosystem, from students in lower grades and those entering college, and to the out-of-school community. We welcome participation and contributions from anyone looking to make a real difference in STEM learning for underserved populations. Be prepared to learn, to share success or challenges, to confront implicit bias, and to create community between educators, industry practitioners, and students.

AM BREAKOUT II

Case studies will be made available on the Summit website via a link prior to the conference.

SPEAKERS

Tracy Callahan, Community Lab Director, Biogen
Connie Chow, Board member, Massachusetts Academy of Sciences

Developing Young Children's Numbersense and Mathematics Readiness through Sidewalk Math

Time: 11:20am – 12:30pm
Room: Showcase Corner
Strand: Early Ed

"Studies find that the mathematics knowledge acquired in early childhood and early elementary grades is a critical foundation for long-term student success." (The National Governors Association Paper, 2014)

Recognizing the importance of supporting teachers and caregivers in developing number sense and mathematics readiness for all children, a partnership of community members collaborated school leaders to bring Sidewalk Math to young children in their community. Sidewalk Math is designed to engage young children in learning mathematical patterns by walking, hopping, jumping, and skipping through colorful designs painted on sidewalks, school hallways, and playgrounds. Sidewalk Math has been collaboratively designed by mathematics educators to build critical number sense skills in young children, by designers to engage children in kinesthetic learning, and by early childhood educators to ensure caregivers feel confident in practicing counting and patternmaking with children.

In this workshop we will engage participants in interacting with the Sidewalk Math patterns; examine the "We Count" teaching resources designed for teachers and caregivers to engage their children with the patterns; explore the variety of educational resources found in "The Footbook: Steps to Developing Numbersense in Young Children" that accompanies Sidewalk Math; and identify strategies for developing partnerships to bring Sidewalk Math to their community.

The design team of mathematics educators, university faculty, and school leaders who created Sidewalk Math will lead this workshop. This will ensure that all participants have the opportunity to explore these resources with colleagues able to support them in considering how to bring this project back to their own community.

SPEAKERS

Martha Barry McKenna, University Professor & Director of the Creativity Commons, Lesley University
Siobhan Dennis, Principal, Columbus Park Preparatory Academy, Worcester
Art Bardige, Mathematician & Educator, CEO, Sustainablearning
Yvonne Liu-Constant, Assistant Professor, Lesley University
Lisa Carignan, Instructional Coach, Columbus Park Preparatory Academy, Worcester

Exploring the Landscape of Engineering Education in Massachusetts

Time: 11:20am – 12:30pm
Room: Meeting Room B
Strand: Research & Practice

The NSF-funded project entitled Massachusetts Engineering Innovation and Dissemination Community (MEIDC) is conducting an analysis of K-12 engineering education in the greater Boston area to understand 1) the types and levels of connections and collaborations–past and current; 2) the types and levels of resources that have been committed and are available; and 3) key issues. This session offers attendees the chance to hear about the data the presenters have gathered with respect to these topics (copies of the report will be provided), and for attendees to share how they are approaching engineering education, what challenges and opportunities they face, and the types of collaborations that would help them move forward more effectively with their efforts.

This session is recommended for those interested in and contributing to engineering education in K-12 formal and informal education environments, including but not limited to researchers, industry and IHE outreach programs, educators and administrators, non-profit support providers, and policy-makers.

SPEAKERS

Darryl N. Williams, Research Associate Professor, Tufts University
Catherine McCulloch, Project Director, Education Development Center, Inc.
Tracy McMahon, Research Associate, Education Development Center, Inc.

Growing the STEM Workforce: Engaging Women & Underrepresented Minorities in Computer Science

Time: 11:20am – 12:30pm
Room: Meeting Room D
Strand: Digital Ed

Computer Science is one of the most rewarding and challenging undergraduate degrees a college student can earn. Yet, only 0.7% of college students graduate from American colleges with a Computer Science degree each year when the technology industry demand is so high. Recent statistics about the low number of women and underrepresented minority employees in many of the large technology companies further stress the opportunity to build a diverse workforce by introducing a more diverse set of students to computer science.

AM BREAKOUT II

In this panel, hear from community leaders about programs in Massachusetts that are exploring ways to engage young women and a more diverse set of students to learn to code.

MODERATOR

Aimee Sprung, Microsoft

SPEAKERS

Milton Irving, Executive Director, Timothy Smith Network
David Delmar, Founder, Resilient Coders
Lonsdale Koester, Executive Director, Science Club for Girls

How Can the Arts Improve STEM Outcomes for Students?

Time: 11:20am – 12:30pm
Room: Grand Ballroom South
Strand: K-12 Ed

This session will address many questions about how adding arts to STEM learning can help educators meet the goals of the Massachusetts STEM Plan 2.0 by increasing engagement, mastery, and aspirations. After a short introductory film, participants will experience integrated learning firsthand as they move through interactive demonstrations of field-tested projects where the arts are integrated into STEM learning. Each project shows how students were challenged to use their STEM knowledge in creating visual and performing arts pieces. These will be examples from residencies implemented by Flying Cloud Institute in lower elementary, middle, and high schools in Berkshire County including robotics, ceramic chemistry, cyanotype photography, dance, theater, and 2-D design. Demonstrations will be facilitated by specialists from Flying Cloud Institute and representatives from the participating schools: administrators, classroom teachers, art teachers, science teachers, and students. They will share their experiences in securing funding; aligning projects with state standards and school curricula; managing classroom time and materials; and the outcomes achieved for all learners. Participants are encouraged to ask questions of the facilitators and share their own experiences.

SPEAKERS

Jane S. Burke, Founding Director, Flying Cloud Institute
Kristen Sparhawk, SMArt Education Director, Flying Cloud Institute
Alexandra Benton, Art Teacher, Muddy Brook Elementary School
Mary Berle, Principal, Muddy Brook Elementary School
Sarah DiFazio, Classroom teacher, Muddy Brook Elementary School
Diane Daily, Creative Youth Development Programs Manager, Massachusetts Cultural Council
Stephanie Graham, Art teacher, Southern Berkshire Regional Schools
Lindsey Berkowitz, Engineering Educator, Flying Cloud Institute
Dale Abrams, Director of Science Education in the Schools, Flying Cloud Institute

Impactful Teaching and Learning and Environmental Restoration through Citizen Science

Time: 11:20am – 12:30pm
Room: Conference Room 210A
Strand: Innovation & Entrepreneurship

From the White House, across the nation and back, learn directly from Green Schools and our National Green Schools Society Student Leaders how to develop the next generation of environmentally innovative students and schools through Best E-STEM (Environment + STEM) Practices, project-based learning, leadership, and action. Green Schools has been invited to participate and strategize in Climate Literacy and E-STEM conversation with our nation's top thought leaders ranging from President Obama, Vice President Biden, U.S. Dept. of Education Secretary Duncan, U.S. Dept. of Agriculture Secretary Tom Vilsack, and Dr. Greene with a common goal to create a healthier, more sustainable and innovative future for people and planet through solutions that work!

Additionally, the STEM-C Curriculum and Community Enterprise for New York Harbor Restoration in New York City Public schools consists of five district resource pillars that when combined in practice will foster direct collaboration between teachers and STEM-C professionals, innovative methods for teaching in schools, afterschool curriculum, and aquarium-based programming, Ultimately, it is expandable to restoration, environmental research, and sustainability projects in national/international communities, creating extremely broad impacts on mainstream science pedagogy. The program exclusively engages public schools in neighborhoods with persistent poverty and low socio-economic indicators. The model demonstrates that physically engaged, field-based, authentic scientific research can provide systematic inequities to equalize learning for student groups currently under-represented in the STEM-C professions. The partners' extensive pedagogical experience and existing literature indicate that STEM-C teaching and learning is greatly enhanced when students practice authentic science inquiry, field research, and socially beneficial conservation.

SPEAKERS

Hannah Traggis, Director of Students & Schools, Green Schools
Robin Organ, Executive Director, Green Schools
Lauren Birney, Assistant Professor of STEM Education, Pace University
Jonathan Hill, Dean, The Seidenberg School of Computer Science and Information Systems, Pace University

Integrating STEM Education Throughout a District or School

Time: 11:20am – 12:30pm
Room: Grand Ballroom North
Strand: K-12 Ed

In order to prepare students for the future jobs that may not even exist today, students need to have strong skills and understandings of STEM concepts. The U.S. Department of Commerce estimates that jobs in STEM fields will grow 17 percent by 2018 — nearly double the growth for non-STEM fields. By 2018, the U.S. will have more than 1.2 million unfilled STEM jobs because there will not be enough qualified workers to fill them. STEM is where jobs are today and where job growth will be in the future.

Anticipating this need, the Hudson and Medway Public School Districts and Saint Peter-Marian Central Catholic Junior/Senior High School implemented integrated STEM educational programs. During this session a panel of district representatives will discuss how the STEM programs were initiated at the schools, what professional development was provided to the teachers, and strategies to build community support for the new programs. Data on student performance and outcomes will also be presented.

Audience participation and discussion are encouraged during the session so all can learn from each other's experiences.

SPEAKERS

Ellen Schuck, Director of Technology, Hudson Public Schools
Armand Pires, Interim Superintendent, Medway Public Schools
Jennifer Vear, Teacher, St. Peter-Marian Central Catholic Jr./Sr. High School

Leveraging 2- and 4-Year Partnerships and Student Research to Foster Student Success in STEM

Time: 11:20am – 12:30pm
Room: Conference Room 210B
Strand: Higher Ed - 2-year

At the national level, community colleges are powerful forces for transforming the scientific workforce because most college students from diverse backgrounds begin higher education there. Hundreds of thousands plan to transfer to 4-year institutions to earn a bachelor's degree in a science-related field, but more work is needed to strengthen 2- and 4-year collaborations. The Stonehill College-Massasoit Community College (MCC) Science Transfer Initiative (STI) has the overall objective to create "purposeful interactions" between faculty and students that are critical to attract, retain, and graduate STEM students. This program provides early research experiences shown to increase retention in STEM and overall student outcomes. Although the benefits of early research are well established, most students do not have access to these types of opportunities while at the community college and upon transfer find it hard to compete for limited research positions.

The STI program aims to remove these barriers by providing research internships for: 1) high-school students the summer before they start at MCC through the STEM Start Academy; 2) first and second year MCC students in the Liberal Arts Transfer-Science program who intend to transfer to a four-year school in the sciences; and 3) MCC-Stonehill transfers the summer before they transfer. This multi-year program is meant to prepare students for intensive lab work and allow them to develop relationships with faculty and student mentors. During this session, ways to forge sustainable partnerships with four-year institutions, the adaptation of MCC's research program, funding opportunities and outcomes of student participants will be discussed.

SPEAKERS

Rachel Hirst, Assistant Professor of Biology, Stonehill College
Michael Bankson, STEM Coordinator and Adjunct Biology Faculty, Massasoit Community College

Project-Based Learning + Real-World Manufacturing + Industry Mentors = Job-Driven STEM Education

Time: 11:20am – 12:30pm
Room: Meeting Room A
Strand: Career Awareness/Workforce Development

The attainment of critical thinking skills through project-based learning is at the heart of STEM education. Then add the opportunities for students to immerse themselves into the manufacturing process and learning real-world technical skills from industry mentors. Put those three components together and it becomes a job-driven STEM educational program called the National Robotics League (NRL). The NRL highlights the importance of partnership models between educators and businesses in creating project-based learning opportunities that apply real-world manufacturing problems to solve. Closing the large and growing skills gap in the US will provide our youth with innumerable job opportunities, and employers with the talent they so desperately need to have sustained success. We will present a model that will highlight how successful partnerships between high school educators and manufacturers have paved the way for fun, applied learning opportunities for students. Our business/industry partners, post-secondary partners, community leaders, parents, administrators and students have, and will continue, to play an important role in our success as we build a STEM career pipeline for our students.

MODERATOR

Steve Tamasi, CEO, Boston Centerless

SPEAKERS

David Petty, STEM Coordinator, Winchester High School
Cindy Zylkuski-Norris, Administrator, Boston Tooling & Machining Association

Joanna Dowling, President, The Custom Group Center for Manufacturing Technology
Sarah Brooks, NRL Program Manager, National Tool and Machining Association

Science is Everywhere: In and Out of the Library

Time: 11:20am – 12:30pm
Room: Grand Ballroom Prefunction
Strand: Out-of-School Time

Across the Commonwealth when school closes for the day, children arrive at the public library to participate in a wide range of STEM-specific topics and programs. For the past seven years, selected Massachusetts libraries have been offering special after-school programs to engage elementary and middle school children in enrichment opportunities around a range of science and math topics. While based in libraries, these programs have successfully collaborated with a broad range of community organizations including schools, museums, science and nature centers, boys and girls clubs, parks and recreational facilities, local business, and institutions of higher education.

SPEAKERS

Shelley Quezada, Educational Consultant, Massachusetts Board of Library Commissioners
Jill Graboski, Assistant Director, Newton Free Library
Bernadette Rivard, Director, Bellingham Public Library
Cate Merlin, Teen & Special Projects Librarian, Peabody Institute Library
Kathy Moran-Wallace, Head of Children's Services, Nevins Library, Methuen
Robert Carter, Children's Librarian, Winchester Public Library

STEM 2.0: Career Skills for a 21st Century STEM Worker

Time: 11:20am – 12:30pm
Room: Meeting Room E
Strand: Career Awareness/Workforce Development

The STEM Innovation Task Force (SITF) is comprised of 36 industry, government, education, and non-profit leaders. Members include companies such as Cisco, Cognizant, Deloitte, Dow, Dassault Systemes, KPMG, PepsiCo, PTC, Sodexo, Tata Consultancy Services, Walmart as well as leading educators and governmental organizations. The SITF has a grand vision of "Accelerating sustainable STEM careers and wealth through innovation science and excellence in tomorrow's new economy." The task force will accomplish their agenda of developing STEM human capital through a number of high powered working groups that focus on certain priority areas of STEM innovation, including the STEM Career Accelerator Day, STEM 2.0, collaboration with the Million Women Mentors® program, the STEM Higher Ed Council, and others.

This session will focus on an overview of all SITF programs with specific focus on STEM 2.0. STEM 2.0 defines capability platforms that lie in the gap employers see that exists today between what we require and what the current educational ecosystem is producing. This session, presented by the SITF co-chairs, touches on our collaboration with the Commonwealth of Massachusetts and will present ways for organizations to join the movement, to make a real impact!

MODERATOR

Al Bunshaft, President and CEO, Dassault Systemes Government Solutions

SPEAKERS

Balaji Ganapathy, Head, Workforce Effectiveness, North America, Tata Consultancy Services
Sheila Boyington, President, Thinking Media; National Senior Advisor-STEMconnector®/Million Women Mentors®

STEM Education and Workforce in Northern New England: Report of the Councils

Time: 11:20am – 12:30pm
Room: Junior Ballroom Prefunction
Strand: Policy

This session focuses on the unique opportunities and challenges that different statewide STEM strategies face across four New England states. During this session, attendees will hear from the Maine STEM Council, the Massachusetts STEM Council, the New Hampshire K-12 STEM Task Force, and the Vermont STEM Collaborative. The representative from each state will discuss the role of the Council in their state, metrics to measure success, mechanisms to act in its rule, and the life cycle of these groups. Attendees will benefit from hearing from other state Councils to provide new strategies to implement on their local level and have a deeper understanding of a broader sense of the STEM movement on a regional level. Attendees will also have a greater appreciation for the bigger picture of the overall nature of the politics, policy, leadership, education, and partnerships needed to move this agenda forward.

MODERATOR

Doug Banks, Editor-in-Chief, Boston Business Journal

SPEAKERS

Allison Scheff Little, Executive Director of STEM, MA Department of Higher Education
Tom Keller, Executive Director, Maine STEM Council
Regina Toolin, Associate Professor, University of Vermont
Robert Hallowell, Scientist, MIT Lincoln Laboratory
David Allard, Outreach Manager, Office of Governor Gina Raimondo (RI)

AM BREAKOUT II

What's the Flippin' Difference? The Implementation and Effectiveness of Flipped Learning

Time: 11:20am – 12:30pm
Room: Meeting Room C
Strand: Higher Ed - 4-year

Flipped learning involves moving passive, background instruction outside of the classroom, reserving in-class time for student-centered learning activities that fortify and support long-lasting learning. The effectiveness of flipped learning over traditional, passive, lecture-based instruction has been demonstrated in published studies for years. However, many instructors remain resistant to adopting flipped learning for two well-founded reasons: (1) they lack the tools needed to implement flipped learning in their classroom and/or (2) they remain skeptical about the effectiveness of this approach. This session seeks to address both concerns. First, the design of an effectively implemented flipped course in undergraduate genetics will be presented so that instructors will have the tools needed to implement a similar approach in their own classrooms. Second, the results of a comparison study will be shared, where two parallel sections of undergraduate genetics were offered; one flipped and the other traditional, with active learning components integrated throughout. With these results in hand, participants will leave this session able to make informed choices regarding the effectiveness and usefulness of adopting flipped learning and the need for active learning in the college classroom.

SPEAKER

Thomas Mennella, Associate Professor of Biology, Bay Path University

Breakout Sessions - PM Breakout

A Conversation with Governor Baker's Workforce Skills Cabinet

Time: 2:35pm – 3:45pm
Room: Plenary Hall
Strand: Policy

Following up on the Governor's presentation, the Secretaries of Education, Housing & Economic Development, and Labor & Workforce Development will share their views on the needs, challenges, and potential next steps for the Commonwealth as we work to sustain and grow the pool of STEM talent, beginning in early education and continuing through to the workforce. The session will include a panel discussion as well as time for Q&A, both amongst the panelists and from the audience.

MODERATOR

JD Chesloff, Executive Director, Massachusetts Business Roundtable

OPENING REMARKS

Joe Kennedy III, Congressman, 4th District of Massachusetts and Honorary Chairman, Massachusetts STEM Advisory Council

SPEAKERS

Jay Ash, Massachusetts Secretary of Housing & Economic Development
James A. Peyser, Massachusetts Secretary of Education
Ronald L. Walker, II, Massachusetts Secretary of Labor & Workforce Development

CLOSING REMARKS

Karyn Polito, Lieutenant Governor, Commonwealth of Massachusetts and Co-Chair, Massachusetts STEM Advisory Council
Joe Kennedy III, Congressman, 4th District of Massachusetts and Honorary Chairman, Massachusetts STEM Advisory Council

APPS FOR GOOD - Socially Responsible App Development in K-12 Curriculum

Time: 2:35pm – 3:45pm
Room: Meeting Room A
Strand: K-12 Ed

Mass Academy of Math and Science at WPI was one of a handful of NCSSS (National Consortium of Secondary STEM) Schools that piloted the APPS FOR GOOD curriculum from the UK in the Spring of 2015. In the course, students work together as teams to find real issues they care about and learn to build a mobile, web or social app to solve them. Like professional entrepreneurs, students go through all key aspects of new product development, from idea generation, technical feasibility and programming to product design, deciding on business models and marketing. We will present our pilot program and talk about the successes and challenges of the pilot, including examples of new app designs developed by Mass Academy juniors. We will highlight our end of the year APPS FAIR as the culminating event of the presentation, including demonstrations of student apps.

SPEAKERS

Angela Taricco, Computer Science Teacher, Mass Academy of Math and Science at WPI
Michael Barney, Director, Mass Academy of Math and Science at WPI

Bringing Students into the Formative Assessment Process: Research Headlines, Resources and Tools

Time: 2:35pm – 3:45pm
Room: Grand Ballroom Prefunction
Strand: K-12 Ed

Compelling research around the effectiveness of formative assessment practices suggests that students can, and should be, the primary consumers of their own formative assessment data. The richness of using formative assessment lies in building students' ownership and involvement in their learning through the use of a collection of specific instructional practices. When used together, these practices outline an effective instructional approach that makes content more accessible for all students, and particularly for struggling learners. These practices center around teaching students to be able to answer for themselves the questions: 1) What goals am I aiming for in my learning? 2) Where am I currently in relation to those goals? 3) If I have not yet met the goals, what do I need to do next to move closer to meeting them?

This workshop will summarize the results of a five-year NSF-funded project to: 1) design a professional development approach and materials to teach mathematics teachers how to effective

implement these formative-assessment-related instructional practices, specifically in mathematics instruction, focused on helping students learn to take part in the formative assessment process; and 2) document barriers, challenges, and possible learning trajectories in teachers' learning of these instructional practices. Workshop participants will learn about several key shifts in teachers' mindsets and teaching practice around student ownership of and involvement in their learning and will do several hands-on activities that illustrate the approach and resources used in the professional development.

SPEAKERS

Susan Janssen Creighton, Senior Research Associate, Education Development Center, Inc.
Emily R. Fagan, Senior Research Associate, Education Development Center, Inc.

Digital Resources for STEM Learning and Engagement: Young Children to Teens

Time: 2:35pm – 3:45pm
Room: Grand Ballroom South
Strand: Digital Ed

How do we insure that students are learning to be creative thinkers in a world of global change and what does that mean for the future of education in the digital age? This session includes a discussion of two digital STEM programs for elementary, middle, and high school students - Plum Landing and Land Science. Developed by WGBH Boston with NSF funding, Plum Landing is designed to support parents, children (ages 6-9 years), and educators in educational settings as well as in out-of-school settings such as afterschool programs, independent camps, and museums. Plum Landing offers a digital curriculum, including animated webisodes, online games, free apps, hands-on science activities, and live-action videos. Developed by the University of Wisconsin's Epistemic Games Group, in partnership with Mass Audubon, Land Science is a NSF funded project that utilizes virtual Urban Planning internships for middle and high school students in formal and informal settings. Virtual internships are designed to foster creativity and introduce youth to real-world applications for STEM practices and content.

Learn about the successes and challenges of implementing these projects as well as the results of data collected that demonstrate that these types of programs have a significant impact on participants' environmental science-related habits of mind, understanding of socio-ecological systems, interest in STEM careers, and environmental science content knowledge.

SPEAKERS

Christine Paulsen, Evaluation Director, Concord Evaluation Group
Jennifer Cutraro, Editorial Project Director, WGBH
Kris Scopinich, Director of Education, Mass Audubon
Jen Klein, Project Manager, Mass Audubon
Lisa Marshall, Teacher, Nashua High School and PhD Candidate, Lesley University

Engaging Elementary Education Majors in STEM: Investigations Impact Science Teaching Efficacy

Time: 2:35pm – 3:45pm
Room: Junior Ballroom Prefunction
Strand: Higher Ed - 4-year

Science teacher efficacy for elementary education majors tends to be low, impacting their ability to perceive themselves teaching science. Science methods courses for elementary education majors need to address this issue in order for students to fully realize their potential as effective science teachers. This hands-on workshop models open-ended, challenge-type science investigations, used in a science methods course. The investigations are designed to engage elementary education majors in learning and doing science while reflecting on their beliefs about science and being science teachers. Evidence from course assessments show that components of students' science teacher efficacy were positively impacted following participation in the investigations. Workshop participants will reflect on the concept of science teacher efficacy and how it determines what and how science is taught, experience engaging science investigations, and reflect on the relevancy of the experience to their own practice.

SPEAKERS

Tarin H. Weiss, Associate Professor, Chemical and Physical Science Department, Westfield State University
Frank Giuliano, Professor, Chemical and Physical Science Department, Westfield State University

HS Engineering 4.0: Going from One Engineering Class to an Articulated 4-year Science/CVTE Program

Time: 2:35pm – 3:45pm
Room: Meeting Room B
Strand: K-12 Ed

Find out about our homegrown curriculum, program expansion and articulation, and engineering infused science classes. Develop your own "next steps" for expanding (or starting) engineering offerings at home.

The goal for this session is to both highlight the need for high school engineering programs and then to demonstrate how a school can build its own engineering program using resources that are already in place in their schools.

Participants will analyze the engineering currently offered at their high schools, compare and contrast science and engineering, and discuss why we should teach high school science AND high school engineering.

SPEAKER

Amy Winston, Department Head, Science and Technology/ Engineering, Newton North High School

ITEST Projects in the Out of School Context: Diverse Practices to Reach Underrepresented Youth

Time: 2:35pm – 3:45pm
Room: Meeting Room E
Strand: Out-of-School Time

The STEM Learning and Research (STELAR) Center, in collaboration with two projects funded by the National Science Foundation's Innovative Technology Experiences for Students and Teachers (ITEST) program, will present two models promoting STEM among underserved youth. Seeding the Future targets low-income, underrepresented populations in science at the high school level, and FUSE engages young people ages 11-18 in STEM experiences.

Participants in this session will learn about: the design principles behind each project and how those design principles provide the framework for materials design and program evaluation; implementation strategies and outcomes that lead to broadening participation and developing important 21st-century skills among young people who are traditionally underrepresented in STEM; how to leverage partnerships to build, grow, and sustain the work over time; how the projects leverage evaluation results to implement change to improve the structural aspects of our program; and how STEM career development and social justice are critical to the engagement of low-income youth in developing interest in science.

MODERATOR

Caroline E. Parker, Principal Research Scientist, Education Development Center, Inc.

SPEAKERS

Kemi Jona, Research Professor, Northwestern University
G. Michael Barnett, Associate Professor, Boston College Lynch School of Education
Maggie Waldron, Program Director, Office of STEM Education Partnerships, Northwestern University
Catherine Wong, Director of Urban Outreach Initiatives, Boston College Lynch School of Education
David Blustein, Lynch School of Education, Boston College

Local Nature and Young Children: A Natural Choice in Support of Learning

Time: 2:35pm – 3:45pm
Room: Grand Ballroom Center
Strand: Early Ed

Red-tailed hawks, squirrels, sowbugs, buds, leaves, and twigs have an important place in science learning. Find out how to use familiar and unfamiliar resources right outside your door to support young children's STEM learning. Early childhood educators will share many strategies for supporting children's inherent curiosity and interest.

Hear stories of success, see examples from three different locations, experience simple sensory activities focused on local nature, and envision science learning that everyone can implement — inside and out.

Find out more about how we share our love of the outdoors and local nature in the interest of supporting understanding of earth, physical, and life sciences for children ages two to six. It's easy to embrace the natural world and outdoor exploration in support of STEM learning. Find out how nature is "hyper local" engages children in classification, inquiry, exploration, and questioning. Children are not the only ones who find it interesting!

SPEAKERS

Heather DiGiovanni, Preschool Director, Mass Audubon Habitat Education Center and Wildlife Sanctuary
Marian Miller, Outreach Education Coordinator, Mass Audubon Habitat Education Center and Wildlife Sanctuary

Make a Joyful Noise: Young Children Explore Sound and Music

Time: 2:35pm – 3:45pm
Room: Showcase Corner
Strand: Early Ed

This session will cover investigations of sound crossover between art (music), the biology of the senses (hearing), and physical science (acoustics). Find out how to approach all of these in a deep, conceptual way through child-centered discovery using simple materials…with a little "teaching" asked of the session attendees!

SPEAKER

Greg Nelson, Professor of Early Childhood, Bridgewater State University

Making STE(A)M: Integrating Project Based Learning and STEM Grades K-12

Time: 2:35pm – 3:45pm
Room: Grand Ballroom North
Strand: K-12 Ed

K–12 teachers, learning coaches, and administrators will be introduced to a lesson development approach that incorporates state and common core frameworks for math, science, history, ELA, and the arts with the Engineering Design Process, project-based learning and hands-on "making." Presenters will share unit plans and lesson materials that will support session attendees in developing their own curriculum units that engage students and bring STEM into every class. Unit plans for multiple grades and disciplines will be shared. There will truly be something for everyone! Additionally, presenters will share how a STEM

learning coach and dedicated MakerSpace have led to embedded professional development for district teachers and increased capacity for problem-based learning and STEM instruction in the Bourne Public Schools.

SPEAKERS

Amy Fish, Innovation Studio Facilitator, Bourne Public Schools
Christine Borning, STEAM Director, Bourne Public Schools
William Dow, ELA Teacher, Bourne High School

STEM + M Partnerships

Time: 2:35pm – 3:45pm
Room: Meeting Room C
Strand: Career Awareness/Workforce Development

We will be discussing the many ways that our local workforce development system is working collaboratively to support the MA STEM state goals and how it relates back to the workforce development systems and our businesses and adult and youth job seekers. Also, the programs that we're involved in to expand STEM awareness to both adult and youth in our regional schools.

The session will be about our multi-pronged approaches to filling the current and future employment gaps in STEM companies focusing on manufacturing. We will share best practices found in our organizations, the workforce system, and through our partnerships. We will emphasize "Promising Practices, Proven Results" over the past year. We will also speak about STEM related activities/work that is occurring within our partnership to reach and prepare adults and youth interested in pursuing STEM+M careers.

MODERATOR

Sheila Sullivan-Jardim, Executive Director, Brockton Area Workforce Investment Board

SPEAKERS

Lorraine Albert, Director of Regional Training, Brockton Area Workforce Investment Board
Diane Ferrera, Director of Human Resources, AccuRounds
Paula Martel, Human Resource Manager, North Easton Machine
Andrea Kingman, Senior Employer Service Representative, UMass Donahue Institute/Career Works
Leslie Parady, Workforce Development Manager, MassMEP

Teaching Science to Learn Science

Time: 2:35pm – 3:45pm
Room: Conference Room 210A
Strand: Research & Practice

In this interactive panel session, researchers and participants from the NSF-funded Teaching to Learn (T2L) project will engage in a focused discussion with session participants on the ways in which the T2L model may be applicable to their institutions.

The T2L project places pairs of undergraduate students from two four-year liberal arts colleges (one public, one private) into the elementary classrooms of a high-needs public school district to teach science once a week. In this way, college students and elementary teachers play three distinct roles: collaborators, co-teachers, and learners; and the elementary classroom becomes a unique site for an overlapping set of teaching and learning practices. Pairs of undergraduates co-taught science units with elementary classroom teachers and the support of college science education professors over the course of the 2014-2015 school year. Undergraduates and elementary teachers have also participated in joint professional development to deepen their understanding of both the nature of scientific inquiry and science pedagogy and reinforce their connection as a community of learners.

MODERATOR

Nick Stroud, Assistant Professor of Science and Technology Education, Massachusetts College of Liberal Arts

SPEAKERS

Jean Bacon, Administrator of Teaching and Learning, North Adams Public Schools
Lindley Wells, Education Outreach Consultant, Williams College
Leslie Rule, Teaching to Learn Supervisor, Massachusetts College of Liberal Arts
Melissa Boyer, Teacher, Greylock Elementary School, North Adams Public Schools
Daniel Heinen, Computer Science major, Massachusetts College of Liberal Arts
Dawn Wu, Sophomore, MA College of Liberal Arts

Understanding the Middle School Science Fair Experience

Time: 2:35pm – 3:45pm
Room: Conference Room 210B
Strand: Out-of-School Time

Recent science education reforms emphasize the importance of having students do real scientific and engineering work because of the opportunities that "doing" science gives students. Science fairs are designed to give students precisely this experience and they have been promoted by education and industry leaders for over a half century. Supporters claim that they accomplish these goals and more, but little research has been done to examine whether and how much impact they have on students or how much they cost. The National Science Foundation has funded Education Development Center to conduct a four-year, national study to answer questions about science fairs including: What do kids gain from science fairs? What makes some science fair experiences better than others? How much does a good science fair cost?

A study of science fairs of this scope has not been conducted in the U.S. before, and this study offers a potentially high-value

bridge between the informal and formal science education worlds. The study's findings have the potential to increase the effectiveness and reach of science fairs, provide science educators — both formal and informal — with cost-effective ways of bringing the science and engineering practices to their students, and provide researchers with tools for assessing the science and engineering practices. We will present our current findings from this study, including insights into the models and outcomes of science fairs, and offer the audience a chance to reflect on their own science fair experiences and connections to the informal science education community.

SPEAKERS

Jackie DeLisi, Research Scientist, Education Development Center, Inc.
Abigail Jurist Levy, Principal Research Scientist, Education Development Center, Inc.
Marian Pasquale, Senior Research Scientist, Education Development Center, Inc.

Where are the Middle Skill Jobs?

Time: 2:35pm – 3:45pm
Room: Meeting Room D
Strand: Career Awareness/Workforce Development

Broadening Advanced Technological Education Connections (BATEC) has partnered with Burning Glass to analyze labor market data to scope out middle skill jobs in nine are areas of computing. This report provides an in-depth look at nine middle skill occupations: Computer System Analysts, Health Informatics (defined as Medical Record Technicians and Health Information Technicians), Web Developers, Big Data Analysts (defined as Database Administrators, Data Warehousing Specialists, and Business Intelligence Analysts), Computer User Support Specialists, Computer Network Support Specialists, Computer Programmers, Software Developers and Information Security Analysts. This will include an analysis of demand characteristics for top middle-skill IT occupations in key U.S. markets and investigate the size, growth, requirements, and hiring difficulty of the top middle-skill IT-related occupations. Two additional reports allow an in-depth look at jobs in big data and cybersecurity. This session will feature a panel that will engage participants in a discussion about how these research reports can inform programs and impact students within their institutions.

MODERATOR

Deborah Boisvert, Executive Director, BATEC, University of Massachusetts Boston

SPEAKERS

Lou Piazza, Director, BATEC, University of Massachusetts Boston
Matt Sigelman, CEO, Burning Glass Technologies
Christine Williams, Director of Economic and Workforce Development; Lead, Technology Talent Initiative; MA Department of Higher Education

Writing to Think: Using Notebook Writing to Guide Inquiry-Based Learning in Science

Time: 2:35pm – 3:45pm
Room: Junior Ballroom
Strand: K-12 Ed

The goal of this session is to illustrate how science notebook writing can be used to support K-12 students in thinking like a scientist, mastering science content, and developing strong writing skills. Science notebook writing can guide thinking through the inquiry process as students make predictions, record observations, reason using evidence, and communicate their findings. At another level, it provides a mechanism through which students can articulate their beliefs about the natural world, hold up evidence to reflect on the accuracy of their beliefs, and clarify misconceptions. And by engaging in writing that is purposeful, students will at the same time build skills that address many ELA writing standards. Who will benefit from this workshop? Every K-12 science teacher is charged with guiding student growth in science practices, science content, AND English literacy, so all can benefit. Workshop participants will be introduced to a notebook format used for science inquiry in the Braintree Public Schools, which we believe contributes to the strong performance the district achieves on the science MCAS. We will examine the notebook to identify how each part guides and extends science thinking, while developing writing skills. We'll have fun doing some inquiry science ourselves to practice using the notebooks. We'll examine student work to see how notebooks can be used for both formative and summative assessment. Participants will leave with a generic format that can be adapted to their own curriculum, as well as with an assessment rubric appropriate for upper elementary students. Teachers are encouraged to come with one of their own lessons in mind to see how it might be adapted to the inquiry format and supported with science notebook writing.

SPEAKER

Dianne Rees, Director of Science K-12, Braintree Public Schools

Exhibits

Full exhibit descriptions are available online at: www.mass-stem-summit.org

1-4

Organization: WGBH (STEM Summit Media Partner)
Website: facebook.com/wgbheducation
Contact: Denise Olson, Marketing Manager, WGBH Education, 617-300-3995, denise_olson@wgbh.org
Strand(s): Early Education, K-12 Education, Out-of-School Time, Digital Education

Program: For over 40 years, WGBH has demonstrated expertise in translating science, math and engineering content to television, outreach, and digital learning, all the while ensuring that the final results are appealing to kids and useful to adults. WGBH is recognized as one of the nation's leading producers of media-based resources to support teaching and learning, focused on both content and methodology at all grade levels. WGBH's commitment to STEM education continues with our current initiatives.

At the Massachusetts STEM Summit 2015, we're proud to feature:

DesignSquad Nation (pbskids.org/designsquad/) is a multimedia platform on PBSKIDS that helps kids age eight and above engage with the design process through hands-on engineering activities, design challenges, interactive games, and streaming videos intended to increase kids' understanding of engineering and invention. Get a sneak peak of the upcoming outreach project, DESIGN SQUAD GLOBAL, which connects kids with their peers from around the world, empowering them to collaborate with one another to solve real-world engineering problems and expand their cross-cultural understanding.

Early Math with *Gracie & Friends*™ (first8studios.org/) is a math-focused curriculum supplement based on the Next Generation Preschool Math research project and funded by the National Science Foundation. The research focused on the development of 8 learning apps, more than 40 hands-on and traditional preschool activities, and a digital Teacher's Guide — all designed and tested for preschool classroom use.

NOVA Labs (pbs.org/nova/labs) engages teens and lifelong learners in games and interactives that foster authentic scientific exploration. NOVA Labs participants take part in real-world investigations by visualizing, analyzing, and playing with the same data that scientists use. Each Lab also illustrates key concepts with the kind of engaging videos that NOVA has been making for over 40 years. New to NOVA Labs is the Evolution Lab, a phylogeny game and an interactive tree of life that helps players explore the relationship between species and the history of life on Earth.

6 **Sponsor:** Clark University

6 **Sponsor:** Mass Tech Collaborative

7 **Title:** A Year-Round Environmental Study of Trees and Place-Based Education Connections
Organization: GLCAC, Inc. Head Start
Strand: Early Education
Overview: The project will be exhibited on the table and surrounding area. It will have visual displays, a PowerPoint presentation, handouts of brochures and the curriculum map. Staff from GLCAC Head Start will be present to answer questions and provide information about the project.

9 **Sponsor:** IBM

9 **Sponsor:** IntellAdapt

10 **Title:** Roller Coaster Physics
Organization: Thomas Prince School
Strand: K-12 Education
Overview: Middle school students design a roller coaster to investigate the various energy transfers and conversions involved in a successful design. Students also research the pros and cons of wooden versus steel coasters and the history of amusement park rides.

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EXHIBITS

11
Title: Robotics Education & Competition Foundation
Organization: REC Foundation
Strand: Innovation/Entrepreneurship
Overview: The Robotics Education & Competition (REC) Foundation seeks to increase student interest and involvement in STEM by engaging students in hands-on, sustainable, and affordable curriculum-based robotics engineering programs across the U.S. and internationally. The REC Foundation manages the VEX IQ Challenge (grades 3-8), VEX Robotics Competition (grades 6-12), and VEX U (Post-Secondary) which now include well over 12,000 robotics teams across the U.S. and more than 30 other countries. The REC Foundation develops partnerships with K-12 education, higher education, government, industry, and the non-profit community to achieve this work so that one day these programs will become accessible to all students and all schools in all communities.

12
Title: Stellar Student Research & Engineering Design Invention – Through Mentoring & Science Fair Programs
Organization: Massachusetts State Science & Engineering Fair Inc. (MSSEF)
Strand: Innovation/Entrepreneurship
Overview: Come interact directly with K-12 school students who are eager to discuss their scientific research and engineering inventions. Learn about resources and grants to help your school offer students this rare opportunity to investigate a question or solve a problem that truly interests them, guided by STEM mentors.

13
Title: Newton LigerBots: FIRST team 2877
Organization: Newton South High School
Strand: K-12 Education
Overview: Come and meet Newton's competitive high school robotics team, the LigerBots FIRST team 2877. Meet our team, meet our robots, and learn about our team and about FIRST.

14
Title: Robots that help kids (4-18 years) learn computational thinking and problem solving through coding and robotics in an easy and fun way
Organization: Robotix USA, LLC
Strand: K-12 Education
Overview: Kids enhance their coding skills as they program the robot's smart sensors to navigate around a room, flash lights of any color, play music, detect and avoid objects and edges, record videos, take pictures, follow faces and even transform it into a humanoid, animal, or friend using Lego bricks.

15
Title: FIRST Team 839 Rosie Robotics. Emphasizing STEM to all Students.
Organization: Rosie Robotics Mentor (FIRST Team 839)
Strand: K-12 Education
Overview: Robots are the way of the future and todays' students are showing what STEM allows them to accomplish. FIRST Team 839 Rosie Robotics is one of thousands of student teams across the world that take STEM to the next level and apply it to robotics.

16
Title: NUTRONs Robotics Team's Cost-Effective & Proven STEM Pipeline
Organization: Revere High School/Northeastern University
Strand: Out-of-School Time
Overview: The NUTRONs Robotics students and mentors will demonstrate our STEM pipeline using our award-winning competition robot, videos, and pictures of our various programs, posters, and informational pamphlets to help provide information for those who are not sure how to start.

17
Title: FIRST Robotics at BRRHS - 20 years and growing!
Organization: Bridgewater Raynham Regional HS
Strand: Out-of-School Time
Overview: Hear from students, see with pictures, or drive the robot yourself to see why BRRHS is so excited to be the home of the TJ2 Robotics Team.

18
Sponsor: General Dynamics

19
Sponsor: WPI

20
Title: Global STEM Classroom
Organization: Blackstone Valley Regional Vocational Technical High School
Strand: Digital Education
Overview: The BioGen Foundation "Ignite the Power of STEM" Award — Winning Global STEM Classroom Program at Blackstone Valley Regional Vocational Technical School (BVT).

21-22
Sponsor: Biogen Idec

24
Title: Branching Out: Youth Exploring Landscape Stewardship
Organization: National Park Service
Strand: Out-of-School Time
Overview: Providing pathways for youth into STEM subject higher education and careers. Learn about National Park Service youth employment programs including Branching Out: Youth Exploring Landscape Stewardship.

25
Title: College Success Communities, AP STEM, and Out-of-School Time
Organization: Mass Insight Education
Strand: Out-of-School Time
Overview: Mass Insight's AP STEM program and College Success Communities serve 10,000 students statewide,

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begin in the 6th grade, and focus on broadening the pipeline of students beginning high school ready to enroll in AP courses. Mass Insight utilizes out of school time activities and strategies to improve results overall.

26
Title: AP Math & Science for ALL: Improving 21st Century Student STEM Skills and Achievement
Organization: Mass Insight Education (MIE)
Strand: K-12 Education
Overview: Learn about Mass Insight Education AP Program, and its AP Statistics offering in particular, that supports the introduction of AP math, science, and english courses to schools throughout Massachusetts. Operating since 2008, MIE provides extensive support for teachers and strong focus on their students. Results include increased AP participation and performance for students who would never have had this opportunity in the past. An independent study shows that taking an MIE AP course results in higher persistence rates in college than is exhibited by those who were not in the program.

28 **Host and Sponsor:** UMass Donahue Institute

29 **Information Booth**

31
Title: 4CSTEM; Community College Students as leaders in Engineering!
Organization: Cape Cod Community College
Strand: Higher Education
Overview: Cape Cod Community College's new engineering program and 4CSTEM club will be showcasing their new programming, outreach, and community engagement activities. Along with the academic work they have engaged with in the classroom in relation to 3D printing.

32
Title: Creating a STEAM Room in an Early Education and Care Setting
Organization: Worcester Child Development Head Start
Strand: Early Education
Overview: This exhibit highlights the process of creating a STEAM room within an early education and care setting. Resources and hands-on activities will be provided to demonstrate the potential learning and excitement a STEAM room can have for children and families.

33
Title: Building STEAM at Berkshire County Head Start
Organization: Berkshire County Head Start
Strand: Early Education
Overview: Building STEAM at Berkshire County Head Start showcases curriculum and projects created by children and staff as they explored integrating the arts into STEM activities.

34
Title: Scientific Superheroes, Tinkering Titans, Extraordinary Engineers and Marvelous Mechanics
Organization: Communities United, Inc.
Strand: Early Education
Overview: Faster than a speeding tricycle, able to leap small buildings in a single bound…In this exhibit, superheroes and their amazing engineering capabilities will be explored. Create your own superhero gizmo with found materials as we discuss innovative STEM education at the preschool level…and beyond.

35
Title: Maze Games for STEM boost student motivation/ knowledge and will enhance many learning venues
Organization: MazeFire.com and Northeastern University
Strand: Digital Education
Overview: MazeFire produces engaging STEM games that lead students to think about what they do and do not know. These easy access games are scalable across subjects and age levels, while providing teachers pleasing breaks to their platform performances and offering kids a fun and collaborative activity to boost their knowledge.

36
Title: Demystifying the NGSS through STEMscopes PreK-12 STEM Science
Organization: Accelerate Learning – STEMscopes at Rice University
Strand: Digital Education
Overview: STEMscopes NGSS is a digital online curriculum tightly aligned to the three Dimensions of the NGSS. As an innovative curriculum delivery model, STEMscopes focuses on teacher ease in access and delivery by being written by teachers for teachers meeting the diverse needs of the students in a STEM science classroom.

37
Title: National Green Schools Society: Taking Students and STEM to the Environment
Organization: Green Schools and National Green Schools Society
Strand: Innovation/Entrepreneurship
Overview: The National Green Schools Society exhibit will highlight the importance of student-driven activities that integrate STEM and the environment. Visitors to our exhibit will see examples of E-STEM student projects presented by students who designed and implemented them.

38
Title: STEAM Power
Organization: Artists For Humanity, Inc. (AFH)
Strand: Innovation/Entrepreneurship
Overview: Innovation District Enterprises, Artists For Humanity (AFH) and Artaic, profile their successful partnership on STEM learning through hands-on design projects and entrepreneurial activities. See why mentorship in innovation and entrepreneurship cannot begin too early, and how immersion in arts-based STEM projects can create greater diversity in the STEM pipeline.

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EXHIBITS

39 **Title:** The Discovery Museums' Traveling Science Workshops
Organization: The Discovery Museums
Strand: K-12 Education
Overview: A variety of hands-on STEM activities from magnetism to sound to physical changes of matter that not only represent the depth and breadth of what The Discovery Museums Traveling Science Workshops offer students and teachers PreK-8th grade, but also provides ideas for simple and affordable ways to bring physical science concepts to life in the classroom.

40 **Title:** miniPCR: Bring Hands-On DNA Science to the Classroom
Organization: miniPCR (Amplyus LLC)
Strand: K-12 Education
Overview: miniPCR develops innovative tools that enable hands-on DNA experimentation. With miniPCR educators for grades 6-12 can introduce students to DNA science and prepare them for the STEM economy. Teach Genetics, Food Safety, Forensics, and essential 21st century skills. miniPCR puts DNA discovery entirely in the hands of students.

41 **Title:** The Boston Society of Civil Engineers K-12 STEM Outreach Program
Organization: Boston Society of Civil Engineers
Strand: Career Awareness/Workforce Development
Overview: Get involved with one of the many BSCES K-12 STEM programs including Future City, their model bridge contests, bridge tours, and all other efforts. Meet some volunteers, collect info, and try out a few activities for yourself.

43 **Sponsor:** Microsoft

44 **Title:** Natick Soldier Research Development & Engineering Center's STEM Outreach Program
Organization: Natick Soldier Research, Development & Engineering Center
Strand: Career Awareness/Workforce Development
Overview: The Natick Soldier Research, Development & Engineering Center is a Department of Defense R&D facility that develops equipment and technologies for the military, including military rations, collective protective equipment, shelters, and aerial delivery resupply. We will display some of our technologies in collective protection equipment and military rations and highlight the STEM disciplines necessary to achieve our mission requirements.

45 **Sponsor:** Northeastern University

46 **Sponsor:** EMC

47 **Sponsor:** Mt. Wachusett CC

47 **Sponsor:** Museum of Science - NCTL

48 **Sponsor:** EEC

48 **Sponsor:** New England Institute of Technology

49 **Title:** Bringing the Workplace into the Classroom using Problem Based Learning
Organization: New England Board of Higher Education-PBL Projects
Strand: Career Awareness/Workforce Development
Overview: PBL Projects will demonstrate how its problem-based learning case studies called Challenges can transform STEM education and students' future career choices. The Challenges are developed in collaboration with industry and teach 21st century problem-solving, critical thinking, and teamwork skills required by employers and imperative to success in a global economy.

50 **Sponsor:** Laboratory Robotics

51 **Sponsor:** Mass Commission for the Blind

52 **Sponsor:** Analog Devices

53 **Title:** Project Lead The Way STEM Programs for K-12 Students and Teachers
Organization: Worcester Polytechnic Institute (WPI)
Strand: K-12 Education
Overview: Learn about Project Lead The Way's five standards-based STEM programs that engage K-12 students in problem-solving and critical thinking related to Engineering, Computer Science and Biomedical Science. Try a student activity. View student projects. Hear about the professional development offered at Worcester Polytechnic Institute and on PLTW's Learning Management System.

54 **Title:** The Small World Initiative: an authentic research based curriculum for undergraduate STEM education
Organization: Worcester Polytechnic Institute
Strand: Higher Education
Overview: This exhibit will describe the Small World Initiative, a program that uses an authentic, crowd-sourced research project to create a new model for introductory science laboratory teaching and learning at the college level.

55 **Title:** The STEM Education Center at WPI
Organization: WPI, STEM Education Center
Strand: K-12 Education
Overview: The STEM Education Center at WPI focuses on improving the preparedness of teachers and administrators in primary and secondary schools through

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a wide variety of STEM-based professional development and master's degree programs for current educators.

57 **Title:** Introduction to New England FIRST and ingenuityNE, Inc.
Organization: New England FIRST, The U.S. Foundation for the Inspiration and Recognition of Science and Technology
Strand: Career Awareness/Workforce Development
Overview: FIRST Robotics offers programs focused on STEM for K-12 students. The mission of FIRST is to inspire young people to become science and technology leaders by engaging them in exciting mentor-based programs that build STEM skills that inspire innovation, and foster well-rounded life capabilities including self-confidence, communication, and leadership.

58 **Title:** Teacher and Student Demonstrations of Inquiry-Based STEM Investigations with the Museum Institute for Teaching Science
Organization: Museum Institute for Teaching Science (MITS, Inc.)
Strand: K-12 Education
Overview: Teachers from MITS programs share inquiry-based investigations focusing on robotics, citizen monitoring programs and data software such as Data Nuggets in their classrooms. Along with some of their students, they will showcase these STEM investigations. Explore the searchable Science by Connections website that links K-12 educators with STEM classroom programs, field trips, online resources, and professional development opportunities from organizations throughout Massachusetts.

59 **Title:** STEM in the Field: Local Habitats as Gateways for Engaging Students in STEM Content and Practices
Organization: Mass Audubon
Strand: K-12 Education
Overview: This exhibit will showcase specific Mass Audubon programs and curricula that engage students in authentic field-based science, including designing and implementing research, real-world data collection and analysis, and the use of the technology to share and communicate. Sample projects for elementary, middle, and high school students include biological inventories, raising native species, habitat restoration, and land planning.

60 **Sponsor:** Raytheon

61 **Sponsor:** Lemelson-MIT

62 **Title:** The Great Diseases Biosciences Curriculum and BIOSCANN (Biosciences Career Network and Navigator)
Organization: Center for Translational Science Education - Tufts University
Strand: K-12 Education
Overview: Tufts Medical School scientists and Boston teachers have developed a Biology II curriculum 'The Great Diseases' that promotes scientific and health literacy. We will also demonstrate related web technologies that enable students to work collaboratively in an interactive career awareness PBL role-playing activity to design a novel therapeutic drug.

64 **Title:** Recyclable City: Designing Against Disaster
Organization: Wachusett Regional School District
Strand: K-12 Education
Overview: Solutions to wind and water damage are designed, constructed, and improved as students build a 3-D recyclable city based on learned economic, science, and map skills.

65 **Sponsor:** UMass Dartmouth

66 **Title:** AMNH's Seminars on Science, Online Professional Development for K-12 Educators
Organization: American Museum of Natural History
Strand: K-12 Education
Overview: Seminars on Science, the American Museum of Natural History's online professional development program for K-12 educators offer six-week online graduate courses in the life, earth, and physical sciences.

67 **Title:** Science Club for Girls
Organization: Science Club for Girls
Strand: Out-of-School Time
Overview: Science Club for Girls is a K-12 Out-of-School Time program, currently serving the Greater Boston area. Stop by to hear about the engaging programs our high school girls are part of and the impact it is having both on their lives and in their communities.

68 **Title:** Camp Invention - Impacting Fluency, Flexibility, and Elaboration in Creativity Skills for K-8 Out-of-School Time
Organization: Camp Invention
Strand: Out-of-School Time
Overview: Experience Camp Invention/Invention Project with two fun hands-on activities and take away information on how your community can implement this exciting Out-of-School Time STEM enrichment program. Can you design a neutrally buoyant object? Who will win the mini bot face-off? Let's reinvent summer fun!

69 **Sponsor:** EDC

70 **Title:** Engaging the Community in STEM Exploration and Excitement through Open Laboratory Night
Organization: Center for the Advancement of STEM Education at Bridgewater State University
Strand: Out-of-School Time

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Overview: Exhibit participants will learn how to increase community awareness and excitement about STEM in everyday life by hosting an open laboratory night at their facility. Participants will acquire information about planning and implementing an event, including staffing, budgeting, activity selection, and preparation. A sample activity will be demonstrated.

71
Title: The MathPOWER Algebra Plus Summer Academy
Organization: MathPOWER
Strand: Out-of-School Time
Overview: The Algebra Plus Summer Academy exhibit will include instructional manuals and displays of student centered projects and activities.

72
Title: The LEAH Project: Peer-to-Peer Model STEM Program
Organization: Health Resources in Action, The LEAH Project
Strand: Out-of-School Time
Overview: The Leaders through Education, Action and Hope (LEAH) Project is an Out-of-School Time program that works with high school students and elementary school students during the summer and school year. This exhibit will show their peer-to-peer model and program outcomes for two cohorts of Boston Public School high school students.

73
Sponsor: UMass Lowell

74
Sponsor: Boston University

75
Title: CircuiTree Bio-Energy Exploration
Organization: Voltree Power Inc.
Strand: K-12 Education
Overview: The CircuiTree BioExploration Learning Center provides an opportunity to ignite the imagination of teachers and learners and to expand their world vision as a place that can be interrogated, understood, and altered.

76
Sponsor: iRobot

77
Title: Tri-County RVTHS Engineering Technology: Saving the Earth and Reaching for the Stars
Organization: Tri-County Regional Vocational Technical High School
Strand: K-12 Education
Overview: This exhibit showcases the engagement and exposure that secondary students can achieve by actively partnering with government, university, and industry partners through established and supportive programs. Participation in three authentic and powerful programs in particular, NASA HUNCH, Zero Robotics, and PTCs STEM Certificate Program, will be highlighted in the exhibit and were made possible with support from MIT, NASA, PTC Corporation, and others.

78
Sponsor: UMass Amherst

79
Title: Resources for Using the Tools of Systems Thinking and System Dynamics to Build STEM Understanding
Organization: Creative Learning Exchange
Strand: K-12 Education
Overview: This exhibit showcases resources, including books, free on-line curricula, and computer simulations for using the tools of Systems Thinking and System Dynamics. These activities build STEM understanding, engaging K-12 students in learner-centered activities that promote critical thinking.

80
Sponsor: TERC

80
Sponsor: UMass Medical

82
Title: Building Bridges
Organization: STEM Beginnings
Strand: K-12 Education
Overview: BUILDING BRIDGES by STEM Beginnings. Learn how to construct different types of bridges using a variety of materials utilizing the Engineering Design Process. Make it more fun by lighting up the model bridges using Snap Circuits and understand the fundamentals of circuit board. STEM is Fun!

83
Sponsor: McGraw Hill Education

84
Title: Design, Robotics, Engineering, Art and Math (DREAM)
Organization: Hanscom Middle School, Lincoln Public Schools
Strand: Research and Practice
Overview: Learn about integrating 3D printing and Programming concepts and tools into your math classroom. For beginners and beyond, take home proven projects and be inspired to try it in your own classroom!

85
Title: Sharing global, on-going, environmental research in Massachusetts classrooms
Organization: The School for Field Studies
Strand: Research and Practice
Overview: The School for Field Studies partnered with educators in Massachusetts to augment the teacher and learning of K-12 STEM education through sharing our research conducted overseas. We have created educational resources (videos, activities, data sets) that serve as a curricular supplement to K-12 lesson plans and bring research to life.

86
Title: Project-Based Learning + Real-World Manufacturing + Industry Mentors = Job-Driven STEM Education
Organization: Boston Centerless/National Tooling & Machining Association
Strand: Career Awareness/Workforce Development

Booth Number in Exhibit Hall **L** Exhibit Located in Lobby

Overview: Attaining critical thinking skills through project-based learning is at the heart of STEM education. When you add opportunities to learn the real-world technical skills from industry mentors/partners and manufacture a Bot to battle, it becomes a fun, job-driven STEM education program called the *National Robotics League* (NRL).

87 **Title:** The Power of Wind
Organization: Cape Cod Child Development Head Start
Strand: Early Education
Overview: The Power of Wind includes hands-on activities and experiments for children in the early childhood range. It focuses on the many forces of wind and includes a connection with early learning frameworks and the common core, as well as instructional support questioning for CLASS.

88 **Sponsor:** Framingham State/McAuliffe Center

89 **Title:** ABLE Pathfinder: A Community College Route to a UMass STEM Degree
Organization: ABLE4STEM
Strand: Higher Education
Overview: ABLE Pathfinder is a curriculum mapping advising tool design to facilitate transfer ease in a STEM major for community college students and a valuable resource for academic advisors.

90 **Sponsor:** Salem State

90 **Sponsor:** Siemens

91 **Title:** Real World Design Challenge
Organization: MassDOT Aeronautics Division
Strand: Innovation/Entrepreneurship
Overview: The Real World Design Challenge (RWDC) is an annual high school competition with the goal of sustainably increasing the STEM workforce. The challenge provides students with an opportunity to use real professional engineering software and access industry and academic mentors in the aerospace field.

92 **Sponsor:** Middlesex CC

L **Sponsor:** Destination Worcester

L **Sponsor:** Genzyme

L **Sponsor:** Mass Business Roundtable

L **Sponsor:** Mass Life Sciences

L **Sponsor:** National Grid

L **Sponsor:** STEM Advisory Council

L **Sponsor:** UMass Boston/BATEC

L **Sponsor:** Vertex

Booth Number in Exhibit Hall **L** Exhibit Located in Lobby

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COMMONWEALTH OF MASSACHUSETTS
STATE HOUSE • BOSTON, MA 02133
(617) 725-4000

CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR

November 2015

Dear Friends:

On behalf of the Commonwealth of Massachusetts, we welcome you to the 12th Annual STEM Summit at the DCU Center in Worcester.

We want to thank the Donahue Institute at the University of Massachusetts for all their continued work in this field and for making this event a success each year. We also want to thank the Commonwealth's STEM Advisory Council, led by co-chairs Congressman Joe Kennedy and Dr. Jeffrey Leiden, with the support of our administration and Secretary of Education Jim Peyser, for their energy, enthusiasm and commitment to broadening opportunities in STEM for more students across the state.

Our economy depends on a well-trained and high-quality workforce. We are pleased that today's STEM Summit brings together our institutions of education from K-12 and higher education as well as our partners in industry to think about how we build strong collaborations in STEM fields so that our students can be prepared and excited for all of the opportunities that await them in the workforce.

With all of you here today, from education, business, community organizations, and government, this conversation is not only continuing, but it has the chance to evolve and grow. Just as the needs of the businesses in our state change over time, so do the educational needs of our students. It is our collective job to determine how to best prepare our students so they graduate high school ready to meet the demands of higher education and the workforce.

We look forward to today's conversation and to the work we will undertake to together to ensure that every student is ready to succeed in the careers of our 21st century economy.

Sincerely,

CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR
CO-CHAIR, MASSACHUSETTS STEM
ADVISORY COUNCIL

Massachusetts STEM Advisory Council

One Ashburton Place, Suite 1403, Boston, MA 0210 | www.mass.edu/stem

November 10, 2015

Dear Members of STEM Community:

On behalf of the STEM Advisory Council, we would like to welcome you to the 12th annual STEM Summit. The Summit provides an opportunity for the entire community to share best practices and highlight successful programs and partnerships across the Commonwealth. We hope that you'll find this to be a valuable day to connect with each other, learn something new, and find inspiration.

The STEM Advisory Council is looking forward to building upon the work of the past seven years to continue raising awareness about the importance of STEM education and to develop and spread best practices from pre-K through college.

Under the leadership of Governor Baker and Lt. Governor Polito, the Commonwealth is focusing its attention on ensuring all of our students have access to high-quality educational opportunities that prepare them for the workforce. As our K-12 and higher education institutions tackle that challenge, the STEM community – and the leadership of the STEM Advisory Council – can be a vital resource to help educators meet the demands facing the science, technology, engineering and math fields.

It is this sense of collaboration that brings us all together for the Summit today, and which we hope will continue throughout the year. We hope that the conversations at tables, in hallways, and during breakout sessions are just the beginning of ongoing discussions and collaborations that will have a lasting, positive impact on the educational and career opportunities for our students throughout Massachusetts. On behalf of the STEM Advisory Council, we look forward to continuing the dialogue with all of you.

Sincerely,

Joe Kennedy III
U.S. Congressman
Honorary Co-Chair, STEM Council

Jeffrey Leiden, M.D. Ph.D.
Chairman, President & CEO, Vertex Pharmaceuticals
Co-Chair, STEM Council

MBR
MASSACHUSETTS BUSINESS ROUNDTABLE

November 10, 2015

Dear Members of the STEM Community:

Thank you for your commitment to STEM education and for your participation in today's Summit. Now in its twelfth year, the Summit is both a celebration of your daily work to bring STEM education to our communities and a call to action to continue to grow and expand these programs to children across the Commonwealth.

For employers, this is a critical issue for the state's long term competitiveness. In a survey of more than 400 employers from across the state, 69% reported some difficulty in hiring employees with the right skills for open positions. When employers were asked what types of jobs they were having trouble filling, six of the top ten responses were in STEM fields. The type of hands-on, experiential learning that is inherent in STEM teaching and learning was also identified as the most effective way to grow a STEM-qualified workforce. That is why today is so important – to highlight, to reinvigorate, and to celebrate the essential work being carried out by the STEM field throughout the year.

Under the leadership of the Baker Administration, the STEM Advisory Council is being reenergized to help lead the effort statewide. Lt. Governor Polito, Congressman Joe Kennedy III, and the CEO of Vertex Pharmaceuticals, Jeff Leiden, are providing dynamic leadership as the Council charts a path forward that is clear and designed to maximize impact. Education Secretary Jim Peyser and his team are similarly focused on STEM and how it fits into a broader workforce and economic development strategy.

These are exciting times for STEM in the Commonwealth. There is great momentum, a renewed commitment, tremendous leadership, and innovative activities happening all across the state. As employers compete nationally and indeed globally, the stakes couldn't be higher. Today is a day to acknowledge that, build upon it, and leave the DCU Center with a sense of purpose that will continue and expand Massachusetts' national leadership in STEM.

The Massachusetts Business Roundtable is pleased and honored to partner with you in this effort.

Sincerely,

Michael P. Hogan
President & Chief Executive Officer
A.D. Makepeace Company
Chair

JD Chesloff
Executive Director

University of Massachusetts
UMASS Amherst • Boston • Dartmouth • Lowell • Medical School • UMassOnline

Martin T. Meehan
President

November 10, 2015

Dear STEM Colleagues,

On behalf of the University of Massachusetts, its five campuses and the UMass Donahue Institute, I welcome you to the 2015 Massachusetts STEM Summit. In keeping with today's theme of *Promising Practices, Proven Results,* this gathering will provide an in-depth look at the successful applications of STEM principles and practices in areas including workforce development, education and research.

The STEM fields represent a critical area of job and economic growth in the Commonwealth. As the economy continues to improve, opportunities are increasing for STEM graduates. UMass plays a crucial role in educating the state's workforce and continues to increase its commitment to the growing demand for STEM-related degrees. Between 2008 and 2013, the number of UMass bachelor's degrees in STEM-related fields grew by 98 percent to 4,022 degrees awarded; master's by 56 percent to 1,100 degrees and doctorates awarded grew by 58 percent to 503 degrees.

UMass continues to burnish its reputation as a global research and innovation leader, placing 57th in Thomson Reuters' inaugural edition of the World's Most Innovative Universities. The 100 universities ranked, according to Thomson Reuters, "are the most elite" and "most reliably produce original research, create useful technology, and have the greatest economic impact."

In addition, UMass in the past year was awarded 65 U.S. patents, a record for the university system and a 20 percent jump from the previous year The university's increased influence and contributions in science and technology is crucial to the Commonwealth's efforts to compete in the global economy

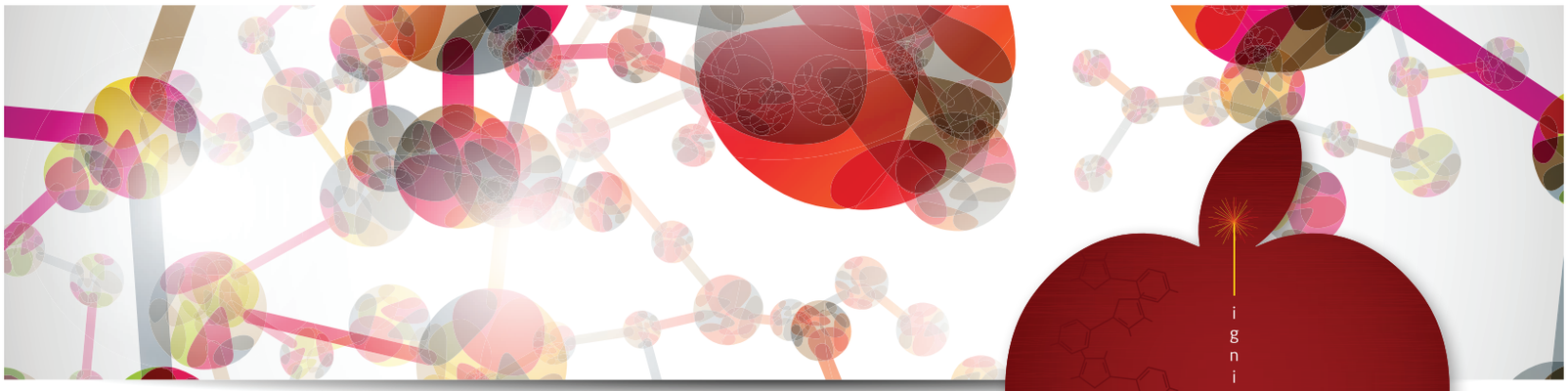
I thank our co-organizers, the Massachusetts STEM Advisory Council, the Massachusetts Business Roundtable and the UMass Donahue Institute -- and all of you for your continued commitment to STEM education in the Commonwealth. I also especially wish to thank the sponsors that stepped forward to support this annual Summit. We are proud to contribute to the Commonwealth's increasing vitality through STEM education intended to enhance the lives of our citizens.

I wish you all a great Summit.

Sincerely,

Martin T Meehan
President

225 Franklin Street 33rd Floor Boston, MA 02110 | P: (617) 287–7050 | F: (617) 287–7167 | www.massachusetts.edu



Congratulations to the recipients of the 2015 Ignite the Power of STEM Grant Program

Assabet Valley Collaborative Alternative School
Robotics and Practical Application in the Classroom

Billerica — Locke Middle School
The Math and Science of Robotic Drones

Blackstone Valley Regional Vocational Technical High School
Space Station and Russian Integration Projects

Bourne High School
Aquaponics Lab

Cambridge Rindge & Latin School
Mapping Genetic Pathways in Yeast

Danvers High School
Digital Fabrication Lab

Everett High School
EHS Robotics

Fitchburg — South Street Elementary School
WeDo Simple Machines

Framingham — Fuller Middle School
Supporting STEAM @ Fuller

Medford Vocational Technical High School
Aqua Culture Facility

North Middlesex Regional — Nissitissit Middle School
NMS Raspberry Pi Technology Program

Old Colony Regional Vocational Technical High School
Get the Lead Out: Evaluating and Eliminating Lead Based Paint Hazards

Sandwich STEM Academy
Environmental Monitoring and Technology

Springfield — STEM Middle Academy
Carlisle Brook Preserve/Outdoor Classroom

Waltham High School
Did You See That? I Did!

Weston — Country Elementary School
Take it Outdoors: Green STEAM

Weymouth — Abigail Adams Middle School
"little Bits" of STEM

Worcester — Mass Academy of Math and Science
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Boston University Office of the President

Dr. Robert A. Brown, President
One Silber Way
Boston, Massachusetts 02215
T 617-353-2200 F 617-353-3278

November 10, 2015

Greetings to all STEM Summit participants:

Boston University is pleased to sponsor this year's STEM Summit, an event that promotes the value of the STEM disciplines for our society. As a leading private research university, Boston University is committed to increasing the numbers of STEM graduates across the country and to deepening all students' knowledge of science and technology and its importance to our society.

Boston University is a member of the Association of American Universities (AAU) and an active participant in the AAU's STEM Initiative. BU established the STEM Education Initiatives office, the center of a University-wide effort to develop a coherent strategy for improving STEM education. BU's STEM Education Initiatives are intended to foster innovation in teacher preparation, to promote curriculum transformation, and to prepare the next generation of STEM leaders. BU's STEM Education Initiatives include:

- **CityLab:** In 1992, Boston University pioneered an innovative science education outreach program that has been replicated in several locations across the country. A collaboration of the Schools of Medicine and Education, CityLab provides access to a biotechnology laboratory and curriculum unavailable to most school systems for students and teachers in grades 7–12.
- **Inspiration Ambassadors:** BU's undergraduate Inspiration Ambassadors from the College of Engineering visit elementary, middle, and high schools in Greater Boston to give interactive, inspiring presentations to students, showing that engineering is essential to our health, happiness, and safety.
- **PhysTEC (Physics Teacher Education Coalition):** This new teacher training program has been developed in collaboration with BU's core science departments and the School of Education. The BU Physics Teacher Network, a group of more than 50 active high school physics teachers in the Boston area, is an extension of PhysTEC. Members of this coalition developed a new MOOC for AP Physics that launched on edX in January 2015. This will provide access to advanced courses for schools with insufficient resources.
- **STEM Educator-Engineer Program (STEEP):** This five-year program was designed to help meet the nation's need for educators with the skills and passion for both engineering and education to sustain the nation's competitive advantage. By combining a Master of Arts in Teaching with a Bachelor of Science in Engineering, STEEP graduates are prepared to teach science, technology, engineering, or math (STEM) in middle schools and high schools.
- **NetSci High:** Network Science for the Next Generation is a program for high school students run by the Science Education Group of the Center for Polymer Studies. The program introduces students to the field of network science, with opportunities to collaborate or research and attend an intensive residential summer camp.

Please stop by BU's information table to learn more about BU's work in STEM education.

We are pleased to sponsor this year's STEM Summit for the third consecutive year. We look forward to the opportunity to promote BU's STEM education initiatives and to connect with our STEM colleagues.

Sincerely,

Robert A. Brown
President

Challenging all students to own their future

The College Board is committed to ensuring that more students are inspired and prepared to become STEM professionals by connecting them with challenging coursework. Getting more students into AP® STEM courses is one immediate way to produce more candidates for college majors in STEM fields.

Learn more at collegeboard.org.

CollegeBoard

Burt Granofsky/EDC

Expertise and Innovation in STEM Education

From preschool through college, students need high-quality, inspiring STEM learning experiences every step of the way. For nearly 60 years, EDC has worked with Massachusetts educators, policymakers, and business leaders to foster students' STEM proficiency. We offer:

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REDEFINE OUR FUTURE

At EMC, success comes from creating technology which enables organizations to redefine their future—and from sharing that success by supporting a range of educational, cultural, and social programs in our community.

EMC is proud to sponsor Massachusetts' 2015 STEM Summit.

Learn more at emc.com.

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EMC²

Framingham
State University

October 7, 2015

Dear STEM Stakeholders,

Framingham State University is proud to support the 2015 Massachusetts STEM Summit. As the oldest public institution for teacher preparation in the nation, we are committed to delivering STEM-focused undergraduate programs and to preparing STEM teachers for the 21st century. Our highly qualified faculty mentor more than 1,000 undergraduate STEM majors and provide science and math content courses for elementary and early childhood education students. We also offer a variety of graduate degrees in the sciences including a Masters in STEM Education for elementary school teachers and a Professional Science Masters in Biotechnology.

FSU hosts the McAuliffe Center for Integrated STEM Learning. The McAuliffe Center offers STEM-focused professional development programs for K-12 teachers and houses the FSU Planetarium and Challenger Center. Each year the Challenger Center offers more than 10,000 middle and high school students a totally immersive, hands-on STEM education experience that is like nothing else. The mission scenarios put young learners in charge of a simulated space flight to the red planet, the Moon, or the International Space Station. The FSU planetarium offers planetarium shows as part of the Challenger experience and provides out-of-school time programs and free public planetarium shows.

FSU also hosts the MetroWest STEM Education Network (MSEN) which brings together key stakeholders to address regional education and workforce needs relating to STEM careers. FSU faculty, together with our partners at the McAuliffe Center and MSEN, host the Massachusetts Science Olympiad and offer a growing array of programming to engage the public in STEM activities including Science on State Street, our annual science festival.

We will continue to build on our record of providing strong undergraduate and graduate training in STEM and a broad range of professional development and public outreach programs.

We are pleased to support the STEM summit and look forward to engaging our students and our communities to enhance STEM literacy in the Commonwealth.

Sincerely,

Linda Vaden-Goad, Ph.D.
Provost, Vice President for Academic Affairs

OFFICE OF ACADEMIC AFFAIRS
100 State Street PO Box 9101 Framingham, MA 01701-9101 T 508-626-4582 F 508-626-4592 • www.framingham.edu

GENERAL DYNAMICS
Mission Systems

November 10, 2015

Dear STEM Stakeholders:

Welcome to the 2015 Massachusetts STEM Summit. General Dynamics Mission Systems is honored to participate in this event. Bringing together industry leaders, educators, policymakers, parents and students to focus on the Science, Technology, Engineering and Math (STEM) field for a full day sends a clear message that STEM careers are important to the future of our commonwealth.

General Dynamics Mission Systems strives to engage the students, parents and educators in our community to embrace STEM careers, particularly engineering. We host an annual high school engineering competition, judge regional science fairs, host shadow days, visit classrooms, participate in high school and college career fairs, sponsor robotics teams, mentor students and engage with students from early education through college.

In addition to the activities above, two key programs that assist us to attract and retain a highly technical workforce include a robust internship/co-op student program and an Engineering Leadership Development program for select full-time employees. Our internship program provides college students with real-world, hands on experience that goes beyond engineering and teaches students to be a successful addition to our workforce and a quality team member. Our Engineering Leadership Development program selects recent college graduates to participate in a rigorous three-year program that involves six-month rotational assignments through all aspects of the business, leadership training, and community involvement and culminates with a master's degree.

We are strong advocates of STEM careers and are delighted to participate in this STEM Summit as a way to bring more awareness to the STEM opportunities available throughout the entire commonwealth of Massachusetts.

Sincerely,

Beth Mitchell

Beth Mitchell
Director of Engineering, Maritime and Strategic Systems
General Dynamics Mission Systems

100 Plastics Ave
Pittsfield, MA 01201
www.gdmissionsystems.com

November 10, 2015

Dear STEM Stakeholders:

Welcome to the 2015 Massachusetts STEM Summit. The Summit represents a dynamic combination of business leaders, educators, government leaders, and non–profit agencies all dedicated to strengthening our students STEM education. With the cooperation of all the constituents involved, we can continue to rise to the forefront in technology.

iRobot has dedicated the last 25 years to building robots. As The Robot Company, we design and build robots that make a difference. We provide meaningful solutions to important human needs. We design robots that change the way people clean, change the way we respond to danger, and change the way we work in business and healthcare. Yet one of our greatest achievements is to change the way students think about science, technology, engineering and math.

The iRobot STEM program inspires our next generation of engineers and scientists. Our multi-faceted outreach program is a resource for students, parents and educators to share in our excitement for the robotics industry and get an inside look at what we do at iRobot. By offering real life examples, sharing our triumphant (and not so triumphant) robots, and providing hands-on experience, we encourage all students to explore and be curious.

iRobot. We are building robots and building the engineers that change the future.

Sincerely,

Colin Angle

Chairman, CEO and Co-Founder of iRobot

LEMELSON-MIT

Celebrating invention, inspiring youth

Massachusetts Institute of Technology
School of Engineering
77 Massachusetts Avenue, 10-110
Cambridge, MA 02139
lemelson.mit.edu

October 5, 2015

Welcome STEM Summit Participants:

The Lemelson-MIT Program is proud to sponsor this year's Massachusetts STEM Summit. Our program is dedicated to inspiring youth to invent and develop their hands-on skills in science, technology, engineering and math through two national grants initiatives that reach students in grades 9-12:

- The **InvenTeam** initiative introduces high school students to the invention process and increases their interest and excitement in STEM related subjects. We have seen the positive impact this experience has on teachers, students, and their community from establishing invention curriculums to inspiring youth to pursue STEM disciplines in college.

- The **JV InvenTeam** initiative helps educators cultivate inventive curiosity and technical skills in ninth and tenth grade students traditionally lacking access to hands-on enrichment opportunities in STEM. JV InvenTeams practice invention-based design activities from invention kits that include themed guides and materials for students and educators.

We are excited to be a part of the STEM Summit along with other sponsors and participants around the Commonwealth who are investing in STEM programs. Stop by the Lemelson-MIT Program's information table to learn more about our work and talk to young inventors from the 2015 John D. O'Bryant School of Mathematics & Science InvenTeam.

Sincerely,

Joshua Schuler
Executive Director
Lemelson-MIT Program

MASSACHUSETTS
LIFE SCIENCES CENTER

Investing in the State of Innovation

November 10, 2015

Dear STEM Stakeholders:

The Massachusetts Life Sciences Center (MLSC) is very pleased to support the Massachusetts STEM Summit. We also are proud to be represented on the Massachusetts STEM Advisory Council, the goal of which is to ensure that all students in the Commonwealth receive a strong education that prepares them for jobs in the innovation economy.

Massachusetts has established its undisputed global leadership in the life sciences. Our state has become ñthe place to beò for companies in all industry sectors including biotech, pharmaceuticals and medical technology. While the state's hallmark is the concentration and skill of our workforce, we must continue to invest in the highest caliber education and training across the entire state if we are to meet the demands of the rapidly growing number of life sciences companies here in Massachusetts. Students and future workers across the state must have the preparation they need to compete for and be successful in STEM-related careers. We are grateful to the Baker Administration for their leadership in meeting this challenge by investing in STEM education and training programs in Massachusetts.

The MLSC recognizes that there are different levels of skill and expertise needed by the breadth and diversity of the stateôs life sciences industry. Through our innovative programs and key partnerships, we are committed to promote access to the institutions and programs across the state that are providing STEM education and training ï including K-12, vocational-technical schools, community colleges, world-class universities, and community-based workforce development programs.

Collectively, we must engage students and workforce ready adults in STEM subjects, and we must enable our teachers, programs, and schools to provide the highest quality STEM training. Toward this end, the **MLSC has invested nearly $60 million in programs and projects that support STEM education and workforce development.**

Over the past five years the MLSC has awarded 17 grants totaling nearly $1.3 million to support studentsôearly interest in STEM. Grants have been provided to organizations offering innovative programs, such as The DIGITS Project, Citizens Schools, Science Club for Girls, Freedom House, Youth CITIES, Girls Inc., and the Boston Childrenôs Museum. These programs broaden young peopleôs skills, and enhance their knowledge of career opportunities in the life sciences, and provide STEM professional development for teachers. Importantly, these programs target girls and underrepresented minorities, whose participation in STEM is critical to our success as a state.

The MLSC also offers the STEM Equipment and Supplies Grant Program, which has awarded more than $12 million in grant funding to over 100 vocational technical high schools, public high schools and middle schools in gateway cities, public high schools and middle schools serving low-income students, and workforce training organizations that serve such schools. The program enables schools to purchase much-needed new equipment and supplies to support improved student learning and skills that are relevant and necessary for tomorrowôs life sciences workforce.

For our college students and recent graduates, the MLSC runs the Internship Challenge, a year-round workforce development program that strengthens the talent pipeline for our stateôs life sciences industry by creating hundreds of internships each year that offer students a hands-on learning experience. To date, the MLSC has funded more than 2,200 paid internships at over 500 life sciences companies across Massachusetts.

I hope and expect that this yearôs STEM Summit will further mobilize our STEM community to keep Massachusettsôa global leader in STEM. We look forward to participating in the Summit and collaborating with you to make these goals a reality.

Sincerely,

Travis McCready
President & CEO

1000 Winter Street
Suite 2900
South Entrance
Waltham, MA 02451

T : 781.373.7777
F : 781.622.1530

masslifesciences.com

Microsoft

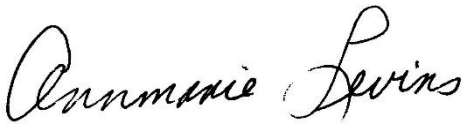
Welcome to the 2015 Massachusetts STEM Summit!

Microsoft works with local communities to help leverage the power of technology to promote economic growth and increased opportunities for all. We are fortunate that Massachusetts continues to experience rapid growth and lead in civic innovation. But like many states across the US, Massachusetts suffers from a lack of qualified candidates to fill jobs that require STEM skills. Microsoft is committed to helping to fill the pipeline of qualified candidates for these jobs of the future.

Students of the Commonwealth of Massachusetts must be competitive, agile students prepared with 21st century skills. Microsoft supports its employees in making individual contributions through a program called TEALS: Technology Education and Literacy in Schools. This program, in practice today in Boston, pairs Microsoft employee volunteers and high school teachers to teach "Intro to Computer Science" and "AP Computer Science" courses. We are also proud to support key organizations driving computer science education efforts for Massachusetts such as the MassTLC Education Foundation and MassCAN, the Massachusetts Computer Science Attainment Network.

Together we are making progress. More students are becoming interested in STEM. More teachers are learning cutting edge technologies. Schools are partnering with industry. But it's just the start. We look forward to partnering with you to strengthen the STEM pipeline in Massachusetts, to close the skills gap and meet projected domestic workforce needs.

Sincerely,



Annmarie Levins
General Manager
Technology & Civic Engagement

Marcy L. Reed
President, Massachusetts

November 10, 2015

Dear STEM Stakeholders,

I am thrilled to be among so many influencers who share my and National Grid's passion for inspiring, attracting and developing a skilled workforce. As a member of the Governor's STEM Advisory Council, it is my privilege to welcome you to the 2015 Massachusetts STEM Summit.

In the utility industry and beyond, we face a skills gap: both because a large number of our employees are entering retiring age, and we don't have enough students entering the science, technology, engineering and math fields. These jobs are critical to the success of our economy. Through targeted discussions such as those we will have today, we're helping to make sure we advance students' STEM skills.

We at National Grid already know many of these students, and have worked with them right here in Worcester, the largest of the state's 26 Gateway Cities. Down the street, you can find our Sustainability Hub, where graduate students serve as ambassadors, cultivating their interest in the energy field while creating cooperative learning opportunities for local residents.

Our industry needs to inspire a new generation of engineers and other STEM professionals as we face unprecedented energy challenges. I've said numerous times, unapologetically, that our motivation for supporting numerous educational programs is not selfless. We want the best, the brightest, the most passionate, working in our ranks. To this end, we are proud to invest in several organizations in the Worcester community:

> **Girls Incorporated:** Providing girls with high quality STEM training and support throughout the school year and summer months.
> **FIRST Robotics:** Sponsorship of Central MA district event at Worcester Polytechnic Institute.
> **Bottom Line:** Assisting students through college application process and mentoring through college graduation.

Thank you for your interest in and efforts toward building a STEM-literate workforce. I look forward to a successful day of brainstorming, idea-sharing and action on this critical issue.

Sincerely,

Marcy L. Reed

40 Sylvan Road, Waltham, MA 02451
www.nationalgridus.com

STRENGTHENING STEM

IN THESE FACES, WE CAN SEE THE FUTURE.

Raytheon salutes the participants of the Massachusetts STEM Summit. The dedication, leadership and collaboration of government, academia, nonprofits and the private sector enrich our community today and shape the future leaders of tomorrow. We applaud and thank you for your continual efforts to advance STEM education in the Commonwealth.

Raytheon.com

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AMHERST

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181 Presidents Drive
Amherst, MA 01003-9313

Office of the Provost

Voice: 413.545.6223
Fax: 413.577.3980
www.umass.edu/provost

October 8, 2015

Dear STEM colleagues,

As the Commonwealth's flagship campus, the University of Massachusetts Amherst makes notable contributions to STEM-related educational and workforce efforts at the national, state, and community levels. UMass Amherst offers a range of NSF-funded Research Experience for Undergraduates (REU) programs that attract undergraduates throughout the U.S. Our scientists have created a host of Online Web-based Learning (OWL) modules and math tutoring systems that have been adopted at the national level. UMass Amherst partners with communities across the Commonwealth to provide STEM teacher training, curriculum plans, and certificates, and brings primary and secondary school students to campus for immersive educational visits.

On campus, UMass Amherst is focused on producing the next generation of leaders in science. Our STEM students experience innovative inquiry-based classroom and laboratory experiences and work with faculty who are both internationally known for their research and honored for their teaching efforts. One indicator of our success is the consistently high number of Goldwater Scholarships awarded annually. In 2015, all four nominees, the maximum number allowed per campus, were selected as Goldwater Scholars. MIT was the only other Massachusetts institution to have four nominees selected.

The College of Engineering incorporates real-world design challenges and experiential learning architecture into its programs to promote hands-on learning and inventing. We are pleased to announce a recent $632,369 NSF award to provide scholarship and academic support for low-income, academically talented students, transferring into our four-year engineering programs from area community colleges. Early K-12 exposure to the engineering field occurs through our Summer Engineering Institute (SENGI), Girl Scout Days, Women in Engineering Career Day, and outreach initiatives with local schools and Boys & Girls Clubs. Research and teaching focus areas include biomedicine, sustainable energy, cybersecurity, mechatronics, and biomechanics, all of which have strong, positive societal benefits that appeal to a new generation of engineers. These focus areas also widely complement our state's innovative economy, which makes the College of Engineering a strong contributor to the STEM talent pipeline.

The College of Information and Computer Sciences (CICS) provides students with a strong grounding in the principles of computer science and exposure to special areas of focus including artificial intelligence, machine learning, data science, robotics, bioinformatics, and security and privacy. In recognition of computing's central role in society, CICS faculty engage in interdisciplinary, collaborative teaching and research in order to prepare students to solve problems in fields as diverse as healthcare, education, technology, and government. CICS further broadens its reach to K-12 students and educators through the Commonwealth Alliance for Information Technology Education (CAITE), a NSF-funded project that develops programs to address underrepresentation in information technology education and workforce in Massachusetts.

The College of Natural Sciences (CNS) unites mathematics and the life, environmental, and physical sciences and prepares students for careers in the sciences, medicine, industry, and agriculture, and entry into graduate and professional schools. CNS faculty are dedicated to effective and innovative teaching and committed to mentoring undergraduates in their research laboratories as well as in the classroom. Among the many hands-on research opportunities for CNS undergraduates, two pioneering programs give students authentic research experiences their first year on campus: the First-Year Research Experience and the *Integrated Concentration in Science* (iCons). CNS Outreach includes the STEM Starter Academy, a partnership with area community, and Eureka!, a collaboration with Girls Inc. of Holyoke that encourages eighth grade girls from diverse backgrounds to pursue post-secondary education and career paths in STEM fields.

With enrollment burgeoning in the three STEM colleges, and a substantial proportion of our 80 percent in-state enrolled students entering the Massachusetts workforce upon graduation, UMass Amherst is an invaluable contributor to the Commonwealth's STEM efforts.

Sincerely,

Katherine S. Newman
Provost and Senior Vice Chancellor for Academic Affairs

UMASS BOSTON
UNIVERSITY OF MASSACHUSETTS BOSTON
50 Years

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Boston, MA 02125-3393
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November 10, 2015

Dear STEM Colleagues:

The University of Massachusetts Boston brings together a strong set of partners, including the College of Science and Mathematics (CSM), College of Advancing and Professional Studies (CAPS), Broadening Advanced Technological Education Connections (BATEC), Office for Research and Strategic Initiatives and Enrollment Management, to support the 2015 Massachusetts STEM Summit statewide collaboration. The summit is a critical convening opportunity for those of us who work together to create a strong STEM education and workforce system for our state.

The College of Science and Mathematics employs a comprehensive approach that integrates effective pedagogy and immersive research experiences in areas ranging from life sciences and biomedical sciences, green chemistry, engineering and applied physics as well as from environmental sciences to mathematics and computational sciences. We maintain strong partnerships with global corporate and institutional partners that support our commitment to STEM education. Through a problem-based approach, our undergraduate students are provided with meaningful opportunities to participate in active research projects and enrichment programs in order to better demonstrate how their learned skills and knowledge can be applied in real life settings thereby preparing them for future professional careers and graduate programs.

The College of Advancing and Professional Studies offers wide-ranging educational opportunities across a diverse set of programmatic options, providing quality education in formats that are relevant and accessible to all. Housed within the college, Broadening Advanced Technological Education Connections (BATEC) is the National Center of Excellence for Computing and Information Technologies within the National Science Foundation's Advanced Technological Education program. BATEC has a history of success helping to improve computing and information technology programs. We work throughout the state and nationally to define, extend, and strengthen computing and information technology pathways and career opportunities for urban students. BATEC's data-driven research initiative provides for better understanding and profiling of these middle-career skill pathways.

The Office of Research and Strategic Initiatives connects our faculty, research staff, staff, and students with opportunities to blend research, innovation, scholarship, and creativity to yields vital contributions to the city of Boston, the Commonwealth of Massachusetts, and beyond. Our multidisciplinary and now fast-growing transdisciplinary approaches to research focus on the needs of our communities to make UMB an urban research university with a teaching soul.

The Division of Enrollment Management supports the needs of graduate and undergraduate students as they apply for admission, finance their education and make progress toward their educational objectives. Just as the STEM Summit has grown in attendance over the past 12 years, so has enrollment at UMass Boston, especially in STEM related programs which have more than doubled in size. Students studying in our College of Science and Mathematics have the unique opportunity to take courses in a small classroom environment, conduct research with our esteemed faculty and take advantage of coastal labs on our waterfront campuses in Boston and Nantucket.

UMass Boston wishes to thank the Governor's STEM Advisory Council, the UMass Donahue Institute, and the other supporters of this event for their leadership in the quest to make Massachusetts a world-class STEM leader.

Sincerely,

Andrew Grosovsky	*Philip DiSalvio*	*Deborah Boisvert*	*Zong-Guo Xia*	*Lisa Johnson*
Dean, College of Science and Math	Dean, College of Advancing and Professional Studies	PI and Executive Director, BATEC	Vice Provost for Research	Vice Chancellor, Enrollment Management

University of Massachusetts Lowell
Learning with Purpose

University Crossing
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Lowell, Massachusetts 01854
tel: 978.934.2201
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Jacqueline F. Moloney
Chancellor

OFFICE OF THE CHANCELLOR

November 10, 2015

Dear STEM Summit Participants:

The University of Massachusetts Lowell is proud to support the 2015 Massachusetts STEM Summit. This gathering provides an important opportunity for stakeholders to exchange ideas, learn about best practices and collaborate on future growth.

STEM-related industries are key drivers of the Commonwealth's economy. Our university is committed to offering the best academic programs to prepare our graduates for a wide variety of careers in such fields as high technology, computer science, biotechnology, engineering, robotics and STEM education.

UMass Lowell is engaged in STEM-related work on numerous fronts—through research, scholarship, teacher education and training and community outreach. Through initiatives like our DifferenceMaker program, undergraduates and graduate students alike are applying knowledge and skills to develop solutions to real-world problems. For students interested in education, our UTeach program is helping to train the next generation of STEM educators. To foster interest and build skills among high school students, the Francis College of Engineering offers summer camps where attendees learn about such topics as the science of sports and sustainable engineering.

Across our campus, faculty and student researchers are working side-by-side with our partners in industry to expand the boundaries of knowledge and understanding about STEM fields. For example, they are developing robots that will advance search and rescue efforts and improve the lives of people with disabilities. They are inventing materials to better protect the safety of soldiers on the battlefield and designing sustainable energy projects to address the impact of climate change.

As a center of innovation, Massachusetts has long been a leader in STEM disciplines. For our Commonwealth, and indeed our nation, to remain competitive and drive innovation in a global economy, we need to cultivate STEM talent at all levels. As a participant in today's STEM Summit, we look forward to working with everyone to continue making progress.

Sincerely,

Jacqueline F. Moloney
Chancellor
University of Massachusetts Lowell

Donna C. Cupelo
Region President – New England

Verizon Communications
125 High Street, Oliver Tower
7th Floor
Boston, MA 02110

November 10, 2015

Dear STEM Stakeholders,

It is an honor to support the 2015 Massachusetts STEM Summit. At Verizon, we understand how important it is to engage in discussion with educators, business leaders, nonprofit partners, and public officials to strengthen the Science, Technology, Engineering, and Math (STEM) skills of Massachusetts students.

As a technology company and innovation driver, STEM is the lifeblood of our industry. Verizon relies on employees who have a wealth of expertise in the STEM fields. Our goal is to use our resources – both technical and human – to engage students and educators in STEM so we can help fill a pipeline of talented professionals ready to succeed and innovate in a fast paced global market.

Verizon strives to instill a passion for STEM through our community service efforts. For example, our Verizon Innovative Learning Schools provide intensive professional development for math and science teachers in underserved schools to improve student outcomes in STEM, and the Verizon Innovation App Challenge, in partnership with the Technology Student Association and MIT Media Labs, is driving student interest in STEM through the development of mobile apps.

Summit participants should be commended for ensuring that students in this state have the strong STEM foundation necessary to succeed in higher education, and ultimately, careers that fuel our local and global economies. Thanks to your efforts, under the leadership of Governor Charlie Baker and his team, Massachusetts continues to be a national leader in STEM student achievement.

We are excited to partner with such a committed group of people focused on shaping the future of innovation.

Sincerely,

Donna C Cupelo

WGBH
One Guest Street
Boston
Massachusetts
02135

617 300 2000
wgbh.org

Dear Massachusetts STEM Summit Participants,

WGBH is proud to once again be the media partner for the annual Massachusetts STEM Summit. We commend the Massachusetts Business Roundtable, the Massachusetts STEM Advisory Council, and the UMass Donahue Institute for their ongoing and extraordinary commitment to STEM education and for convening this summit, now in its twelfth year.

A pioneer in digital learning, WGBH has a long history of promoting STEM awareness and education both locally and across the country. PBS LearningMedia, created through a partnership between WGBH and PBS, now has over 1.7 million registered users and over 100,000 free classroom-ready, curriculum-targeted digital resources. WGBH has taken the lead in creating PBS LearningMedia's timely and expanding STEM content. Resources are drawn from WGBH-produced programs such as *NOVA*, *ZOOM* and *Peep and the Big Wide World* as well as educational content we produce in collaboration with esteemed partners such as the National Science Foundation. Consistently, WGBH-produced STEM resources are among the top favorites of educators who visit the site.

Here at the Summit we are teaming up with the Massachusetts Department of Elementary and Secondary Education to present the new Science Technology and Engineering (STE) standards, scheduled for adoption in January 2016. Massachusetts districts and schools will be working to adjust programs and curriculum to reflect key changes in student performance expectations, particularly in regard to the inclusion of science and engineering practices, a focus on college and career readiness, and coherent progressions of learning across years. Resources for Massachusetts educators on PBS LearningMedia will be updated to current local standards alignment in 2016. This means that educators will then easily search the entire PBS LearningMedia library to find exactly what they need to support the new curriculum frameworks.

WGBH salutes Massachusetts Governor Charlie Baker, the Commonwealth's Department of Education, the participants in today's summit, and educators statewide for making improved STEM education a priority. We are thrilled to join with you in making a real difference in the lives of students and their families.

Jonathan C. Abbott
President and CEO

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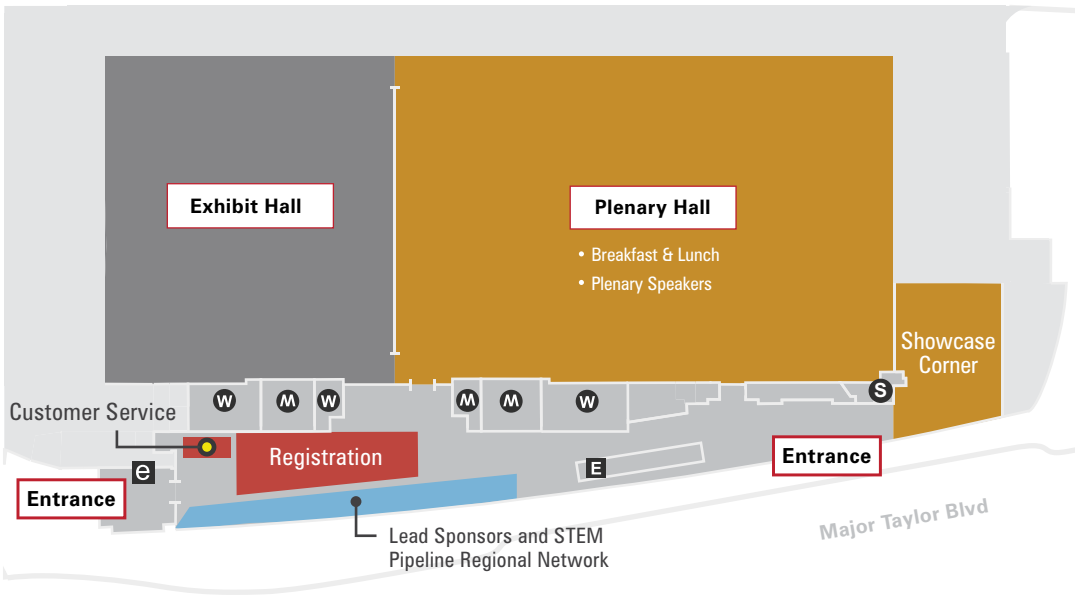
BREAKOUT SESSION ROOM ASSIGNMENTS

DCU CENTER – 1ST LEVEL			
Location	AM Breakout I (9:50-11:00)	AM Breakout II (11:20-12:30)	PM Breakout (2:35-3:45)
Plenary Hall	**Research & Practice:** Supporting the Rollout of the Revised MA STE Standards: A Partnership of Research and Practice	**Policy:** A Discussion with Massachusetts Education Commissioners: Statewide Programs that Support the STEM Plan	**Policy:** A Conversation with Governor Baker's Workforce Skills Cabinet
Exhibit Hall		Resource and Sponsor Exhibits Hall	
Showcase Corner	**Early Ed:** Building Brains with Boxes!	**Early Ed:** Developing Young Children's Numbersense and Mathematics Readiness through Sidewalk Math	**Early Ed:** Make a Joyful Noise: Young Children Explore Sound and Music

DCU CENTER – 2ND LEVEL			
Location	AM Breakout I (9:50-11:00)	AM Breakout II (11:20-12:30)	PM Breakout (2:35-3:45)
Conference Room 210A	**Higher Ed - 2-year:** Bridging the Gap Between Students and Employers: The NECC Laboratory Science Program	**Innovation & Entrepreneurship:** Impactful Teaching and Learning and Environmental Restoration through Citizen Science	**Research & Practice:** Teaching Science to Learn Science
Conference Room 210B	**Career Awareness/Workforce Dev:** Early Engagement and Growth for the STEM Professional	**Higher Ed - 2-year:** Leveraging 2- and 4-Year Partnerships and Student Research to Foster Student Success in STEM	**Out-of-School Time:** Understanding the Middle School Science Fair Experience

DCU CENTER – 3RD LEVEL			
Location	AM Breakout I (9:50-11:00)	AM Breakout II (11:20-12:30)	PM Breakout (2:35-3:45)
Grand Ballroom Prefunction	**Career Awareness/Workforce Dev:** The Effect of Mentoring: The Million Women Mentors Initiative	**Out-of-School Time:** Science is Everywhere: In and Out of the Library	**K-12 Ed:** Bringing Students into the Formative Assessment Process: Research Headlines, Resources and Tools
Junior Ballroom Prefunction	**K-12 Ed:** Innovation in Biotechnology Education	**Policy:** STEM Education and Workforce in Northern New England: Report of the Councils	**Higher Ed - 4-year:** Engaging Elementary Education Majors in STEM: Investigations Impact Science Teaching Efficacy
Grand Ballroom South	**K-12 Ed:** An Effective Professional Development Model for Training Science Teacher Leaders K-12	**K-12 Ed:** How Can the Arts Improve STEM Outcomes for Students?	**Digital Ed:** Digital Resources for STEM Learning and Engagement: Young Children to Teens
Grand Ballroom Center	**K-12 Ed:** 10 Quick Wins for STEM Integration and Programming	**K-12 Ed:** Accept the Challenge: Design Meaningful Projects	**Early Ed:** Local Nature and Young Children: A Natural Choice in Support of Learning
Grand Ballroom North	**Higher Ed - 4-year:** Proven Strategies in Fostering and Retaining STEM Students	**K-12 Ed:** Integrating STEM Education Throughout a District or School	**K-12 Ed:** Making STE(A)M: Integrating Project Based Learning and STEM Grades K-12
Meeting Room A	**Innovation & Entrepreneurship:** Successful Models for Student Innovation and Entrepreneurship in High School	**Career Awareness/Workforce Dev:** Project-Based Learning + Real-World Manufacturing + Industry Mentors = Job-Driven STEM Education	**K-12 Ed:** APPS FOR GOOD: Socially Responsible App Development in K-12 Curriculum
Meeting Room B	**Early Ed:** STEM in the Infant and Toddler Classroom	**Research & Practice:** Exploring the Landscape of Engineering Education in Massachusetts	**K-12 Ed:** HS Engineering 4.0: Going from One Engineering Class to an Articulated 4-year Science/ CVTE Program
Meeting Room C	**Digital Ed:** Best Practice: Dennis-Yarmouth Regional High School Leading Global STEM Classroom™ Programs in MA	**Higher Ed - 4-year:** What's the Flippin' Difference? The Implementation and Effectiveness of Flipped Learning	**Career Awareness/Workforce Dev:** STEM + M Partnerships
Meeting Room D	**Out-of-School Time:** Fusing STEM & Youth Development: A New Approach to Summer Learning	**Digital Ed:** Growing the STEM Workforce: Engaging Women & Underrepresented Minorities in Computer Science	**Career Awareness/Workforce Dev:** Where are the Middle Skill Jobs?
Meeting Room E	**K-12 Ed:** Field Data is Awesome Data: How to Use Real Science to do Real Math	**Career Awareness/Workforce Dev:** STEM 2.0: Career Skills for a 21st Century STEM Worker	**Out-of-School Time:** ITEST Projects in the Out of School Context: Diverse Practices to Reach Underrepresented Youth
Junior Ballroom	**Policy:** Building to STEM Plan 3.0: Beacons of Success and Leveraging National Connections	**K-12 Ed:** Breaking Down Barriers: Social and Cultural Contributors to Ensure STEM for All	**K-12 Ed:** Writing to Think: Using Notebook Writing to Guide Inquiry-Based Learning in Science

LEVEL 1



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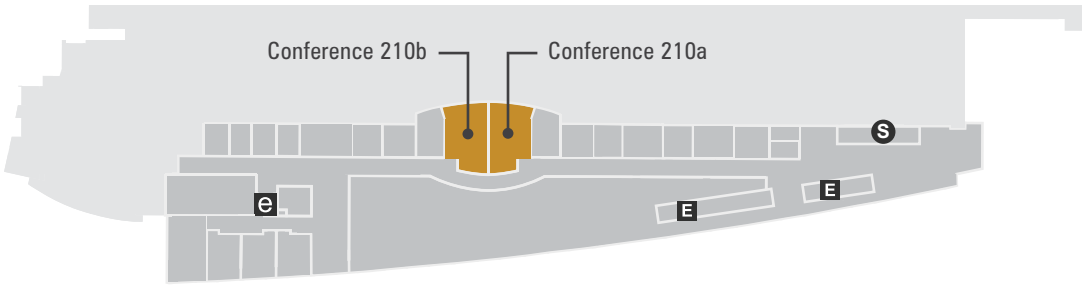

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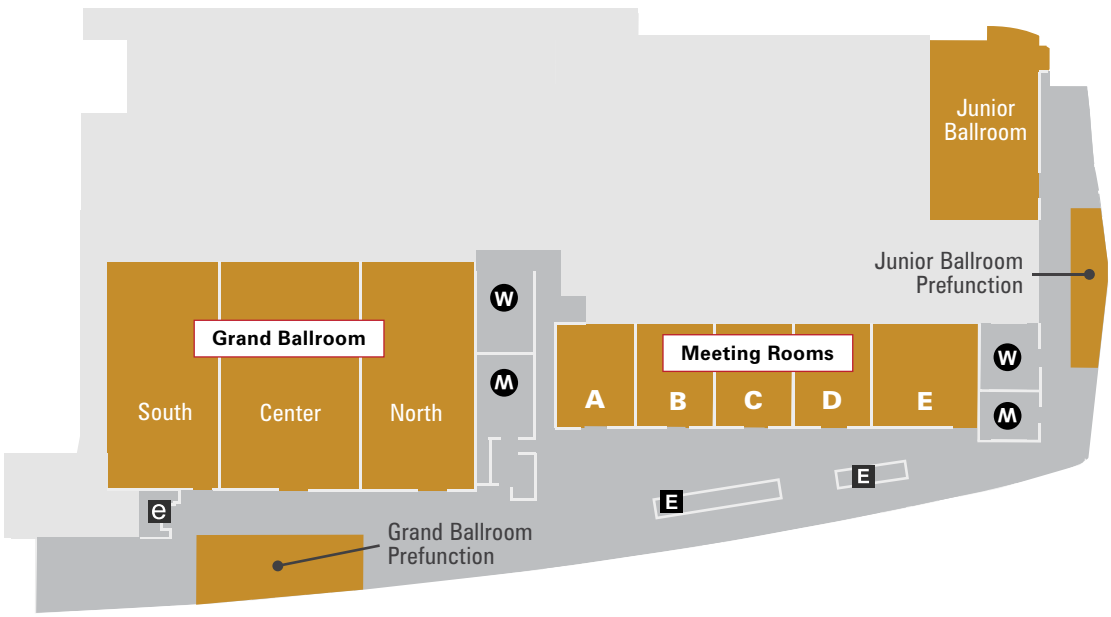

Breakout Session Location | W Women's Room | M Men's Room | E Escalator | e Elevator | S Stairs

Special Thanks

Cora Beth Abel, MA State Science & Engineering Fair
Meghan Abella-Bowen, Bristol Community College
Jennifer Aizenman, Bridgewater State University
Barbara Berns, EDC
Michele Bernier, UMass President's Office
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Amy Fish, Bourne Public Schools
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Shawn Goulet, Cape Cod Commission
Vicki Grisanti, Robotics Education and Competition Foundation
Peter Holden, STARBASE Academy, Hanscom AFB
Isabel Huff, Springfield Technical Community College
Chitra Javdekar, Mass Bay Community College
Mary Lee Ledbetter, College of the Holy Cross
Lise LeTellier, Holyoke Catholic High School
Eric Lieberman, MA Dept. of Early Education and Care
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