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Event Schedule

7:30am – 2:00pm Registration

7:30am – 9:30am Breakfast Buffet

8:00am – 3:30pm Exhibit Hall

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

- **Doug Banks**, Executive Editor, Boston Business Journal
- **J. Lynn Griesemer**, Associate Vice-President, Economic Development, University of Massachusetts President's Office; Executive Director, UMass Donahue Institute
- **Congressman Joseph Kennedy** - Honorary Co-chair, Massachusetts STEM Advisory Council
- **Kelli Wells**, Executive Director, Education, GE Foundation

Youth CITIES:

- **Vicky Wu Davis**, Founder and Executive Director, Youth CITIES
- **Olutoni (Toni) Oloko**, Student, Wharton School, University of Pennsylvania
- **Emma Boyd**, Student, McCall Middle School, Winchester
- **Justin Yu**, Student, Winchester High School

9:30am – 9:45am Break

9:45am – 10:35am AM Breakout I

- Boston STEM Week: A Collaborative Effort to Bring Integrated STEM to Middle Schoolers
- Building STEM Majors' Capacity for Delivering Inquiry-based Mathematics and Science Lessons through UTeach
- Communities and Opportunities for STEM Majors: MST & PRISM at Northeastern University
- Connecting the Dots - Linking Opportunity and Insight from K-12 to the Workforce
- Designing a Longitudinal STEM Career Pathway from 7th Grade through Community College
- Engineering in Your Classroom Block Area: Using Problems Encountered in Children's Literature to Solve Problems Together
- Exploring the "T" in the Early Childhood STEM Standards: Extending Technology beyond Screens
- Leveraging Educator-Industry Partnerships to Increase Diversity in High School STEM Internships
- Preparing to Teach STE in Elementary Schools: A Discussion for Stakeholders
- Project Accelerate: A University – HS Partnership Bringing AP® Physics 1 to Underserved Students
- Teaching Students to Ask Their Own Questions in the STEM Classroom

Event Schedule

10:35am – 10:55am Break

10:55am – 11:45am AM Breakout II

- A Reverse Science Fair: Building Relationships between High School Students and Graduate Researchers
- An Alternative to Exams in the Sciences: eReports for Better Learning Opportunities with Less Stress
- Bringing the Universe to America's Classrooms: Using Digital Media to Support Three-Dimensional Learning in Earth and Space Science (WGBH)
- Building Bridges through STEM between a College and Urban High-Risk Middle School Students
- Building Middle School Engagement in Math and Computer Science: Findings from the NSF ITEST Program
- Cape Cod STEM Network Teacher-in-Residence Program: Making Connections Outside the Standards
- Clean Energy Corps: From Classroom to Company
- iRobot Create® 2 and Scratch in Your Classroom
- Managing Knowledge, Lore, and Connections
- STEM Matters in the Earliest Years
- Using Literacy Experiences to Extend STEM Learning
- Writing in Science to Support Thinking and Inquiry in STEM

11:35am – 1:00pm Luncheon Buffet

12:30pm – 1:30pm Luncheon Plenary (Plenary Hall)

- **Doug Banks**, Executive Editor, Boston Business Journal
- **Bryan Morry**, Executive Director, The Hall at Patriot Place presented by Raytheon
- **David Mangus**, Brockton High School, The Hall at Patriot Place 2016 Massachusetts STEM Teacher of the Year
- **Marty Meehan**, President, University of Massachusetts
- **Lt. Governor Karyn Polito**, Commonwealth of Massachusetts; Co-chair, Massachusetts STEM Advisory Council
- **JD Chesloff**, Executive Director, Mass Business Roundtable
- **Colin Angle**, Chairman of the Board, Chief Executive Officer and Co-founder, iRobot® Corporation

1:30pm – 1:45pm Break

1:45pm – 2:35pm PM Breakout I

- Animal-based Pedagogy in Engineering Education
- Best Practices to Develop a Skilled Workforce through Industry/Academia Partnerships
- Building a Diverse Healthcare Workforce: Creating a Pathway for Success
- Developing and Designing Impactful STEM Programs Based on K-8 Teacher Needs: A Discussion Forum
- Exploring Computer Science: Engaging High School Students and Teachers Across MA
- Games for Young Mathematicians: Mathematics Learning and Persistence in Preschool
- How Community College Students Form a STEM Identity
- Invasive Species and Elementary Age Students: Using Literature and Theater as Educational Tools
- Let Your Inner Child Out in the STEM Playground
- Resources and Strategies for Implementing the 2016 MA Science and Technology/Engineering Standards
- STEM Program Evaluation: Focused Roundtable Discussions

2:35pm – 2:55pm Break

2:55pm – 3:45pm PM Breakout II

- Advancing Career Pathways in Automation and Quality
- Building Connections to STEM Careers through 21st Century Learning Conferences
- Building Effective STEM Communities
- Careers in Fire Protection
- CS Pathways: A Model of Inclusive Middle School Computing for Social Good
- Including the Special Needs Student in STEAM Programming
- Learning Math as a Creative Experience
- Re-imagine Teacher Education for STEM Educators with Woodrow Wilson Academy of Teaching and Learning and MIT
- Real-World Learning: Teaching Science through Case Studies
- Seeds of STEM: A Problem Solving Curriculum for Pre-K Classrooms
- Through the Eyes of the Protagonist: Using Story to Foster STEM Identity and Engage Girls in STEM

Plenary Speaker Bios

Colin Angle

Colin Angle is the chairman of the board, chief executive officer and co-founder of iRobot® Corp. Angle's leadership has transformed the Massachusetts Institute of Technology spin-off into a global leader of practical robots. One of the world's leading authorities on mobile robots, Angle is an industry pioneer with more than two decades of experience.

Under his guidance, iRobot is at the forefront of the growing robot industry, delivering home and military robots that are making a difference. A longtime sailor, Angle is known for his ability to bring together and inspire a winning crew. By setting a course of team empowerment, collaboration and innovation, Angle is enabling iRobot to deliver cutting-edge, market-leading robots that save time and lives. Today, more than 14 million home robots have been sold worldwide, revolutionizing the way people clean. More than 5,000 military robots have been delivered to defense forces worldwide, performing thousands of dangerous missions while keeping troops out of harm's way. Angle's vision for the future of robots and his keen sense of business strategy are driving forces behind iRobot's successful identification and execution of expansion opportunities. Under Angle's leadership, iRobot has formed strategic partnerships with Clorox, Boeing and a variety of other companies, building on decades of expertise from each partner to create new and innovative robot solutions. In iRobot's early days, Angle and his team designed the behavior-controlled rovers for NASA that led to the Sojourner exploring Mars in 1997. Angle's team won the NASA Group Achievement Award for its accomplishments, and his name is inscribed inside the case of Spirit, the Mars exploration rover on display at NASA. Before co-founding iRobot in 1990, Angle was president of Artificial Creatures Inc.

Earlier in his career, Angle worked at MIT's Artificial Intelligence Laboratory, where he first teamed with iRobot co-founders Helen Greiner and Dr. Rodney Brooks. Angle's master thesis at MIT produced Genghis, a six-legged autonomous walking robot that is now at the Smithsonian National Air and Science Museum in Washington, D.C. Angle's leadership has been recognized with numerous professional awards. He has been named CEO of the Year by the Mass Technology Leadership Council, a Mass High Tech AllStar, one of Fortune Small Business Magazine's Best Bosses and New England Entrepreneur of the Year by Ernst and Young. Angle holds a bachelor's degree in electrical engineering and a master's degree in computer science, both from MIT.

Doug Banks

Doug Banks is executive editor of the Boston Business Journal (BBJ), where he oversees all editorial content of the company's daily web site, multiple electronic newsletters, weekly print edition, and panel and award events. He is a frequent speaker and panel moderator on a variety of issues, from regional business and economic trends to communications, journalism and digital media.

Prior to his role as executive editor, Doug was publisher and editor of BBJ sister company Mass High Tech. While leading Mass High Tech, he launched multiple digital products, including a new website and a family of e-newsletters, and helped dramatically grow its events business.

Between stints at the Business Journal and Mass High Tech Doug served for three years as associate vice president for economic development at the University of Massachusetts President's Office, where his duties included developing strategic partnerships with state and federal government, business and industry, and other institutions of higher education, and where he managed a seed-fund investment program to drive new faculty-research projects.

Doug has a wife and two teen-aged children. A native of Worcester, Banks received a bachelor's degree in journalism and English literature from the University of Massachusetts Amherst and a master's of fine arts degree in nonfiction writing from the University of Pittsburgh. He has served on the boards of several area nonprofits and is currently the board treasurer at Calvary Christian Church in Lynnfield.

The Boston Business Journal is Boston's leading business media company, which received the Breaking News award from the Society of American Business Editors and Writers in 2016 and the General Excellence Award as one of the nation's top three weekly print publications in 2013. It is one of 40 regional publications owned by American City Business Journals.

Emma Boyd

Emma Boyd is currently in 8th grade. Emma started off as an extremely academic-centric child. At age 8 she was tested and found to be gifted, so she started attending a school for gifted children in second grade. The school was not a good fit, and

since it was a financial hardship, she re-entered public school. However, around that time, her natural sense of curiosity and love for tinkering started to diminish as she became disconnected to classroom learning. Eventually, the fire within her was re-ignited when she — at age 11 — was introduced to the mindset of innovation through solving real-world complex challenges. There is new meaning in her classroom studies, and has found that she can enjoy the confluence of many subjects on a higher level — especially engineering, coding, and math. She, along with her venture partner (an 8th grader from another town), is in the process of filing a provisional patent (an insole that connects wirelessly by bluetooth to a mobile device that allows the user to physically participate in their favorite games through physical movement), to be used for addressing issues of obesity, as well as for rehabilitative purposes.

JD Chesloff

As Executive Director of the Massachusetts Business Roundtable (MBR), JD is responsible for developing and implementing the strategic framework and direction for MBR in partnership with the Chair, Executive Committee and Board of Directors. He works with MBR Task Forces and MBR leadership to develop its agenda on public policy matters and convey those ideas to opinion leaders and policy makers to help inform their deliberations.

JD has worked in and around Beacon Hill for more than 25 years. In the Legislature, he was the Chief of Staff to the House Committee on Commerce and Labor, and was the education issues analyst and Deputy Budget Director for the House Committee on Ways and Means. After working as both a budget analyst and Assistant to the President at the University of Massachusetts, JD worked as the Legislative Director for State Treasurer Shannon O'Brien and then as Issues Director for the O'Brien-Gabrieli gubernatorial campaign in 2002.

He joined MBR in 2004 after serving as Legislative/Issues Director for the Early Education for All (EEA) Campaign, where he was responsible for developing and driving legislative support for EEA's legislation and agenda which included the creation of the Massachusetts Department of Early Education and Care. He currently serves on the Department's Board of Directors.

In addition, he serves on the state's STEM (Science, Technology, Engineering, and Math) Advisory Council's Executive Committee, and is a Trustee at the Massachusetts College of Liberal Arts. He also serves on the Board of The Discovery Museums; the Board of the Massachusetts Business Alliance for Education; and the Advisory Board of ReadyNation.

JD holds a Masters in Public Affairs from the McCormack Institute of Public Affairs at the University of Massachusetts Boston, and has a Bachelor's Degree in Law and Public Policy and Telecommunications Writing from Syracuse University. He lives in Arlington, MA with his wife Lori and his two daughters, Sadie and Tessa.

Vicky Wu Davis

Leaving the corporate world of the telecom in her late 20's, Vicky Wu Davis started a software company in the videogame industry and ran it for over 10 years before deciding to teach innovation and entrepreneurship to middle/high school kids through her nonprofit, Youth CITIES. Outside of Youth CITIES, Vicky ran a program that taught Chinese as a second-language to very young kids — leveraging the natural curiosity of children, and the inquiry-based/hands-on learning from STEM experiments (she started this program when her older son rejected traditional classroom-style learning in Chinese school). In addition, Vicky has been a mentor at MIT's Venture Mentor Services for the past 12 years, and she is also a member for Beacon Angels, a Boston-based angel group that makes investments mostly in tech and life sciences. She is also an advisor to a community maker-space, and sits on the School Improvement Council for her sons' elementary school. Vicky's work has been recognized numerous times, such as Red Herring's cover story "Young Moguls: 20 Outstanding Entrepreneurs Under 35", the Kauffman Foundation for "Entrepreneurs Giving Back", the 2004 Boston Business Journal's "40 Under 40", 2015 WomenUp Honoree as a local woman of influence, and most recently, the 2016 Mass Technology Leadership Council's Distinguished Leadership Award.

J. 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.

PLENARY SPEAKER BIOS

Congressman Joseph Kennedy III

Joe Kennedy III is proud to serve the Fourth District of Massachusetts in Congress. Currently in his second term, he represents a diverse district that spans from the suburbs of Boston to the more industrial towns of Massachusetts' South Coast.

As member of the influential House Energy & Commerce Committee, Joe has prioritized economic opportunity for working families. A vocal advocate for Science, Technology, Engineering, and Mathematics (STEM) education, vocational schools and community colleges, he has authored several pieces of legislation in Washington aimed at improving access to our modern economy, including the Perkins Modernization Act and STEM Gateways Act.

Inspired by the manufacturing traditions that drive many of the communities he represents, Joe also introduced the Revitalize American Manufacturing (RAMI) Act during his first term, which will help fuel innovation and new technologies throughout our manufacturing sector. After a year of building broad bipartisan and industry support, RAMI passed the House of Representatives and was signed into law by President Obama at the end of 2014.

From his spot on the E&C Committee, Joe has emphasized issues of critical importance to Massachusetts. Whether leading efforts to combat opiate abuse or working with federal regulators to tackle the rising cost of energy across New England, his legislative agenda is driven by the communities back home. Deeply dedicated to being as accessible as possible to his constituents, Joe has launched creative efforts to consistently visit every city and town in the 4th District, from "Tour 34" to "District Days."

Whether at home in the Commonwealth or down in Washington, Joe has become a powerful voice for social justice, championing issues like employment non-discrimination, pay equity, marriage equality and comprehensive immigration reform.

Prior to being elected to Congress, Joe served the Commonwealth of Massachusetts as an Assistant District Attorney in both the Middlesex County and Cape and Island's District Attorneys' Offices. Before that he served as a member of the Peace Corps in the Dominican Republic where he designed and implemented an economic development project near Puerto Plata.

Born and raised in Massachusetts, Joe is fluent in Spanish and holds a bachelor's degree in Management Science and Engineering from Stanford University as well as a J.D. from Harvard Law School. He lives with his wife, Lauren, a health policy expert, their daughter, Eleanor, and their dog, Banjo, in Brookline, Mass.

David Mangus

David Mangus is the "Hall at Patriot Place 2016 Massachusetts STEM Teacher of the Year" David brought his research experience to Brockton High School where he has worked to develop an innovative four year non-vocational biotechnology program. The vision of the program is to improve access for Brockton students to high quality, engaging, and relevant STEM curriculum which will prepare them for the demands of the 21st century. In just its fifth year, the program has grown dramatically and now serves more than 260 students.

Students in this program explore fundamental concepts in biology using an engineering perspective (genetic engineering, synthetic biology, and biomimicry). Each course includes laboratories activities that engage students with authentic research questions, thus allowing them to explore key concepts in ways that make those concepts transparent, quantifiable and understandable. To mediate their research, students use modern equipment including a UV/fluorescence spectrophotometer, luminometer, and a real-time qPCR machine. With generous funding from outside agencies like the Massachusetts Life Sciences Center, Brockton High School is among the first high schools in the nation to utilize these technologies in the classroom.

Mr. Mangus received his bachelor's degree from Ohio Wesleyan University and his doctorate in molecular cellular and developmental biology from Indiana University. He spent 18 years, first as a postdoctoral fellow and then as a research assistant professor, at the University of Massachusetts Medical School researching post-transcriptional aspects of gene expression mediated by poly(A)-binding protein. This multifunctional protein regulates diverse aspects of gene expression, including mRNA processing, export, and turnover, as well as translational control.

Marty Meehan

Marty Meehan is the President of the University of Massachusetts and is the first undergraduate alumnus to lead the five-campus system. He became the university's 27th president after serving in the U.S. House of Representatives and as chancellor of UMass Lowell.

Born in Lowell, President Meehan was one of seven children and grew up in a family where the importance of education was always stressed. After attending the Lowell public schools, President Meehan, a first-generation college student, graduated cum laude from UMass Lowell in 1978 with a degree in education and political science.

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

He was elected to the presidency 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 embraced a career in public service early in his life. He served as the deputy secretary of state for securities and corporations from 1986 to 1990. During that time, he was recognized by The Boston Globe for transforming the securities division from "being a frequent embarrassment to gaining a national reputation as hard-hitting and activist."

In 1991, President Meehan was appointed first assistant district attorney for Middlesex County. He managed a staff of more than 150 people, including 80 prosecutors, and established an innovative "priority prosecution" policy that targeted hardened criminals.

Seeing an opportunity to bring his public service commitment to a broader audience and to serve his nation, President Meehan ran for U.S. Congress and was elected to represent the 5th Congressional District of Massachusetts in the U.S. House of Representatives in 1992. He served on the House Armed Services and Judiciary committees. He established a national reputation for his legislative leadership, including for his efforts to protect the public from the health risks of tobacco. President Meehan also was a central figure in campaign finance reform and a major sponsor of the Bipartisan Campaign Reform Act of 2002, known as the McCain-Feingold Bill in the Senate and the Shays-Meehan Bill in the House.

After serving 14 years in Congress, President Meehan was elected chancellor of UMass Lowell in 2007. He made quality, diversity and access and affordability keystones of his vision to raise UMass Lowell's national and international reputation and its impact. During his eight-year tenure, UMass Lowell climbed into the top-tier of U.S. News & World Report's best national universities and was the third-fastest-rising institution on its list.

Now, as the leader of the 73,000-student public research university, President Meehan is poised to guide the University of Massachusetts — an engine for social mobility and economic development in the Commonwealth — into a new era of growth and achievement.

In addition to his degree from UMass Lowell, President Meehan earned a master's degree in public administration from Suffolk University in 1981 and a juris doctor from Suffolk University Law School in 1986.

President Meehan currently resides in Andover with his wife, Ellen T. Murphy, and their two children, Robert Francis and Daniel Martin.

Bryan Morry

Bryan Morry rejoined The Kraft Group as The Hall at Patriot Place's executive director during the venue's construction in December of 2007 after spending the previous two-plus years as the afternoon drive sports talk show host on The Score AM/FM in Providence, R.I. 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 television show. Bryan covered the first three Patriots Super Bowl victories 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.

Mr. Morry oversees all museum operations. In addition to serving on the STEM Teacher of the Year committee, he is an officer on the board of directors of the International Sports Heritage Association as the secretary and chairs the group's communications committee. He also serves on the Massachusetts Interscholastic Athletic Association's Endowment Committee.

Olutoni (Toni) Oloko

When Olutoni (Toni) Oloko was in high school, he was captain of the tennis team, and a nationally-ranked tennis player. While Toni has always had a love of learning, he never considered himself a "STEM kid" while in high school because he didn't see its relevance to his life as an athlete. After being bitten by the entrepreneurial bug, he leveraged his own passion to produce a mobile app that facilitated a peer-to-peer learning marketplace to help people improve their tennis skills. Taking two gap years to build his technology venture, he recently sold that company. He is currently a freshman at the Wharton School at University of Pennsylvania. In parallel, he is working on his second technology startup, which helps software developers build mobile apps with minimal latency. Toni always knew he wanted to make impact in this world, and he often reflects on his "late" realization that STEM is integrally connected to various facets of his aspirations.

Lieutenant Governor Karyn Polito

Karyn Polito was inaugurated on January 8th, 2015 as the 72nd Lieutenant Governor of the Commonwealth of Massachusetts.

Elected alongside Governor Charlie Baker in November of 2014 on a platform of making Massachusetts great for everyone, Lieutenant Governor Polito continues her career in public service in the new administration.

Lieutenant Governor Polito began her public service in local government, serving as a member of the Shrewsbury Board of Selectmen. She then expanded her work to the state level, serving as a member of the State Lottery Commission. Then, in 2001, Polito ran for State Representative and won, proudly representing the residents of the 11th Worcester District (Shrewsbury and Westborough) for five terms.

In her time on Beacon Hill, Polito was a leading advocate for the passage of "Jessica's Law," a bill which would establish tough mandatory minimum sentences for child sex offenders. Her advocacy paid off in 2008, when she worked with her Democratic colleagues to pass tougher sentencing legislation and require District Attorneys to file more comprehensive reports about child sex offenses in Massachusetts.

Lieutenant Governor Polito understands the strain on local budgets, and worked relentlessly to secure increases in local aid, Chapter 70 school aid, Special Education aid, and Special Education transportation aid, as well as for local grant funding. Throughout her term in office, Polito advocated for a safer Commonwealth by filing legislation in a number of key areas: cracking down on drunk drivers, requiring defibrillators in public schools, and strengthening the experience requirements for young drivers.

Polito has also worked hard to promote jobs and economic development, especially encouraging young people to explore careers in science and technology. She served on the Robert H. Goddard Council on Science, Technology, Engineering and Mathematics Education, and she hosted the annual "Women in Science" conference in Worcester. She is a board member of the Worcester Area Regional Chamber of Commerce, and the Corridor Nine Area Chamber of Commerce.

Lieutenant Governor Polito also believes strongly in giving back to the community. Her first major legislative initiative in 2003 was to file legislation allowing for the issuance of special license plates with the Red Sox and Jimmy Fund insignias. Since that bill was passed, the Red Sox special-issued license plates have raised more than $7,000,000 to date for the Jimmy Fund of the Dana-Farber Cancer Institute and the Red Sox Foundation.

Lieutenant Governor Polito is a lifelong resident of Shrewsbury, where she owns and operates a commercial real estate development firm and lives with her husband and two young children.

Kelli List Wells

Kelli List Wells is the Executive Director for Global Education and Skills at the GE Foundation in Fairfield, CT. Her portfolio focuses on building education, skills and training initiatives to prepare the next generation for the demands of the workforce and the changing labor economy both nationally and globally.

Wells joined GE in 1995 as an Investment Broker with GE Asset Management. In 1996, she was appointed to Quality where she became a Black Belt in Six Sigma. After her role in Quality she managed International Marketing for GE's Retail Services Division. In 2001 she joined the corporate citizenship team at GE Capital where she held responsibilities around global programs. In 2004, she was appointed to her current role at the GE Foundation. Prior to joining GE, Wells spent 5 years as a licensed financial advisor, holding her Series 7 and Series 63 Investment licenses.

Wells is also a member of various non-profit organizations. She serves on the board of directors for the Bridgeport Public Education Foundation. She has served on the executive board of GE's Volunteer organization in Stamford; President of the Fairfield County Contributions Group; served on the distribution committee of United Way; the board of the Parent Leadership Training Institute; the board of the Connecticut Academy of Education; and member of the Stamford Mayor's council for School Readiness. She led the Stamford Achieves initiative in Stamford, CT that brought the community together to look at and address the Achievement Gap.

Wells studied International Relations and Japanese at the University of Massachusetts Amherst and continued her education at Nanzan University in Nagoya, Japan. She currently lives in Stamford, Connecticut with her husband, Kyle and two children, Cameron and Alysa.

Justin Yu

Justin Yu is a long-time STEM-enthusiast with a wide range of interests including computational biology, computer science, autonomous robotics and social entrepreneurship. Currently a junior, he has been (and continues to be) an active participant and captain of his school's Science Olympiad team, and robotics team, which has consistently placed in the top 3 of the International Botball Robotics Competition. Outside of school, Justin enjoys participating in various hackathons, STEM conferences, and STEM-related programs such as the MIT Beaverworks Summer Institute. Justin's interest in STEM started as a hobby, and was later portrayed to him as a potential career pathway to earn big paychecks. When Justin learned about entrepreneurship, he began to see the value of STEM as a critical tool to actually make real impact, rather than simply as a stable job option. To Justin, having an entrepreneurial mindset has motivated him to further pursue STEM learning, as he knows the knowledge will help him to craft better solutions as an aspiring engineer/scientist/developer. His STEM ventures include designing assistive technology for the visually impaired, and creating an app for kids with Type 1 Diabetes. Justin also founded the Boston Youth Entrepreneurship Society, and enjoys playing the piano, editing videos, and being a sleep-deprived high school student.

Breakout Sessions - AM Breakout I

Boston STEM Week: A Collaborative Effort to Bring Integrated STEM to Middle Schoolers

Time: 9:45am - 10:35am
Room: Grand Ballroom South
Strand: K-12 Education

The need for rigorous and engaging STEM education in middle school classrooms has never been more apparent than today. This session will introduce participants to a collaboration between i2 Learning, Citizen Schools, and the Boston Public Schools. They engaged 6th, 7th, and 8th graders in week-long, immersive STEM courses focused on themes not traditionally found in schools, such as Building an Interactive Friendly Monster, Kinetic Sculptures, and Surgical Techniques. In addition to the scaffolded hands-on activities that students engaged in throughout the course week, important connections were made to STEM career paths through thoughtful use of classroom volunteers. Session participants will have the chance to engage in a hands-on activity from the i2 Learning Surgical Techniques course. Additionally, participants will hear from a variety of stakeholders about the experience of putting together this multifaceted partnership, including: a Boston Public School teacher on the classroom and curriculum experience, a STEM professional on the volunteer experience, an i2 Learning team member on partnering with the district, and a Citizen Schools team member on partnering with the private sector. This session will be informative for individuals from school, nonprofit, and private sector organizations who are interested in building a collaborative partnership to bring hands-on STEM learning into the classroom.

MODERATOR

Melissa Higgins, Director of Curriculum, i2 Learning

SPEAKERS

Monique Symes, Middle School Teacher, McCormack Middle School, Boston Public Schools
Megan Bird, Executive Director, Citizen Schools

Building STEM Majors' Capacity for Delivering Inquiry-based Mathematics and Science Lessons through UTeach

Time: 9:45am - 10:35am
Room: Meeting Room B
Strand: Higher Education

This panel session describes the innovative UTeach mathematics and science undergraduate teacher preparation program at UMass Lowell (UML). To enhance UML's contribution to the community by producing effective mathematics and science teachers who not only are highly knowledgeable in their disciplines, but also can engage students through scientific inquiry instruction, UTeach employs a series of unique courses and a model of instruction based on the 5Es (Engage, Explore, Explain, Elaborate, Evaluate). Our panel presentation will describe the conceptualization of two of the UTeach courses, while showcasing student work to answer the question of whether the program achieves the goal of enhancing course enrollees' development of pedagogical skills in delivering inquiry-based instruction.

SPEAKERS

Eliza Bobek, Lecturer, UMass Lowell Graduate School of Education
Michelle Scribner-MacLean, Clinical Associate Professor, UMass Lowell Graduate School of Education
Edward Tonelli, Adjunct Professor, Graduate School of Education, UMass Lowell
Xiaoxia Newton, Associate Professor, Graduate School of Education, UMass Lowell
Clint Perry, Student, UMass Lowell

Communities and Opportunities for STEM Majors: MST & PRISM at Northeastern University

Time: 9:45am - 10:35am
Room: Meeting Room C
Strand: Higher Education

Our presentation will introduce the audience to two National Science Foundation (NSF)-funded programs at Northeastern

University: Proactive Recruitment in Science and Mathematics (PRISM) and Mathematics and Science Talent (MST). Our panel includes two principal investigators, a participating student, and the external evaluator. The presentation will benefit university faculty, administrators, admissions officers, and students who are interested in strategies to engage STEM majors from traditionally underserved populations and students interested in inter-disciplinary work. Both PRISM and MST were designed to support STEM majors from recruitment to graduation through community-building, inter-disciplinary coursework, and research opportunities. While PRISM focused more broadly on students interested in pursuing STEM majors and careers, MST included students from low-income and ethnic minority backgrounds. The evaluations of both projects found that the students valued both programs and were more likely to choose and stay with a STEM major when compared to students who had not participated. While MST and PRISM required significant funding for full-scale implementation, our session will include lessons learned that can be adapted and immediately used with and without financial support. We hope that during our presentation, audience members will share their own experiences with similar initiatives and we will engage in a discussion that will benefit students from diverse backgrounds in building successful STEM careers, in college and beyond.

MODERATOR

Meghan Broadstone, Evaluator, Evaluation Analysis Solutions, Inc.

SPEAKERS

Richard Porter, Professor, Northeastern University, College of Science, Department of Mathematics
Donald King, Associate Professor and Undergraduate Director, Northeastern University, College of Science, Department of Mathematics
Diana Morel, Student, Northeastern University

Connecting the Dots - Linking Opportunity and Insight from K-12 to the Workforce

Time: 9:45am - 10:35am
Room: Junior Ballroom
Strand: Workforce and Business

This panel will be appropriate and relevant for participants across the spectrum of the conference — educators from K-12 and higher ed as well as workforce development professionals and business leaders. The central theme of this session will be to explore linkages for students from two year to four year institutions and beyond to the job market– connecting the dots between education and the workforce. Specifically, we'll be covering a few major topics related to our shared work, and will follow up the conversation with audience feedback and questions.

Much of this presentation will include summary discussion of three reports produced as part of a partnership between BATEC and Burning Glass to more deeply analyze job categories and demand in Middle Skill occupations in computing, within Big Data/the information economy, and in Cybersecurity.

We will also share insights, learnings and best practices from the Cybersecurity Collaboration Consortium - a joint partnership between the Department of Higher Education and BATEC. This partnership is a focused collaboration between UMass Boston and four community colleges: Bunker Hill Community College, MassBay Community College, Middlesex Community College, and Quinsigamond Community College, to develop academic pathways of stackable certificates and degree options in the field of CyberSecurity (both certificate and Associate's degrees at the community colleges and a BS in Cybersecurity at UMass Boston). Working in institutional partnership and developing standards based on industry qualifications and deep data analysis, these degree programs offer students seamless connection between their academic experience and their future success in the workforce.

MODERATOR

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

SPEAKERS

Lou Piazza, Director, BATEC, University of Massachusetts Boston
Christine Williams, Director of Economic and Workforce Development, MA Department of Higher Education

Designing a Longitudinal STEM Career Pathway from 7th Grade through Community College

Time: 9:45am - 10:35am
Room: Meeting Room D
Strand: K-12 Education

We will describe the design, development, and implementation of a longitudinal STEM career awareness and STEM workforce preparation program that starts in 7th grade and continues through 12th grade. We will discuss the collaboration that involves school level partners, businesses, community colleges, and a research university. Specifically, our collaboration is recruiting, retaining, and preparing students from underrepresented populations in STEM and provide them with the opportunity to opt into and stay in a STEM career pathway. With this goal in mind, our diverse team which involves STEM faculty at Massachusetts Bay Community College, three school districts (Boston, Waltham, and Framingham) and faculty in the School of Management (social entrepreneurship) and the Lynch School of Education from Boston College in collaboration with MentorNet (MentorNet.org) to grow the pipeline of youth graduating with the necessary skills to enter the local area workforce. We will describe project work the new courses and how we are focusing on supporting youth learning and developing the confidence, persistence, and the skills to fill STEM-based positions that are known as "middle skills". We will discuss how

our collaborative work, which cuts across after-school middle school programming and out-of-school programming in high school, is connected to a long-term career STEM pathway through community college. Also discussed is how we engage teachers in classrooms through a variety of science education programs and connect those in-school activities to the out-of-school activities. We will present lessons learned across the different contexts and make recommendations for others who are attempting to develop a similar program.

MODERATOR

Michael Barnett, Professor, Science Education and Technology, Science Teaching Consultant, Boston College

SPEAKERS

Shamsi Moussavi, Professor of Computer Science, Massachusetts Bay Community College
Catherine Wong, Director of Urban Outreach Initiatives Boston College, Boston College
Heather Metallides, Director of Science, Waltham Public Schools
Rajeev Rupani, After-School Science Teacher, Waltham Public Schools

Engineering in Your Classroom Block Area: Using Problems Encountered in Children's Literature to Solve Problems Together

Time: 9:45am - 10:35am
Room: Grand Ballroom Center
Strand: Early Education

Participants will use problems found in familiar early childhood children's literature as the basis for hands-on models that promote children's STEM learning in the preschool and pre-kindergarten childhood setting. Participants will experience opportunities to seamlessly infuse STEM concepts throughout the day with young children. While providing participants with tools and tasks that promote scientific inquiry, the presenters will share the actual work from their integrated public school early childhood center classrooms that allowed all of their 3, 4, and 5 year old students to behave as young scientists.

While engaging in STEM learning experiences participants will pose "What if…?" questions, make predictions, test their models, record their findings, develop solutions, and present their findings. All activities will be carefully linked to the Science, Math, and English Language Arts Curriculum Frameworks, as well as the Social and Emotional Learning, and Approaches to Play and Learning Standards. Focus will also be given to the integration of the eight science and engineering practice standards. Participants will be afforded opportunities to better understand the important roles of team work and problem solving in order to excite their students and provide students with experiences that reinforce feelings of success at the end of a challenge.

SPEAKERS

Donna Rosso, Director/Principal, Franklin Early Childhood Center, Melrose Public Schools
Kristen Harvey, Preschool Teacher, Melrose Public Schools, Franklin Early Childhood Center
Rebecca Hendrick, Special Education Preschool Teacher, Melrose Public Schools, Franklin Early Childhood Center

Exploring the "T" in the Early Childhood STEM Standards: Extending Technology beyond Screens

Time: 9:45am - 10:35am
Room: Showcase Corner
Strand: Early Education

We all make the assumption that technology is an electronic device with a screen. Our fear of screen time and its effects on our children is a supported concern by the American Academy of Pediatrics. This hands-on workshop will help early childhood educators, directors, providers, and coaches experience different types of technology and use these tools to promote children's exploration of their learning environments.

Our goal for this workshop is to help educators at the early childhood level recognize that technology is so much more than screens for our students. Participants will have the opportunity to brainstorm technology they already have in their classrooms, what technology is in early childhood, generate vocabulary, concepts and questions related to technology, experience some demonstration areas using technology, and discuss how they can use technology to support student learning. We will explore the Massachusetts Infant/Toddler and Preschool STEM standards and identify the concepts related to technology and encourage attendees to share their experiences and how they would be able to incorporate these concepts into their classroom or learning environment.

SPEAKERS

Melissa Russell, Preschool Director, The Hundred Acre School at Heritage Museums & Gardens
Kori Bardige, Preschool Director, The Hundred Acre School at Heritage Museums & Gardens
Alicia Raspa, Assistant Preschool Director & Lead Teacher, The Hundred Acre School at Heritage Museums & Gardens
Heidi Anderson, Lead Teacher, The Hundred Acre School at Heritage Museums & Gardens

Leveraging Educator-Industry Partnerships to Increase Diversity in High School STEM Internships

Time: 9:45am - 10:35am
Room: Meeting Room E
Strand: Workforce and Business

As high school internships become a valuable tool for STEM career exploration, how can educator-industry partnerships support equitable access to these opportunities? High school STEM internship opportunities remain highly competitive, leaving many traditionally underrepresented students out of the loop. Science Club for Girls observed this disparity among the girls we serve, and reached out to our STEM industry and research partners to create our High School STEM Internships program in response.

Join us for a panel discussion on leveraging relationships to create targeted internship programs that are accessible to industry and research professionals, utilize educators' skills to maximize student learning and career exploration, and can be targeted to serve underrepresented students. The Science Club for Girls internships will be referenced as a model for creating localized, targeted partnerships that suit community needs. The panel incorporates industry, student, and program perspectives for an inclusive discussion. With all key voices present, we can delve into benefits and challenges on all sides, engaging educators and STEM professionals to consider whether they could support targeted small-scale internships to increase access to STEM internships throughout a diverse student population.

Moderated discussion will be centered on relationship development, intentional inclusion and support for diverse students, and educator-driven components to increase the learning depth, while decreasing the load on industry, in smaller-scale internships. We look forward to sharing our experiences and hearing from other educators and STEM professionals about what works in our communities.

MODERATORS

Lydia Peabody, Youth Program Director, Science Club for Girls

SPEAKERS

Brandy Freitas, Teen Program Manager, Challenge Teams and Internships, Science Club for Girls
Ruth Grossman, Director of the FACE Lab and Associate Professor, Communication Sciences & Disorders, Emerson College
Bouchra Benghomari, Senior, Cambridge Rindge and Latin

Preparing to Teach STE in Elementary Schools: A Discussion for Stakeholders

Time: 9:45am - 10:35am
Room: Meeting Room A
Strand: K-12 Education

A *Framework for K-12 Science Education* makes clear that in order to enact reform in science and technology/engineering teaching and learning there must be concurrent attention to how teachers are prepared and encouraged to develop. The Framework acknowledges that the current system is a complex one. Realizing the Framework's vision at the elementary level will be a challenge as several constituencies, including school administrators, classroom teachers, and college education and sciences faculty must work together toward a unified vision. We are college/university elementary science and technology/engineering education faculty who are involved in various aspects of this work and who have begun to discuss issues pertaining to elementary teacher preparation. In this session we will engage other stakeholders including college/university level faculty both in education and the sciences, classroom teachers, and school administrators, in a discussion about elementary teacher preparation. We will briefly describe what we see as some of the opportunities and challenges. We will then engage participants in discussion of the following questions:

1. What do new teachers need to know and be able to do as a result of their pre-service development?
2. What basic science and/or technology/engineering courses are needed and what is the role of these courses?
3. What are some important considerations for designing elementary science and technology/engineering preservice courses?
4. What are some promising practices for working with practicum sites to support and model effective pedagogical practices?
5. What supports do new teachers need in their induction year(s)?

SPEAKERS

Jeff Winokur, Instructor in Education, Wheelock College
Kate McNeill, Associate Professor of Science Education, Boston College
Eve Manz, Assistant Professor, Boston University
Pam Pelletier, Director of Science, Technology and Engineering, Boston Public Schools
Don DeRosa, Clinical Associate Professor, Director of Boston University School of Medicine CityLab and MobileLab

AM BREAKOUT I

Project Accelerate: A University – HS Partnership Bringing AP® Physics 1 to Underserved Students

Time: 9:45am - 10:35am
Room: Conference Room 210
Strand: K-12 Education

A panel of high school teachers/liaisons and university faculty will share their experiences with a partnership program (Project Accelerate) bringing AP® Physics 1 to underserved students in schools that do not offer AP® Physics as part of the school program of study. Project Accelerate blends together supportive formal structures from a student's home school, a private online course designed specifically with the needs of underserved populations in mind and small group recitation and laboratory experiences. Funding for this program has been increased and Project Accelerate is looking to increase the number of partner sites.

Underserved high school students in many communities don't have access to Advanced Placement® courses because of low student enrollment and lack of trained teachers. Project Accelerate serves as a model offering a solution to a significant national problem of too few underserved high school students having access to high quality physics education, resulting in these students being ill prepared to enter STEM careers and STEM programs in college.

Boston University is in the second year of piloting this model with four Boston Public Schools (BPS) high schools and three small suburban high schools. The course is structured to work seamlessly with a typical high school schedule with assessments designed to encourage early success. Students receive midterm progress reports, quarterly grades and AP credit on their high school transcript. During the 2015-16 academic year, thirty weeks into the pilot year, we have an 88% retention rate, 90% recitation attendance, and an average course GPA of 3.3.

MODERATORS

Andrew Duffy, Physics Faculty, Boston University

SPEAKERS

Mark D. Greenman, Research Fellow and Teacher in Residence, Boston University
Annie Le, Outreach Coordinator and Program Liaison, Urban Science Academy – Boston Public Schools
Anne De Barros Miller, Program Director and Program Liaison, Community Academy of Science and Health, Boston Public Schools

Teaching Students to Ask Their Own Questions in the STEM Classroom

Time: 9:45am - 10:35am
Room: Grand Ballroom North
Strand: K-12 Education

A question is a propulsive agent that can spark curiosity and fuel creativity, understanding, and imagination. As a part of the Next Generation Science Standards (NGSS), students are expected to formulate and explore their own questions. Yet, it is rare that the skill of question formulation is deliberately taught to students. How can we transform teaching and learning and build the capacity for all students to acquire sophisticated higher order thinking skills through question-asking?

This session will introduce attendees to the Question Formulation Technique (QFT), a deceptively simple step-by-step process which teaches students how to produce, improve, strategize around, and use their own questions. The QFT is an effective pedagogical strategy used by over 100,000 educators to teach the skill of question-asking to students across all grade levels and from all educational backgrounds.

Participants will experience the QFT themselves, see examples of how the QFT is used in science classrooms, explore how the QFT address the NGSS, and learn more about how the QFT benefits student learning. Participants will identify ways they can implement the QFT immediately to teach their students how to ask their own questions that will ignite their own STEM curiosity and investigation.

SPEAKERS

Andrew Minigan, Education Project and Research Coordinator, The Right Question Institute
Luz Santana, Co-Director, The Right Question Institute

Breakout Sessions - AM Breakout II

A Reverse Science Fair: Building Relationships between High School Students and Graduate Researchers

Time: 10:55am – 11:45pm
Room: Grand Ballroom South
Strand: K-12 Education

The Reverse Science Fair is an annual event that brings Medford High School students and graduate students from Tufts University together in order to discuss applications of the scientific method and careers in science. Tufts graduate researchers from a variety of science departments at the university set up a poster session at the high school. The high school students are asked to speak with researchers about both the research being presented and about the process of doing the research. High school students are able to discuss real science and meet with young scientists in a low-pressure environment. Because the graduate students are close in age and come from diverse backgrounds, they relate well to the high school students and become role models. The high school students are able to see where they themselves can go in the future if they pursue science. The graduate students also gain valuable experience from the event, in presenting their own research to an audience that is not familiar with their field. After attending the Reverse Science Fair, high school students carry out their own science fair projects during the next several months. Student projects are then judged in the school science fair by the same graduate students that came to present earlier, reversing their original roles.

This roundtable discussion is designed to encourage high school and university partnerships by discussing the Reverse Science Fair and engaging members of both levels in conversation about how to organize and run such an event.

SPEAKERS

Brian Mernoff, High School Chemistry Teacher, Medford High School
Karen O'Hagan, Program and Outreach Specialist, Tufts University

An Alternative to Exams in the Sciences: eReports for Better Learning Opportunities with Less Stress

Time: 10:55am – 11:45pm
Room: Meeting Room A
Strand: Higher Education

The primary purpose of exams is to assess student learning and mastery of course content. But, it can be argued that too much emphasis is placed on exams by both students and instructors. This often leads to stress and anxiety on the part of the student and to "teaching to the exam" by the instructor. Additionally, students often prepare for exams by 'cramming' last minute or by rote practice of course content. Neither approach leads to long-lasting learning, and knowledge gained by these approaches is rarely retained. This session will explore an alternative to traditional exams that can assess and fortify student learning, but do so in a less stressful way. Student electronic reports (eReports) are completely student-generated and multi-media in nature. Students summarize and condense the most critical content from course units into 20-30 minute stand-alone multi-media presentations/ video files. An accurate and effective eReport arguably demonstrates student comprehension of the course material. This session will begin with introducing eReports as an assignment type. It will then move on to provide guidance for assigning and explaining eReports to students. Examples from other students' eReports will be shared, as will methods and rubrics for eReport grading and assessment. The session will end with the results of a study on the student learning impact of creating eReports. It is expected that session attendees will leave with enough information to decide if eReports are a superior alternative to traditional exams, and, if so, be comfortable adopting eReports for use in their own classes.

SPEAKERS

Thomas Mennella, Associate Professor of Biology, Bay Path University

Bringing the Universe to America's Classrooms: Using Digital Media to Support Three-Dimensional Learning in Earth and Space Science (WGBH)

Time: 10:55am – 11:45pm
Room: Plenary Hall
Strand: K-12 Education

WGBH, in collaboration with NASA, is on a 5-year mission to design and develop digital media-integrated instructional resources on PBS LearningMedia for K-12 classrooms.

This panel/presentation will cover:

- How digital information is changing how we see, understand and experience our planet and the universe
- The unique role that digital media can play in three-dimensional learning
- How WGBH is designing and testing media-integrated instructional resources for K-12 classrooms
- Explore free resources, hear what is coming, and discover how you can get involved in this exciting project in the years to come!

Phenomena can provide the 'anchor' to a designed instructional sequence — opening the door to investigation, lines of questioning, and authentic science and engineering practices.

In Earth and Space Science, particularly, these phenomena often happen at huge size scales, over long timelines, or are not even visible to us in our everyday experience. For this reason, digital media can play a tremendous role in giving students access to these phenomena, and therefore opening lines of authentic investigation into these topics.

WGBH has spent 2016 designing, developing, and testing instructional resources that take advantage of the unique possibilities of digital media. We will share this process and what we have learned along the way from thousands of teachers across MA and the nation. Massachusetts teachers from our national teacher advisor team will join the panel to share their experience using and testing these and share insights about how we teach, and learn, with digital media.

MODERATOR

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

SPEAKERS

Dr. Jacob Foster, Project Advisor, Bringing the Universe to America's Classrooms, Former Acting Director, STEM, MA Department of Elementary and Secondary Education
Teacher Advisors:
Laura Degelmann, Linden STEAM Academy, Malden, MA
Jenny Kostka, South Shore Charter Public School, Norwell
Kim Martino, Belmonte Middle School, Saugus
Kerry Zagarella, Winthrop School, Ipswich
Rebecca Pierce, Greater Lawrence Technical School, Andover

Building Bridges through STEM between a College and Urban High-Risk Middle School Students

Time: 10:55am – 11:45pm
Room: Meeting Room E
Strand: Higher Education

This presentation will be helpful for universities wanting to develop or improve their service learning-based community partnerships while developing STEM awareness and knowledge in their elementary and middle school students (3rd-8th graders) as part of an interactive afterschool program. We will share experiences, lessons learned, challenges in building these relationships, highlights of the curriculum and resources used, and the impact this work has on the middle school students. We will also discuss the training and development of Merrimack student volunteers who work with the 3rd through 8th grade students in an urban setting for 10 weeks each semester. Lastly, we will examine the impact of curriculum enhancements on our middle school students' attitudes, motivation and interest in Science and STEM related careers and the impact of curriculum enhancements on our middle school students' attitudes, motivation and interest in Science and STEM related careers through our PEAR Common Instrument results.

SPEAKERS

Anne Gatling, Associate Professor, STEM Education Director, Merrimack College, School of Education and Social Policy
Megan Bouchard, Undergraduate, Elementary STEM Education Major, Merrimack College
Katherine Donell, Assistant Director, Steven's Learning Center, Merrimack College
Megan Ackerman, Undergraduate; Site Coordinator of Bruce Elementary, Lawrence Math Science Partnership, Merrimack College
Cynthia Carlson, Assistant Professor, Civil Engineering, Merrimack College
Amy Burnes, Senior, Civil Engineering, Merrimack College

Building Middle School Engagement in Math and Computer Science: Findings from the NSF ITEST Program

Time: 10:55am – 11:45pm
Room: Meeting Room D
Strand: K-12 Education

This speaker panel will share innovative classroom practices and emerging research and evaluation findings in middle school math and computer science that help foster student motivation to pursue lifetime opportunities in these fields. During this session, three middle school projects funded by the National Science Foundation Innovative Technology Experiences for Teachers and Students (ITEST) program will share their project work and findings. The CryptoClub Project develops material to teach cryptography and mathematics to middle grade students using student created videos. The Middle School Pathways in Computer Science Project is bringing project-based, socially-relevant computing experiences to district middle school students, and studying student learning of computer science. The Predicting STEM Career Choice Project, based at the

Worcester Polytechnic Institute (WPI), impacts youth by creating better understanding of malleable factors that can improve student outcomes, and automated models that can identify if a student is at-risk. Afterwards, the presenters will answer audience questions about their presentations, and further discuss issues related to implementing practices mentioned into their classrooms.

MODERATOR

Bernadette Sibuma, Research Associate, STEM Learning and Research Center, Education Development Center, Inc.

SPEAKERS

Janet Beissinger, Senior Research Specialist, Learning Sciences Research Institute; Research Professor, Dept. of Mathematics, Statistics, and Computer Science, University of Illinois at Chicago
Fred Martin, Director, Engaging Computing Group; Professor, Computer Science, University of Massachusetts Lowell
Neil Heffernan, Professor, Department of Computer Science, Worcester Polytechnic Institute

Cape Cod STEM Network Teacher-in-Residence Program: Making Connections Outside the Standards

Time: 10:55am – 11:45pm
Room: Conference Room 210
Strand: K-12 Education

The Cape Cod Regional STEM Network Teacher-in-Residence program paired 10 teachers from across six different school districts will five different museum/non-profit sites: Cape Cod Museum of Natural History, Chatham Marconi Maritime Center, JFK Hyannis Museum, Cape Cod Media, and Cape Cod Maritime Museum. The selected teachers received a stipend and spent two full weeks at one (or two) program partner sites. During that time, teachers gained new insights on STEM in the contexts of their residencies and in projects relating to the Cape's amazing resources: our ocean, our historic places, or our emerging tech fields. They also collaborated with experts and museum staff on approaches to better engaging young people in STEM beyond the classroom. During this session, we will overview the program and share evaluations and what we learned about building community and collaborating in STEM. We will also have a panel discussion where participants can hear from a participating teacher and the education director at the Cape Cod Museum of Natural History who served as a site leader to learn about what different individuals and organizations gained from this experience.

SPEAKERS

Barbara Knoss, Director of Education and Volunteers, Cape Cod Museum of Natural History
Matt Barnes, Middle School Science/STEM Teacher, Monomoy Public Schools
Jill Neumayer DePiper, Director of Cape Cod Regional STEM Network, Cape Cod Community College

Clean Energy Corps: From Classroom to Company

Time: 10:55am – 11:45pm
Room: Meeting Room C
Strand: Workforce and Business

Funded by a grant from the Massachusetts Clean Energy Council, we have developed a physics curriculum taught through the lens of clean energy applications, specifically photovoltaic, solar thermal, and wind energy applications. The curriculum was delivered during the 2015-2016 academic year to senior physics students at Boston Green Academy (BGA). To create a bridge to workforce and higher education, juniors and seniors from BGA were hired during the summer of 2016 to design, assemble, test, and market demonstration stations for educational use to teach science and engineering knowledge and skills associated with photovoltaic, solar thermal, and wind energy. Long-term goals are to sustain this small company, run by and for students, throughout the academic year to support authentic learning and workforce development. This session will report on the results of the first year and engage the audience in discussion about this and similar efforts.

MODERATOR

Caitlin Johnson, Engineer/Science Teacher, Waltham High School

SPEAKERS

Peter Kane, Engineer/Science Teacher, Norfolk Agricultural School
Erica Wilson, Science/Engineering Teacher, Boston Green Academy
Chamberlain Segrest, Director of Green Programing, Boston Green Academy
Don DeRosa, Clinical Associate Professor, Director of Boston University School of Medicine CityLab and MobileLab

iRobot Create® 2 and Scratch in Your Classroom

Time: 10:55am – 11:45pm
Room: Showcase Corner
Strand: K-12 Education

The iRobot Create® 2 programmable robot is an affordable STEM resource for educators, students, and developers. In 2016, iRobot added the ability to control the Create with Scratch programming language. In this workshop, iRobot will provide a hands-on experience with Create and Scratch. We can show educators how it works and go over some of the vision we have for the robot. Users will leave having a basic knowledge of using Create 2 in their classroom, and allowing students to get their first interaction with programming and robotics.

MODERATOR

Lisa Freed, STEM Program Manager, iRobot

SPEAKERS

Jonathan Dorich, Engineer, iRobot
Cara Brooks, STEM Program Coordinator, iRobot
Andy Reichel, Engineer, iRobot

AM BREAKOUT II

Managing Knowledge, Lore, and Connections

Time: 10:55am – 11:45pm
Room: Meeting Room B
Strand: Workforce and Business

In today's workforce, there are a large number of risks and challenges. These challenges include:

- baby boomers leaving the workforce over the next five to ten years,
- generational diversity,
- budgetary pressures,
- attraction and retention of subject matter experts.

It is critical that business leaders maintain and preserve the knowledge of your products and the history of your designs by having a process in place to retain or transfer your employees' critical STEM related skills and knowledge, your customer connections, and many other important details.

SPEAKERS

Beth A. Mitchell, Director Engineering, Maritime and Strategic Systems, General Dynamics Mission Systems
Brenda Burdick, Director, Marketing and Public Relations, General Dynamics Mission Systems

STEM Matters in the Earliest Years

Time: 10:55am – 11:45pm
Room: Grand Ballroom North
Strand: Early Education

A child's brain goes through an amazing amount of development during the first few years of life. Join us in discussing how to take advantage of that window of opportunity to plant the seeds of curiosity in STEM and the world around them! We will explore ways to inspire meaningful language, observation and prediction skills with infants and toddlers and share hands-on materials that you can use in your programs the very next day.

SPEAKERS

LeeAnn Soucy, Director of Coaching and Mentoring, Region 3 EPS Grant
Kathryn Gallo, Director of the Region 3 Educator & Provider Support Grant

Using Literacy Experiences to Extend STEM Learning

Time: 10:55am – 11:45pm
Room: Grand Ballroom Center
Strand: Early Education

Join us to explore how to use children's literature to engage children's curiosity and extend preschoolers' understanding of STEM concepts, with a focus on physical sciences and mathematics. You will have the opportunity to work with colleagues and use materials to develop hands-on STEM learning experiences based on wonderful children's books. We will consider the efficacy of linking STEM and literacy experiences to enhance children's proficiency in both areas, and review how these experiences align with Massachusetts standards and guidelines. Participants will receive useful handouts and related resources.

SPEAKERS

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

Writing in Science to Support Thinking and Inquiry in STEM

Time: 10:55am – 11:45pm
Room: Junior Ballroom
Strand: K-12 Education

With students, writing in science is a means to deepen students' understanding of concepts and apply the science and engineering practices from Next Generation Science Standards. Research also shows that as students write in the content areas achievement improves as students are asked to clarify and organize their thinking.

Participants will review several examples to span grades K-8 of how writing in science can be used to improve student outcomes using science notebooks and different entry types. Students use their notebooks to begin a science investigation or engineering challenge by asking questions when given a specific focus of inquiry. Students also make observations of the focus of inquiry. From their questions, students generate an inquiry question and design an investigation or create a plan for their design to an engineering challenge. As students implement their investigation, they make prediction, observations, and collect data in their notebooks. Analysis of their data and observations will lead students to draw conclusions. Writing is also integrated into science project based learning as students research to complete a real world task.

Specifically, the session will outline efforts to strengthen students' writing of conclusions in science using the framework of claims, evidence, and reasoning. Focus will be given to grades 5 and 8 MCAS achievement on open response writing. Resources including rubrics, professional development materials, and lesson ideas for supporting writing of conclusions will be discussed. Finally, participants consider how they will apply the strategies to their own classroom settings.

SPEAKERS

Margaret Adams, Assistant Superintendent for Teaching and Learning, Melrose Public Schools
Jon Morris, Director of Science and Technology, Grades 6-12, Melrose Public Schools
Paula Jones, Instructional Coach, Melrose Public Schools

Breakout Sessions - PM Breakout I

Animal-based Pedagogy in Engineering Education

Time: 1:45pm - 2:35pm
Room: Meeting Room B
Strand: K-12 Education

The human-animal bond is a unique and powerfully motivating force. Empirical evidence is mounting for the effectiveness of animal-based pedagogy in many different topic areas. In this session faculty from Cummings School of Veterinary Medicine at Tufts University will demonstrate the use of an animal-based curricular unit as a tool for integrating science and engineering education within an active learning, problem-based model. The unit will be a hands-on interactive project to design a solution for a failure in a major body system in an animal. In this case the development of a prosthesis for a dog whose leg had to be amputated due to a malignant bone cancer (osteosarcoma). We will explore the idea that animal-based education approaches can be used within a school setting to both achieve science benchmarks and to foster long term interest in STEM careers in middle school children.

MODERATOR

Cynthia RL Webster, Professor, Cummings School of Veterinary Medicine at Tufts University

SPEAKERS

Megan Mueller, Assistant Professor, Cummings School of Veterinary Medicine at Tufts University

Best Practices to Develop a Skilled Workforce through Industry/Academia Partnerships

Time: 1:45pm - 2:35pm
Room: Junior Ballroom
Strand: Workforce and Business

There are a range of job opportunities, at all skill levels, in STEM fields such as biotechnology and high tech. Making sure there is a connection between the programs that train people for jobs in STEM fields and the companies that are hiring is critical to avoid a mismatched skillset. Join us as we discuss best practices for industry/academic partnerships that support workforce development.

MODERATOR

Aron Clarke, Manufacturing Training Leader, Shire

SPEAKERS

Bruce Van Dyke, Chair of the Biotechnology Compliance Program, Quincy College
Marybeth Campbell, Executive Director, Skill Works
Gina Plata, Director of Education and Training, Just-A-Start
Paul Brassil, Vice President, Information Technology, Federal Reserve Bank of Boston

Building a Diverse Healthcare Workforce: Creating a Pathway for Success

Time: 1:45pm - 2:35pm
Room: Conference Room 210
Strand: Workforce and Business

Partners HealthCare and its founding hospitals - Brigham and Women's Hospital (BWH) and Massachusetts General Hospital (MGH) - recognize the universal lack of racial and socioeconomic diversity in the medical and science fields. The Student Success Jobs Program at BWH and the Youth Scholars Program at MGH provide innovative STEM programming and comprehensive educational and workforce preparedness services to Boston's underrepresented youth. Specifically, these programs support educational attainment through STEM-focused activities, provide academic assistance, and offer paid internships and career exposure opportunities to young people interested in pursuing a career in health, science or medicine. Through the Partners Scholarship Initiative launched in 2012, these successful programs were expanded to include college bound youth, creating additional opportunities and extending the pathway to a more diverse healthcare workforce.

SPEAKERS

Christyanna Egun, Director of Boston Partnerships, Massachusetts General Hospital
Aliza Porth, Research Manager, UMass Donahue Institute
Lisa Taylor-Montminy, Youth Development Manager, Brigham and Women's Hospital
Jesenia Cortes, SSJP Coordinator, Brigham and Women's Hospital

PM BREAKOUT I

Developing and Designing Impactful STEM Programs Based on K-8 Teacher Needs: A Discussion Forum

Time: 1:45pm - 2:35pm
Room: Meeting Room A
Strand: K-12 Education

Although there is a vast number of STEM resources available to schools, ranging from in-person demonstrations, to multimedia and textbook curricular materials, to field trips and virtual explorations, we often encounter challenges in implementation at the classroom level. Every classroom is unique, yet we seek solutions that are turn-key and scalable. This session invites teachers, school/district curricular support staff, principals, and school administrators to a roundtable conversation to discuss the challenges from their perspectives and ideas for designing, developing, (and adopting) impactful STEM programs.

MODERATOR

Erika Ebbel Angle, Founder and Executive Director, Science from Scientists

Exploring Computer Science: Engaging High School Students and Teachers Across MA

Time: 1:45pm - 2:35pm
Room: Meeting Room E
Strand: K-12 Education

Technology is transforming our world and every career field. Most parents recognize the need for students to move beyond using technology, to understanding how it is made and how computing intersects with our daily lives. Teachers increasingly want to bring basic knowledge of computer science (CS) to their students. Yet more than three-quarters of U.S. schools do not offer CS.

The Massachusetts Exploring Computer Science Partnership (MECSP), with the support of the National Science Foundation, is preparing teachers to engage diverse Massachusetts 9th graders in a yearlong Exploring Computer Science (ECS) course. A teacher-leader, evaluator, and partnership member from MECSP will (1) discuss program impacts on teachers, students, and administrators; (2) present the standards-aligned ECS curriculum and rigorous professional development (PD) model; and (3) explain the research behind ECS; the social, economic, and educational challenges ECS is designed to address; and the successful multi-sector partnership structure of MECSP.

Session participants will leave with an understanding of access and equity issues in CS education, ECS's design as a course to engage diverse students, how ECS fills a gap between K-8 engagement experiences and typical high school CS courses, ECS's impact on student attitudes and self-rated skills in CS, the impact of the PD program and teaching experience on teachers, the impact of the course on schools, opportunities to bring ECS to MA high schools, teachers, and students.

SPEAKERS

Renee Fall, Director, Western Mass. MECSP Hub; Manager, CAITE, Commonwealth Alliance for Information Technology Education, UMass Amherst
Janet Dee, Instructional Technology Specialist, Reading Memorial High School
Karen Gareis, Senior Research Associate, Goodman Research Group, Inc.

Games for Young Mathematicians: Mathematics Learning and Persistence in Preschool

Time: 1:45pm - 2:35pm
Room: Grand Ballroom Center
Strand: Early Education

Children are never too young to have meaningful mathematical experiences. Yet in many preschool settings, expectations for mathematics learning and teaching are not set high enough — especially given the importance of preparing all students for kindergarten. In this early education session, we present the work from the Games for Young Mathematicians project, a National Science Foundation funded research study. This study explores whether a preschool teacher professional development (PD) intervention has an effect upon low-income children's mathematics outcomes and persistence at challenging tasks. The PD intervention (1) trains teachers to use a set of challenging mathematics games; (2) supports teachers in scaffolding persistence; and (3) supports teachers in incorporating ideas from growth mindset research. The games support the development of mathematical perseverance and skills included in the preschool content standards: counting and cardinality; operations and algebraic thinking; and geometry. Learning how preschool children develop mathematical thinking and perseverance skills through the use of fun, developmentally-appropriate games is at the core of this project.

During the session, we will discuss the importance of early mathematics, persistence, and growth mindset in preschool classrooms. Participants will play the mathematics games and watch video of children in Head Start preschool classrooms playing the games. We will present research findings showing the relation between the PD intervention and child outcomes in mathematics and persistence at challenging tasks. Participants will leave with new ideas and resources about how to incorporate this work into their settings to promote children's lifelong interest in mathematics.

SPEAKERS

Jessica M. Young, Research Scientist, EDC
Paul Goldenberg, Distinguished Scholar, EDC
Kristen Reed, Research Scientist, EDC

How Community College Students Form a STEM Identity

Time: 1:45pm - 2:35pm
Room: Meeting Room D
Strand: Higher Education

An urgency exists in the nation to increase the number of graduates with an undergraduate degree within science, technology, engineering, or mathematics, armed with the skills necessary to tackle emergent employment opportunities. Simply exposing students to opportunities that are available within STEM is not sufficient to motivate those students to pursue STEM education. External factors, such as just exposure to STEM opportunities, may not be enough to keep students engaged in these rigorous fields of study. Rotter (1966) noted that motivation must be intrinsic in order for individuals to make changes within their lives. While the notion of identity formation is not novel, considering the development of a STEM identity, the concept of developing a STEM identity within students is an emerging trend of discussion within the STEM literature. Those students need to have tangible experiences, engage in leadership activities, and have positive mentoring, which allow them to develop a sense of self-efficacy, a necessary cultivation in identity formation. Using Waterman's (1990, 2004) model of identity formation as a foundation, this talk will explore a model of STEM identity formation for community college students. This model will highlight the diversity of factors that can contribute to the development of a STEM identity, using the lived experiences of actual community college students to illustrate key factors in this model. Core to this presentation will also be an exploration of how STEM identity development is critical for female community college students.

MODERATOR

Felicia Griffin-Fennell, Director, STEM Starter Academy, Springfield Technical Community College

SPEAKERS

Samantha Cote, Coordinator, STEM Starter Academy, Springfield Technical Community College
Rania Hamied, Student, Pre-Med Major, Springfield Technical Community College
Patricia Chavez, Student, Biotechnology Major, Springfield Technical Community College
Amma Bigbi, Student, General Studies Major, Springfield Technical Community College

Invasive Species and Elementary Age Students: Using Literature and Theater as Educational Tools

Time: 1:45pm - 2:35pm
Room: Meeting Room C
Strand: K-12 Education

Can leaning science be fun for your students and you? Yes it can! Join workshop leader Bricken Sparacino, Assistant Manager of Education at the Central Park Zoo (NYC), as she shares a dynamic lesson on how theater can help students understand science. Studies have found that theater helps students connect kinesthetically and emotionally to the subject being presented. This workshop will discuss the Conservation Theater style that encourages teachers to guide their students to develop their own plays about the natural and scientific world around them. For this workshop participants will delve into the science of invasive species and their impact on the environment. Using drama and a classic children's literature book, this lesson allows the learner to identify invasive species and understand it experientially while having fun portraying a king or a mouse. In this workshop participants will be invited to be the "students" and create a short play about invasive species. The session will include a breakout brainstorm, examples of this lessons past success at the Central Park Zoo and conversations about how to adapt this lesson for middle schools students. Participants will walk away with everything they need to use the lesson in their classroom.

SPEAKER

Bricken Sparacino, Manager of Live Interpretation, Wildlife Conservation Society Education

Let Your Inner Child Out in the STEM Playground

Time: 1:45pm - 2:35pm
Room: Grand Ballroom South
Strand: K-12 Education

Attendees will explore hands-on learning opportunities used in elementary and high school classrooms. Students have learned to use Makey Makey Kits, Hot Wheels, Snap Circuits, Sphero robots, Google Cardboard virtual reality, and 3D doodlers to support the STEM curriculum. These tools not only help students access and model the engineer design process but also afford them opportunities to delve into deep scientific thinking around STEM principles. Students are then able to relate their work to future careers. The STEM instruction has completely changed the way these two classrooms operate.

K-12 classroom teachers in any of them STEM disciplines could adapt these tools into their own classrooms. Examples of how to assess and reflect on these activities will be provided. Teachers will learn how to implement hands on strategies using these tools to teach concepts such as circuits, virtual reality, coding, 3D

modeling, and design process thinking. Teachers will also see how using different ways to teach concepts promotes 21st century learning and teaching such as: problem solving, creativity, critical thinking, collaboration, and communication skills.

SPEAKERS

Jacqueline Prester, Business and Technology Teacher, Mansfield Public Schools
Rayna Freedman, 5th Grade Teacher/ITS, Jordan/Jackson Elementary, Mansfield MA

Resources and Strategies for Implementing the 2016 MA Science and Technology/Engineering Standards

Time: 1:45pm - 2:35pm
Room: Grand Ballroom North
Strand: K-12 Education

The vision of the Massachusetts STE standards is to engage students in the core ideas through the integration of science and engineering practices, while making connections to what they know and the world they live in. Engage with other participants to learn where districts are in the process of transitioning to the 2016 MA Science Technology & Engineering (STE) Framework. Participants will gain an understanding of the STE Framework and learn about partnerships and collaborations throughout the state. To support districts during the transition to 2016 STE standards, DESE has trained a cadre of Science Ambassadors who are available to assist educators across the state to become familiar with the 2016 STE standards and the implications of those for curriculum and instruction. During the session, we will highlight the work of the Science Ambassadors and districts will present how they are working collaboratively to align curriculum and resources. We will discuss interactive strategies to use with your school/district as you begin to implement the 2016 STE standards. We will also share resources that educators and administrators can utilize in their districts.

SPEAKERS

Nicole Scola, Science Specialist, MA Department of Elementary and Secondary Education
Marianne Dunne, Science Specialist, MA Department of Elementary and Secondary Education
Alison Riordan, Science Curriculum Coordinator, Plymouth Public Schools
Ana Hurley, 7th Grade Life Science Teacher/Middle School Science Curriculum Coordinator, Dover Sherborn Middle School

STEM Program Evaluation: Focused Roundtable Discussions

Time: 1:45pm - 2:35pm
Room: Showcase Corner
Strand: Research & Evaluation

Please join us for a set of small group roundtables focused on various aspects of STEM evaluation. Four tables will be set up, staffed by members of the Education Development Center (EDC), TERC, and the UMass Donahue Institute to discuss issues in the following areas:

1. **Evaluation 101 – Getting started**
   New to evaluation? This discussion will provide tips on how to work with evaluators, resource guides, and logic models.
2. **Evaluation 201 – A closer look at key topics**
   This discussion will focus on (slightly) more advanced issues in evaluation, and will be designed for individuals who are somewhat familiar with evaluation. Topics may include "advanced" resource guides, specific concerns raised by audience members, etc.
3. **Balancing multiple evaluation needs/audiences**
   This group will discuss strategies for balancing the competing evaluation needs and demands of multiple stakeholders, selecting appropriate indicators/metrics, and promoting effective communication.
4. **Broadening participation in STEM – Culturally relevant evaluation**
   This will be a wide-ranging discussion touching on both introductory (what is culturally relevant evaluation) and advanced topics.

Each group will talk for 20 minutes, then participants will shift to a second table. Presenters will solicit questions regarding the topic of interest, and address those questions by providing examples from their own work. If no questions surface, presenters will share a brief set of comments related to the topic at hand, and will have a few questions prepped to engage the group in a discussion.

SPEAKERS

Abigail Levy, Co-Director of the Science and Mathematics Programs Unit, EDC
Jackie DeLisi, Research Scientist, EDC
Jim Hammerman, Project Director/ Senior Researcher & Evaluator, TERC
Jeremiah Johnson, Research Manager and Quantitative Specialist, UMass Donahue Institute
Karen Mutch-Jones, Senior Researcher, TERC
Leslie Goodyear, Principal Research Scientist, EDC
Steve Ellis, Senior Research Manager, UMass Donahue Institute
Jean Supel, Research Manager, UMass Donahue Institute
Eric Hochberg, Senior Researcher, TERC

Breakout Sessions - PM Breakout II

Advancing Career Pathways in Automation and Quality

Time: 2:55pm - 3:45pm
Room: Meeting Room C
Strand: Workforce and Business

Mount Wachusett Community College will present examples of industry-education partnerships it has developed through its advanced manufacturing programs. This will include program and curriculum development and review as well as delivery of curriculum to incumbent workers as a means to improve employee skills. Examples of short-term non-credit training delivered to incumbent workers will be shared. A 40-hour Quality Systems Training Program and a 60-hour Automation Technician Training Program will be presented. The intended audience for this presentation includes educators and employers looking for models and lessons learned regarding industry-educator partnerships. The objective is to show how both partners can benefit and how unexpected outcomes can emerge. The result of the described efforts is a demonstration of how short-term training can help build a career pathway and provide an impetus for students/employees to improve their employment prospects. Results from the programs and its associated outcomes will be presented along with employer perspectives. Additionally, program revisions and enhancements made for subsequent trainings will be discussed.

SPEAKERS

John Henshaw, Dean, Workforce Development, Mount Wachusett Community College
Gretchen Ingvason, Senior Learning Specialist, Mount Wachusett Community College
Jennifer Stephens, Senior Learning Specialist, Mount Wachusett Community College
Myrna Matos, Associate Quality Manager, SMC, Ltd.
Julie Rivera, Incoming Quality Inspector, SMC, Ltd.
Nathan Roberts, Tech Ops Admin/Calibration Tech, SMC, Ltd.

Building Connections to STEM Careers through 21st Century Learning Conferences

Time: 2:55pm - 3:45pm
Room: Grand Ballroom South
Strand: K-12 Education

This session is intended for teachers and administrators working with middle and high school students who are looking for ways to partner with professionals, community groups, and local leaders to introduce students to STEM learning experiences and careers and to build a network to support STEM programming. Participants will work with teachers and administrators from Nipmuc Regional High School to learn about the school's implementation of "21st Century Learning Conferences" for students. Introduced as part of the school's STEM Scholars Program, these conferences take place during the school day, allowing students to work with professionals, community groups, and local leaders in STEM-related workshops that teach them about STEM concepts, introduce them to employability skills needed in STEM-professions, and connect them to STEM careers and colleges and universities. Modeled after workshops offered to educators and professionals, the 21st Century Learning Conferences allow students to choose from a variety of workshops/sessions on a range of topics.

Participants in this session will learn a variety of strategies to support STEM programming including developing a STEM advisory board for their school communities as a way to support STEM and career programming; building a STEM network of professionals, community groups, higher education representatives, and local leaders; and integrating STEM and career-focused learning experiences into the curriculum by partnering faculty members with STEM professionals.

SPEAKERS

John Clements, Principal, Nipmuc Regional High School
Mary Anne Moran, Associate Principal, Nipmuc Regional High School
Elizabeth Hennessy, Career and Community Coordinator, Nipmuc Regional High School

Building Effective STEM Communities

Time: 2:55pm - 3:45pm
Room: Junior Ballroom
Strand: K-12 Education

What is needed to assemble a successful STEM Team in your city or town? During this session, members of the Easton STEAM Education Team will discuss the genesis and evolution of their group and its accomplishments to date. Participants will have the opportunity to brainstorm resources and assets in their own communities and then share out with others to gain ideas for developing and strengthening STEM support for their own districts. This session is best suited for K-12 Educators and Administrators who are looking to generate support for STEM initiatives and interest, but business/industry leaders are welcomed to get ideas on how to approach the educators in their region and offer their perspectives.

We would like to share the process we used to begin dialogue with the business community, why we believe a model that is inclusive of diverse stakeholders has been a benefit, and how we have leveraged the relationships we have built to provide greater support for the initiatives of the school department and opened communication with the citizens of the town.

We will show you that once a team is formed and you chart your course, you will inevitably encounter paths you did not imagine. From there, you will develop relationships and collaborate with businesses, politicians, and citizens in your community in a way that is of great benefit to your students. There are limitless possibilities!

SPEAKERS

Kerri Murphy, Easton STEAM Education Team Chair; Math Teacher at Oliver Ames High School
Paula Martel, Human Resources Manager, North Easton Machine Co., Inc.
Dottie Fulginiti, Selectman, Town of Easton
Lisha Cabral, Assistant Superintendent, Easton Public Schools

Careers in Fire Protection

Time: 2:55pm - 3:45pm
Room: Conference Room 210
Strand: Workforce and Business

Careers in fire protection go beyond firefighting. Unlike fighting a fire after it has occurred, fire protection engineers focus on prevention of these fires and fire spread. Fire protection engineers apply scientific and engineering principles to perform a wide range of roles such as designing building systems that detect fires, control the spread of fires, control the movement of smoke, and provide a safe means for building occupants to egress a building.

This panel presentation and Q&A opportunity is intended for students, career seekers and career advisors who wish to learn more about STEM careers in fire protection. This session will showcase diverse career options, highlight the growing use of technology in fire protection, and will describe how higher education institutions have partnered with companies to provide internships and further connect and expose their students to the field of fire protection engineering.

Fire protection engineers are employed internationally by private consulting firms, government agencies, corporations, fire departments, insurance firms, design firms, and local building code officials. Indeed, the demand for fire protection engineers outweighs their availability and for this reason they are amongst the most highly paid engineers. According to a survey conducted in 2012 by the Society of Fire Protection Engineers (SFPE), the median US total compensation for fire protection engineers is $113,748. SFPE Engineering Program Manager, Chris Jelenewicz stated "With a career in fire protection engineering, you receive a stable salary and the satisfaction of keeping the world and its inhabitants safer from fire."

MODERATOR

Nancy Pearce, Senior Fire Protection Engineer, National Fire Protection Association

SPEAKERS

Amanda Kimball, Research Project Manager, Fire Protection Research Foundation
Milosh Puchovsky, Professor of Practice, Department of Fire Protection Engineering; Director, Corporate & Professional Education, Worcester Polytechnic Institute; President, Society of Fire Protection Engineers (SFPE)
Kristin Bigda, Principal Fire Protection Engineer, National Fire Protection Association
J.C. Harrington, Assistant Vice President, FM Global; Board Member, Society of Fire Protection Engineers

CS Pathways: A Model of Inclusive Middle School Computing for Social Good

Time: 2:55pm - 3:45pm
Room: Meeting Room B
Strand: K-12 Education

Middle School Pathways in Computer Science (cspathways.org) is an NSF-supported ITEST Strategies project that launched in Fall 2014. It created a partnership between the University of Massachusetts Lowell (UML), the Tri-City Technology Education Collaborative Inc. (TRITEC), and the urban school districts of Medford and Everett, MA. With activities in-school and during the summer, CS Pathways is bringing project-based, socially-relevant computing experiences to district middle school students.

Project teachers have developed a 15 to 20-hour computing curriculum that is integrated with existing district technology

and engineering courses. During the first and second years of the project (2014/2015 and 2015/2016) the curriculum was implemented in middle schools and was delivered to approximately 450 students per year. The project is now being implemented in each of the districts' seven middle schools. During the project's first year the project team conducted intensive 30-hour summer camps attended by 72 students and the project is recruiting students to participate in similar activities in the summers of 2016 and 2017.

Using MIT App Inventor, a blocks-based design environment for building mobile apps, students are developing their own apps that support socially relevant activities in their communities. University computer science students and industry professionals are visiting project classrooms and to discuss career pathways with project students.

The research and evaluation team is studying student learning outcomes in computer science (both attitudes and computational thinking competencies); teacher learning outcomes and curriculum products, and broadening participation outcomes.

The project's goal is to create an institutionalized computer science curriculum in the two districts that is accessible and appealing to all students.

SPEAKERS

Molly Laden, Executive Director, Tri-City Technology Education Collaborative (TRITEC)
Akira Kamiya, Teacher Learning Center Director, Medford Public Schools
Diane Schilder, Project Evaluator, Evaluation Analysis Solutions, Inc.
Fred Martin, Director, Engaging Computing Group; Professor, Computer Science, University of Massachusetts Lowell

Including the Special Needs Student in STEAM Programming

Time: 2:55pm - 3:45pm
Room: Meeting Room A
Strand: K-12 Education

How do we provide hands-on projects, real world applications and engaging STEAM programming to students with serious disabilities? What are the positive outcomes from supporting these students as STEAM learners?

Many students with serious disabilities have large gaps in their education that manifest as unevenly developed skill sets. This can be the result of frequent changes in school placement, the inability to master the material within the time period it is presented, and/or teaching practices and materials presented in ways that are difficult for the students to understand. Some students have disabilities that require a placement outside of their home school district. This constellation of personal and systemic factors increase the likelihood that such students will be further marginalized due to a lack of the hard (knowledge- and experience-based skills) and soft (interpersonal and temperamental skills) needed to secure employment as they exit the traditional educational system.

It is our intent to demonstrate the essence of STEAM education by combining a traditional presentation with small group work, so that participants will understand how disabilities can affect learning and will gain insights into ways to support student learning. We will examine the benefits to these students of solving real world problems through practical applications of knowledge and hands-on projects. Experiential learning increases the acquired knowledge and understanding of students (hard skills) as it develops the needed skills in problem solving, collaboration, and planning (soft skills).

Audience participation and discussion are encouraged so all can learn from each other's experiences in a process that will mirror the classroom expectations that are the focus of this session.

SPEAKERS

Charles Seekell, STEAM Coordinator, South Coast Educational Collaborative
Catherine Vieira-Baker, Clinical Psychologist, South Coast Educational Collaborative
Kimberly Botelho, Teacher/Educator, South Coast Educational Collaborative

Learning Math as a Creative Experience

Time: 2:55pm - 3:45pm
Room: Meeting Room E
Strand: K-12 Education

As mathematics takes an increasing role in work and life, creativity must become central to its mission because: 1) creativity and creative problem solving are essential 21st century skills, 2) creativity drives engagement and enjoyment, and 3) creativity builds understanding. Over the past three years we have been discovering and developing math lessons using spreadsheets to enable students to ask the central creative question, "What if…" We have over 100 lessons for students of all ages that you can use as problems of the week, as project or problem-based-learning opportunities, or as challenges for those students who may need them. These What if Math Labs are open-source and available for free. They work in Microsoft Excel, Google Sheets, or on iPads in Numbers. You can sign up to receive our Problems of the Week, or you can assign students a "Course" to work through. You are welcome to bring your computer or your tablet to the session. And we look forward to your suggestions for new lessons that we create or that you add to our growing curriculum.

SPEAKERS

Art Bardige, CEO, What if Math
Peter Mili, Chief Learning Officer, What if Math

Re-imagine Teacher Education for STEM Educators with Woodrow Wilson Academy of Teaching and Learning and MIT

Time: 2:55pm - 3:45pm
Room: Grand Ballroom Center
Strand: Higher Education

How can we re-imagine STEM teacher education? We invite STEM educators to participate in a design-based workshop focused on the Woodrow Wilson Academy (the WW Academy). The WW Academy is a competency-based teacher education program with an innovative curriculum that provides real world contexts for learning for teacher candidates. A small pilot class of teacher candidates will start the program in the summer of 2017. Come engage in design thinking to help WW Academy and MIT staff puzzle through exciting design challenges they are facing in developing the teacher education program. During the workshop you will: (a) learn more about the WW Academy and our design process and (b) test and provide insightful and invaluable feedback about components of our program that are grounded in your own experience of teaching and learning.

SPEAKERS

Eliza Spang, Director of Learning Design, Woodrow Wilson Academy of Teaching and Learning
Yoon Jeon Kim, Research Scientist, MIT

Real-World Learning: Teaching Science through Case Studies

Time: 2:55pm - 3:45pm
Room: Showcase Corner
Strand: K-12 Education

Have your students ever asked you, "Why do I need to know this?" Case studies, which are tools for teaching in STEM and other disciplines, bring immediate relevancy to the course material you teach in your classroom. Students will be able to connect the content from your course to problems occurring in the world today, such as antibiotic resistance and ocean acidification. Case studies stimulate curiosity, passion, motivation, and teamwork among students. Throughout the case study, students will work in teams to address a societal problem using science. They have the opportunity to ask their own questions and to conduct their own research. At the end of the case, they have the opportunity to communicate their findings to an audience outside the classroom. This approach is modeled from a program called iCons (Integrated Concentration in Science) that is offered at the University of Massachusetts Amherst. The presenters will take you through the five-step case study process and share four fully developed cases, which include relevant science standards, with you.

MODERATOR

Stephanie Purington, UMass Amherst, iCons Program

SPEAKERS

Erica Light, UMass Amherst, iCons Program
Rebecca Howard, UMass Amherst, iCons Program
Kiki Carey, UMass Amherst, iCons program
Corrine Losch, UMass Amherst, iCons Program

Seeds of STEM: A Problem Solving Curriculum for Pre-K Classrooms

Time: 2:55pm - 3:45pm
Room: Grand Ballroom North
Strand: Early Education

Seeds of STEM is a research project funded by the US Department of Education (Institute of Education Sciences) which focuses on the development and testing of a problem solving (early engineering) curriculum for Pre-K classrooms.

We will conduct a round table discussion session that engages participants in learning about the project, listen to Head Start teachers experience with problem solving activities, review the developed units, and discuss/provide feedback on the content and pedagogy for teaching young children how to follow the engineering design process in order to solve any kind of problem.

The session will share with participants the first couple of Seeds of STEM units, designed to teach problem solving skills to young children. Participants will experience a component of each unit, discuss it with colleagues, and provide feedback and suggestions. Educators will enhance their understanding of the process of problem solving (engineering design process) and how it can be taught at the pre-K classroom. Researchers will learn about the iterative process of the curriculum development.

This session is intended for Pre-K educators, administrators, para-professionals, policy makers, and researchers who study the early learning of STEM.

SPEAKERS

Martha Cyr, PI, Seeds of STEM, The STEM Education Center at WPI
Mia Dubosarsky, Co-PI, Seeds of STEM, The STEM Education Center at WPI
Colleen Bostwick, Seeds of STEM Developer Teacher, Worcester Head Start Program
Christine Grudoff, Seeds of STEM Developer Teacher, Worcester Head Start Program

Through the Eyes of the Protagonist: Using Story to Foster STEM Identity and Engage Girls in STEM

Time: 2:55pm - 3:45pm
Room: Meeting Room D
Strand: K-12 Education

What is STEM identity? What does research say about identity as a predictor of long-term STEM engagement? How can a story be used to cultivate STEM identity and foster engagement? How can these ideas be implemented in afterschool programs? In this session, educator/author Dr. Penny Noyce and engineer/author Sonia Ellis will address these questions as they address the importance of STEM identity in increasing participation of girls and other underrepresented minorities in STEM. They will introduce the research behind using story to foster STEM identity and promote deep learning. Both authors will use their own young-adult books as examples and talk about the ways in which they incorporate STEM and feature diverse, relatable characters (both fictional and real). Finally, Ellis and Noyce will highlight the innovative ways in which story in can be used in OST settings. Attendees will have an opportunity to explore hands-on activities that relate to the books.

A panel discussion with Noyce, Ellis, and Ardith Wieworka from the Massachusetts Afterschool Partnership (MAP) will address audience questions about topics from the presentation as well as how story-based approaches can be partnered with existing programs and curriculum (like Zero Robotics); evidence-based outcomes from pilot sites; and policy considerations for promoting a lifetime of opportunity in STEM for all young people.

MODERATOR

Ardith Wieworka, CEO, Massachusetts Afterschool Partnership (MAP)

SPEAKERS

Sonia Ellis, Writer and Senior Instructional Designer, Smith College/ Through My Window
Penny Noyce, Educator, Writer, Publisher, Tumblehome Learning

Exhibits

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

A Information

B UMass Donahue Institute

C **Sponsor:** UMass Dartmouth

D **Title:** Real World Design Challenge
Organization: MassDOT Aeronautics Division
Strand: K-12 Education
Overview: The Real World Design Challenge (RWDC) annually provides high school students the opportunity to work on real world engineering challenges in a team environment. Student teams address a challenge that confronts our nation's leading industries and this year's challenge is focusing on "Precision Agriculture" utilizing unmanned aircraft systems.

E **Sponsor:** BATEC

F1 **Sponsor:** Greenfield Community College

F2 **Sponsor:** Mt. Wachusett Community College

G **Sponsor:** Quinsigamond Community College

1-3 **Title:** WGBH Education/PBS LearningMedia
Organization: WGBH Education/PBS LearningMedia
Strand: Early Education, K-12 Education, Higher Education, Workforce and Business
Overview: Digital learning resources from WGBH, the Massachusetts-based flagship PBS station and America's premier producer of STEM content for public media. We have resources for all age levels—early learners/PreK to lifelong learning.

4 **Title:** Teen Startups: Inspiring High Schoolers with Entrepreneurship and Innovation
Organization: Epiic Solutions, LLC
Strand: K-12 Education
Overview: Find ways to inspire and equip your high schoolers with the mindset, skills, and connections they need to become creative innovators and entrepreneurs. Learn about resources, programs and communities that can help you build bridges between your school and Massachusetts' thriving innovation economy.

5 **Sponsor:** DellEMC

6 **Title:** Global STEM Classroom™ Programs at Dennis-Yarmouth Regional High School – The Global Education Leader in Massachusetts
Organization: Dennis-Yarmouth Regional High School, South Yarmouth, MA
Strand: K-12 Education
Overview: Students present the results of their collaboration with students in other countries such as England, France, Mexico, Norway, Russia, and Ukraine on STEM projects focused on the world's most challenging science and engineering issues such as availability of clean drinking water around the globe, climate change, nanotechnology, and space exploration.

7 **Sponsor:** iRobot

8 **Title:** The National Inventors Hall of Fame PreK-12 STEM educational programs
Organization: National Inventors Hall of Fame Educational Programs
Strand: K-12 Education
Overview: Honor. Inspire. Challenge. The National Inventors Hall of Fame® is a non-profit organization that pays it forward and invests in the future of innovation and STEM through our national, pre-K-12 educational programs, Invention Playground®, Camp Invention®, Club Invention®, and Invention Project®. All of our education programs focus on creativity, innovation and real-world problem solving.

9 **Title:** STEAM in Motion
Organization: Worcester Child Development Head Start
Strand: Early Education
Overview: The Worcester Child Development Head

Booth Number in Exhibit Hall **L** Exhibits in the Lobby

EXHIBITS

Start STEAM exhibit is perfectly suited to individuals in the early education field. Participants will have the opportunity to experiment with a large wind tunnel, create pendulum art, and experiment with catapults. Vocabulary words, questions starters, assessment tools, and family engagement ideas will be shared.

10 **Title:** Science Learning is Child's Play: Successful Preschool STEAM Programs in Massachusetts Public Libraries
Organization: Massachusetts Board of Library Commissioners
Strand: Early Education
Overview: Public library programs developed to promote STEM learning within the context of the arts provide preschool children with the opportunity to discover their world. This exhibit showcases selected "Full Steam Ahead" grant funded library projects. Participants will come away with new resources, program ideas and evaluation techniques that validate the exploration of STEM within an informal learning environment. Effective programs demonstrate how children can develop an understanding of science concepts through first-hand observation and participation within the trusted space of the community library.

11 **Sponsor:** Mass Commission for The Blind

12 **Title:** Intro to CS and Sensing Technology Design
Organization: Ten80 Education
Strand: K-12 Education
Overview: Experience a visual progression of computer science building blocks that de-mystify coding and engineering through fun projects and games. Start from blinking a message with LED binary counters to wearing simple sensors in human robot control, to a fully sentient custom designed Rover.

13 **Title:** Independent Student Research Projects, Exciting Showcase/Competitions & Mini Grants for Your School
Organization: Massachusetts State Science & Engineering Fair (MSSEF)
Strand: K-12 Education
Overview: Come meet middle and high school students eager to discuss their scientific research findings and engineering design innovations. Learn about resources and grants to help your school/district offer students the opportunity to investigate a meaningful question in depth, guided by STEM mentor — and to bring science/engineering practices into your classroom.

14 **Sponsor:** General Dynamics – Mission Systems

15 **Title:** Culturally Responsive Teaching in Computer Science (Building Inclusive Classrooms)
Organization: Girls Who Code
Strand: K-12 Education
Overview: In this interactive lecture, educators and technologists can converse with each other, sharing resources that will lead to more inclusive classrooms. This interactive lecture will help attendees become better allies as computer science teachers.

16 **Title:** "Minuteman's Girls in STEM" Mentoring Program
Organization: Minuteman High School – Girls in STEM
Strand: K-12 Education
Overview: Although women represent nearly half of the entire workforce, they represent only a quarter of workers in STEM fields. Minuteman's Girls in STEM mission is to encourage and engage girls who enjoy STEM courses to pursue and advance in science, technology, engineering, and math (STEM) fields. Get excited and inspired through this mentoring network for middle school girls interested in Science, Technology, Engineering, or Math! Stop by Minuteman's exhibit and find out more about our Girls in STEM Mentoring program.

17 **Title:** Everett High School Chemistry Initiative
Organization: Everett Public Schools
Strand: K-12 Education
Overview: The Chemistry Initiative at Everett High School exhibit will show the students performing chemistry labs using the equipment and supplies purchased with the Biogen Idec Ignite the Power of STEM grant money. In addition, several pieces of chemistry equipment will be part of the exhibit as visual displays.

18a **Sponsor:** Massachusetts Department of Early Education and Care (EEC)

18b **Sponsor:** National Fire Protection Association

19 **Title:** The Wonderful World of Water
Organization: Communities United, Inc.
Strand: Early Education
Overview: Taking the ordinary to the extraordinary, come explore the wonderful world of water with us.

20 **Sponsor:** University of Massachusetts Lowell

21 **Title:** Just-A-Start's Biomedical Careers Programs – Workforce and Economic Impacts
Organization: Center for Social Policy, UMass Boston
Strand: Workforce and Business
Overview: Just-A-Start's Biomedical Careers program has trained over 600 low-income working adults to work as biomanufacturing and laboratory technicians in the Metro North area. This eight-month certificate program has recently undergone an economic impact assessment that measures the earnings gains and career trajectories for its graduates.

Booth Number in Exhibit Hall **L** Exhibits in the Lobby

EXHIBITS

22 **Title:** The LEAH Project: A Near-Peer STEM Education Model in Out-of-School Time Settings
Organization: Health Resources in Action
Strand: K-12 Education
Overview: The LEAH Project's is a near-peer, replicable OST program model that engages students at two crucial developmental junctures: in elementary school when interest in science is at its peak, and high school when they can be re-engaged in science and education, creating a path toward college and STEM career.

23 **Title:** STEM + PLAYDOUGH = STEAM FUN
Organization: STEM Beginnings
Strand: Early Education
Overview: STEM + PLAYDOUGH = STEAM (Science, Technology, Engineering, Arts, Math) FUN for children of all ages! When children play with playdough, it stimulates their senses, enhances their creativity and imagination, and it becomes a fun and effective tool for hands-on learning.

24 **Title:** MathPOWER Algebra Plus Summer Academy
Organization: MathPOWER
Strand: K-12 Education
Overview: The MathPOWER Algebra Plus Summer Academy exhibit will display informational components that include: displays of student centered projects and activities, informative videotape of various program activities, as well as program literature and information.

25 **Sponsor:** McGraw Hill Education

26 **Title:** MazeFire's Digital Games Boost Student Motivation and Knowledge Integration Across STEM Disciplines
Organization: MazeFire LLC and Northeastern University
Strand: Higher Education
Overview: MazeFire.com provides free (click-n-play) STEM games for High School and HigherEd, e.g. Bio101, Chem101, Microbiology, Physiology and more. Visitors can try our games and receive a complimentary Best Practices Guide that covers in-class game play as well as homework (home-play) where mazes are completed for extra credit or as competitions.

27 **Title:** Integrating the Arts into Early Childhood STEM Explorations
Organization: Berkshire County Head Start
Strand: Early Education
Overview: Integrating the Arts in Early Childhood STEM Explorations offers ideas and examples of curricula designed for implementation preschool classrooms to support the development of the habits of mind that will ensure that children have the tools to address scientific explorations with creativity, innovation, and inspiration.

28 **Title:** Mass Academy of Math and Science at WPI
Organization: Mass Academy of Math and Science
Strand: K-12 Education
Overview: See examples of Mass Academy student research projects, assistive technology projects and APPS developed by student teams.

29 **Sponsor:** Raytheon

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

31 **Sponsor:** Worcester Polytechnic Institute

32 **Title:** Exploring Shared Concepts Across Science, Math and Classical Music
Organization: New Bedford Symphony Orchestra
Strand: K-12 Education
Overview: The New Bedford Symphony Orchestra's "Learning in Concert" program has received national attention for its innovative STEAM curriculum design. Over the course of a school year, the "Learning in Concert" program partners with 40 schools to explore a concept that exists equally and authentically in music and in science or math.

33 **Title:** 3D Portfolio Creation Using Unity 5 Software
Organization: Mashpee Middle-High School
Strand: K-12 Education
Overview: Mashpee Middle-High School students will lead attendees through hands-on interactive demonstrations of their 3D portfolios. This will include the use of several sets of Oculus 3D goggles, laptop computers, and iPad tablets.

34 **Title:** MIT: Playful Powerful Learning
Organization: MIT Scheller Teacher Education Program
Strand: K-12 Education
Overview: Come play with us! MIT will be showcasing its family of free games, simulations, and programming tools designed for secondary educators and their students. Explore a simulated ecosystem, breed monsters with the best traits for battle, or build an app.

Booth Number in Exhibit Hall **L** Exhibits in the Lobby

EXHIBITS

35 **Title:** The Boston Society of Civil Engineers K-12 Outreach Program
Organization: Boston Society of Civil Engineers
Strand: K-12 Education
Overview: Using model bridges and an earthquake simulator, BSCES volunteers will introduce their free contests and programs, which include the Boston Bridge Tours, Future City Competition, and 2 model bridge contests (physical and online).

36 **Sponsor:** Boston University

37 **Title:** Innovative Global STEM Classroom© Models
Organization: Blackstone Valley Reg. Voc. Tech. High School
Strand: K-12 Education
Overview: Replicate multicultural, project-based programs with the Global STEM Education Center! Blackstone Valley Regional Tech's award winning program demonstrates successful global STEM collaboration in a vocational setting. Transform STEM education to develop the global workforce.

38 **Title:** Explore ArtScience with Gique
Organization: Gique
Strand: K-12 Education
Overview: Gique is an MIT-based nonprofit 501(c)(3) organization which exists to inspire and educate youth in STEAM. Come to our booth to learn about how Gique serves as a community partner to after-school program providers through its development of after-school program curricula and educational workshops.

39 **Title:** Enable Educators' Exchange – Involving Students In 3D Printed Prosthetics Projects
Organization: Enable Community Foundation
Strand: K-12 Education
Overview: The Enable Community Foundation and its education wing, the Enable Educators' Exchange, seeks to involve students and schools in the printing, construction, and dissemination of hyper-affordable and customizable 3D printed prosthetics for actual recipients.

40 **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.

41 **Sponsor:** Intel

42 **Title:** Teacher Developed STEM Investigations - Using Scientific Data from Local Research with the Museum Institute for Teaching Science
Organization: Museum Institute for Teaching Science (MITS, Inc.)
Strand: K-12 Education
Overview: Teachers and partners from MITS professional development programs will share inquiry-based investigations focusing on robotics, modeling and research data from MA Global Change projects using Data Nuggets. With their students, they will showcase these STEM investigations. Come play with our friendly robots, Dot and Dash, that the students have programmed.

43a **Sponsor:** EDC

43b **Sponsor:** Mentis Sciences

44a **Sponsor:** GBMP

44b **Sponsor:** AccuRounds

45 **Title:** Foundations for STEM Success: Implementing National Best Practices in a Liberal Arts College Setting
Organization: Merrimack College, Dept. of Civil Engineering
Strand: Higher Education
Overview: Merrimack College's "Foundation for STEM Success" is a student-centered approach to higher education retention: an integrated support network increasing students' self-efficacy, sense of belonging, and belief in their contributions to society. Come learn more, and share your methods of retention and improving outcomes, as well as linkages between K-12 and workforce.

46 **Title:** Introduction to New England FIRST and ingenuityNE, Inc.
Organization: New England FIRST
Strand: K-12 Education
Overview: Visit our booth to learn more about FIRST robotics, a worldwide program that kids can join to design, program, and build sophisticated robots to compete in technical, sports-like events. Working alongside STEM professionals, students become inspired and excited about potential careers in engineering, electronics, computer programming, and many other scientific and technology fields.

47 **Title:** Woodrow Wilson Academy of Teaching and Learning: Designing a Teacher Education Program for the 21st century

Booth Number in Exhibit Hall **L** Exhibits in the Lobby

Organization: Woodrow Wilson Academy of Teaching and Learning
Strand: Higher Education
Overview: The Woodrow Wilson Academy is designing curriculum and assessments for an innovative STEM teacher education program. We are engaging students and teachers in our design process and in testing our prototypes. Visitors to the exhibit can experience early versions of our games and simulations and offer input to help shape this cutting-edge program to prepare STEM teachers.

48 **Title:** This Watery World: Fostering Environmental Stewardship through Afterschool Enrichment
Organization: Center for the Advancement of STEM Education at Bridgewater State University
Strand: K-12 Education
Overview: This exhibit will highlight an afterschool enrichment program, Environmental Explorers - This Watery World. During the program, students in grades 4-6 explored the world of water through inquiry, exploration, experimentation, technology, and mathematical analysis and to spark interest in a lifetime of community stewardship.

49 **Title:** It All STEMS from Nature at Mass Audubon
Organization: Mass Audubon
Strand: K-12 Education
Overview: Mass Audubon's It All STEMS from Nature shares examples, resources, curriculum, and take-aways to support K-12 teachers and community-based educators in increasing student access, engagement and learning in STEM through the study of the natural world, no matter where their school or center is located - urban, suburban, or rural.

50 **Sponsor:** Fitchburg State University

51 **Title:** Take a Look at the World Around You…PATTERNS, PATTERNS, PATTERNS
Organization: Greater Lawrence Community Action Council Inc. Head Start
Strand: Early Education
Overview: Our study of patterns offered preschool children opportunities to focus on explorations, adventures, observations, and games that made connections to many STEM concepts.

52 **Title:** Academy of Applied Science—Inspiring STEM Learners through Experiential Education, Project-based Learning and Research Competitions
Organization: Academy of Applied Science
Strand: K-12 Education
Overview: Our Academy administers STEM AEOP (Army Educational Outreach Programs) as well as serves as the home of the Young Inventors' Program which serves schools in NH/MA.

53 **Title:** Seeding the Future: Creating a Green Collar Workforce through Learning about Indoor Urban Farming Technologies and Alternative Energy Sources
Organization: Boston College
Strand: K-12 Education
Overview: We will be providing examples of curriculum, hydroponic systems, solar power activities, robotics and coding learning experiences. Visitors will learn how we create interdisciplinary curriculum and how to access the curriculum and other learning materials.

54a **Sponsor:** Olin College

54b **Sponsor:** National Network of Libraries of Medicine, New England Region

55 **Title:** Novel Engineering @ Tufts Center for Engineering Education and Outreach
Organization: Tufts University – Center for Engineering Education and Outreach
Strand: K-12 Education
Overview: Inspired by kids and grounded in research, Novel Engineering is an innovative approach to integrate engineering and literacy in K-8. Students use existing classroom literature as the basis for engineering design challenges that help them identify problems, design solutions, and engage in the Engineering Design Process while reinforcing literacy skills.

56 **Title:** NUTRONs Robotics Team's Cost Effective & Proven STEM Pipeline
Organization: NUTRONs FIRST Robotics Team 125
Strand: K-12 Education
Overview: Watch students from the NUTRONs FIRST Robotics team drive their hand built 120-pound robot as well as hear all about their experience competing in FIRST robotics competition!

57a **Sponsor:** Museum of Science, Boston; National Center for Technological Literacy

57b **Sponsor:** TERC

58 **Title:** Educational Robotics Competitions: A Comparison of VEXIQ and LEGO EV3 Mindstorms
Organization: Boston University Academy Robotics Team
Strand: K-12 Education
Overview: In this hands-on exhibit, participants will drive or build robots made from LEGO bricks and/or from VEXIQ bricks side-by-side. Examples of pieces from the FIRST LEGO League and VEXIQ games will

Booth Number in Exhibit Hall L Exhibits in the Lobby

be on display. Boston University Academy hosts both of these events.

59

Title: Future Plans for the Science and Technology/ Engineering MCAS
Organization: MA Department of Elementary and Secondary Education
Strand: K-12 Education
Overview: With the adoption of the new 2016 Massachusetts Science and Technology/Engineering (STE) Framework, the state must now plan to transition the STE MCAS testing program to the new standards. Come by and find out about how the state plans to make this transition.

60a **Sponsor:** Laboratory Robotics Interest Group

60b **Sponsor:** IntelADAPT

61

Title: FIRST Robotics at BRRHS - 20 years and growing!
Organization: Bridgewater-Raynham Regional HS
Strand: K-12 Education
Overview: Visit our booth to see a student-built 120 pound FIRST Robotics Competition robot in action! Our students from Bridgewater Raynham Regional HS will be running the demo and describing the impact STEM has made on them, their college direction, and career goals. They will also be available for Q&A as well as describing the business model that has kept this team going for 20 years!

62-64

Title: Engaging Students Via Hands-On Learning and Building Career Awareness in Automated Manufacturing
Organization: Mount Wachusett Community College
Strand: Higher Education
Overview: Mount Wachusett Community College will exhibit equipment and materials from its advanced manufacturing programs. This demonstration of the use of hands-on learning coupled with industry exposure engages students to consider careers in advanced manufacturing as a STEM pathway. Equipment includes automation, robotics, and measurement tools.

L **Sponsor:** Boston Business Journal

L **Sponsor:** Discover Central Massachusetts

L **Sponsor:** General Electric Foundation

L **Sponsor:** Mass Life Sciences

L **Sponsor:** STEM Networks

Booth Number in Exhibit Hall **L** Exhibits in the Lobby

OFFICE OF THE GOVERNOR
COMMONWEALTH OF MASSACHUSETTS
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CHARLES D. BAKER
GOVERNOR

KARYN E. POLITO
LIEUTENANT GOVERNOR

November 1, 2016

Dear Friends:

On behalf of the Commonwealth of Massachusetts, we welcome you to the 13th Annual STEM Summit at the DCU Center in Worcester.

As always, thank you to the University of Massachusetts Donahue Institute for their ongoing efforts to build a STEM community and for making this event a success each year.

We also want to thank members of the Commonwealth's STEM Advisory Council, led by co-chairs Lieutenant Governor Karyn Polito, Congressman Joe Kennedy and Dr. Jeffrey Leiden, with the support of our administration and Education Secretary Jim Peyser, for their energy, enthusiasm and commitment to broadening opportunities in STEM for more students across the state.

The theme of this year's Summit is "Building a Lifetime of Opportunity", which is also a common thread through many of our administration's initiatives. We want all of the Commonwealth's citizens to have employment opportunities that allow for prosperous and happy lives.

As many of the fastest growing industries in the state have connections to the STEM fields, we must continue to prepare our students for the demands of higher education and the workforce. It is essential that we engage students throughout their years in K-12 school in hands-on lessons in science, engineering, computer science, technology and math. Our system of postsecondary education, whether on campus, online or through a credentialing program, must ensure that students learn the necessary skills so they are ready for the workplace.

We are heartened that so many people – educators, parents, business and community leaders – come to this convening and engage in this conversation at the local, regional and statewide level. It is your excitement, interest, and knowledge that will help our economy and educational system continue to innovate and evolve.

We look forward to today's conversation and to the work we will undertake 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

Massachusetts STEM Advisory Council

One Ashburton Place, Suite 1403, Boston, MA 02108 | www.mass.edu/stem/getinvolved/gicouncil.asp

November 1, 2016

Dear Members of the STEM Community:

On behalf of the STEM Advisory Council, we are delighted to welcome you to the 2016 STEM Summit.

The Summit provides an opportunity for the Commonwealth's entire STEM community to share best practices and highlight successful programs and partnerships. We know that you will find this day to be greatly valuable and that you will enjoy the chance to connect with each other, share ideas and, as always, find inspiration.

Under the leadership of the Baker-Polito Administration, the STEM Advisory Council has focused its efforts over the past year around four key priorities. Aspects of each are woven throughout today's conversation:

- Increasing the number of high school internships in STEM fields
- Developing and implementing models of STEM Early College Career Pathways
- Expanding access to high-quality computer science and engineering curricula
- Strengthening and aligning with the Regional STEM Networks

Through a host of initiatives in these areas, we believe that the Commonwealth will significantly increase the number of students who are interested in science, technology, engineering and math, and who will then ultimately choose a career in a STEM field. We are driven by one overarching question: *How do we ensure that interest in STEM gets sparked early?*

We know that if a high school student gets hands-on learning through an advanced manufacturing internship, or a student earns college credits in IT prior to graduation, that student is far more likely to continue to want to learn and work in a STEM field. And, Massachusetts needs their talent: more than 50% of new jobs created today are in STEM fields, which makes our STEM pipeline critical to a bright economic future.

The STEM Advisory Council looks forward to collaborating with you as we build this road of lifelong learning, where today's STEM students become tomorrow's STEM future.

Hon. Joseph Kennedy III
U.S. Representative, MA 4th District

Jeffrey Leiden, M.D., Ph.D.
Chairman, President and CEO of Vertex

MASSACHUSETTS BUSINESS ROUNDTABLE

November 1, 2016

Dear Members of the STEM Community:

On behalf of the members of the Massachusetts Business Roundtable – a statewide organization of CEOs and senior executives committed to the state's long term economic vitality – we thank you for your commitment to STEM education and for your participation in today's Summit. Talent development, and ensuring a workforce pipeline with skills aligned to the current and future demands of the economy, are the most important public policy issues impacting the state's competitiveness. You are on the front lines of that work and we thank you for your commitment.

Now in its 13th year, this year's Summit focuses on "Building a lifetime of opportunity," recognizing that the core elements of STEM education – curiosity, creativity, collaboration, critical thinking – begin in the earliest years of life and must be nurtured throughout the education continuum and beyond, in a variety of settings, as a necessary strategy to prepare a STEM-literate workforce. This issue is top-of-mind for employers. A recent survey of nearly 500 employers from across the Commonwealth found that 75% experience some difficulty in hiring employees with the right skills for open positions. Employers identified the type of hands-on, experiential learning that is inherent in STEM teaching and learning as the most effective way to grow a STEM-qualified workforce. Employers also highlight applied, real world skills – such as teamwork, critical thinking and communicating – as essential to improving educational outcomes. Skills, of course, that are typical of a STEM education. 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.

These are exciting times for STEM in the Commonwealth. Under the leadership of the Baker – Polito Administration, as well as Congressman Joe Kennedy III and Jeff Leiden, the CEO of Vertex Pharmaceuticals, the state's STEM initiative is reenergized and refocused on building a STEM pipeline to support the state's economy. Working in partnership with you, we 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,

Marcy Reed
Massachusetts President
National Grid
Chair, MBR
Member, MA STEM Council

Tracy Pitcher
Regional Senior Vice President
Comcast
Chair, MBR Education Task Force

JD Chesloff
Executive Director
Member, MA STEM Council

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

Martin T. Meehan
President

November 1, 2016

Dear STEM Colleagues,

On behalf of the University of Massachusetts and its five campuses, I welcome you to the 2016 Massachusetts STEM Summit. In keeping with today's theme of Building a Lifetime of Opportunity, this gathering will provide an in-depth look at how STEM principles and practices are strengthening our Commonwealth in areas including workforce development, education and research.

UMass takes seriously its role in educating the state's workforce and is committed to meeting the growing demand for STEM graduates. Across the UMass system, approximately 35 percent of all bachelor's degrees, 30 percent of master's degrees and 55 percent of doctorates granted are STEM-related. In addition, UMass continues its leadership role in innovation and commercialization, with 66 U.S. patents awarded last year. The University's STEM focus is crucial to the Commonwealth's efforts to compete in the global economy and validated by its recent ranking by Reuters as one of the World's Most Innovative Universities.

I thank our co-organizers – the Massachusetts STEM Advisory Council, the Massachusetts Business Roundtable and the UMass Donahue Institute – as well as the sponsors who stepped forward to support this annual Summit. I also thank all of you for your continued commitment to STEM education in the Commonwealth.

Have a great Summit.

Sincerely,

Martin T. Meehan
President

One Beacon Street | 31st Floor | Boston, MA 02108 | P: (617) 287–7050 | F: (617) 287–7167 | www.massachusetts.edu

Dear STEM Colleagues:

The BATEC National Center of Excellence in Computing and Information Technology is pleased and honored to participate and support the Massachusetts STEM Summit. The Summit is an important opportunity for dialogue and discussion and the only forum devoted exclusively to convening the many stakeholders who tirelessly dedicate themselves to the development of a strong and growing workforce pipeline in the STEM disciplines.

The BATEC Center is an urban laboratory of secondary schools, community colleges and universities charged with the academic preparation of workforce-ready technicians for the high technology fields that drive our region and our nation's economy. Our work is centered in the academic programs of Computer Science, Data Management, Networking, Information Technology and Web Development. We sponsor curriculum development, provide professional development for college faculty and secondary school teachers, and design academic pathways from inner-city high schools to community colleges, and from community colleges to both the University of Massachusetts and high technology employment.

BATEC is headquartered at the University of Massachusetts Boston, a nationally recognized model of excellence for urban public universities. Our academic excellence is reflected by a growing student body of 17,030 undergraduate and graduate students. The university's 11 colleges and schools offer 82 undergraduate programs and 126 graduate programs with a 16:1 student-to-faculty ratio enabling students to easily interact with professors in small class sizes. Ninety-three percent of our full-time faculty hold the highest degree in their fields.

Our College of Science and Mathematics (CSM) offers an applied problem-based approach to effective learning with meaningful opportunities for our students 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 BATEC Center and 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.

Deborah Boisvert
Executive Director
BATEC Center of Excellence

Andrew Grosovsky
Dean
College of Science and Math

Zong-Guo Xia
Vice Provost
Research and Strategic Initiatives

Biogen Foundation

Dear STEM Summit Participants,

Thank you for your role in shaping tomorrow's STEM leaders! The excitement, curiosity and wonder you convey to the students in your classrooms are the keys to capturing their interest and propelling them towards a STEM related career.

In your school or classroom could be a future researcher, technical engineer or even a Nobel Prize winner. We have a collective responsibility to provide access to a variety of STEM pathways for students of all backgrounds, and to provide resources and support for STEM educators.

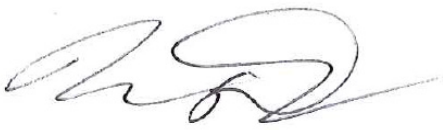
The Biogen Foundation and the Biogen Community Lab continue to focus on supporting programs that enhance high-quality science education for present and future generations. The Biogen Community Lab is the longest running corporate hands-on science lab in the nation where over 29,000 students in Greater Boston have experienced laboratory science over the last 14 years. Community Lab science expertise, coupled with the Foundation's grant program, has led to tremendous partnerships with the Museum of Science, Teach for America, Cambridge Science Festival, Citizen Schools and other local STEM initiatives over the years.

The Biogen Foundation is excited to expand its ***Ignite the Power of STEM*** Grant Program and provide support for innovative science education programs and projects in elementary, middle and high schools. Details regarding this exciting grant program are available at today's event and on the Biogen website.

We appreciate the opportunity to participate in this important meeting and value our continued partnership. I'm confident that the collaboration with your fellow STEM education colleagues here today will spark ideas, discussions and new initiatives that will enhance innovative science programming for students across Massachusetts.

We look forward to supporting your efforts to educate and inspire the next generation of scientists and STEM leaders.

Sincerely,



Michael Dambach, Chairman, Biogen Foundation

Boston University Office of the President

Dr. Robert A. Brown
President

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November 1, 2016

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's Office of STEM Education Initiatives, the center of a University-wide effort to develop a coherent strategy for improving STEM education, fosters innovation in teacher preparation, promotes curriculum transformation, and strives to prepare the next generation of STEM leaders. Initiatives promoted by the Office of 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 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 was 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, which debuted on edX in February 2015. This provides 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 degree with a Bachelor of Science degree 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.

To learn more about BU's work in STEM education, stop by BU's information table, and attend AM Breakout 1 Session - *Project Accelerate: A University – HS Partnership Bringing AP Physics 1 to Underserved Students*, featuring BU Physics Faculty member, Andrew Duffy, Research Fellow and Teacher-in-Residence, Mark D. Greenman, and their colleagues from Boston Public Schools.

We are pleased to sponsor this year's STEM Summit for the fourth 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

FITCHBURG STATE UNIVERSITY

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Fitchburg, MA 01420-2697
Tel 978.345.2151
www.fitchburgstate.edu

November 1, 2016

Dear STEM colleagues,

Fitchburg State University is proud to be a sponsor of this year's STEM Summit and grateful for the opportunity to discuss our achievements and objectives with our industry and academic colleagues.

The university's commitment to STEM is reflected in the 110,000-square-foot Antonucci Science Complex, which has proven transformative to our campus since its completion in 2013. The facilities provide extraordinary space for teaching and learning and has been essential in our efforts to continue recruiting top faculty. Fitchburg State has more than 1,500 students—nearly half our undergraduate enrollment—majoring in STEM fields, including biology, chemistry, earth science, exercise and sports science, geographic science and technology, mathematics, nursing, psychological science, computer science and industrial technology. Our continued investment in these programs is essential as we seek to serve the workforce needs of this critical segment of the Massachusetts and regional economy.

We collaborate closely with our peers in secondary education to help cultivate STEM learners. We have partnered with the Lowell Public Schools, for example, to provide content-based professional development courses for middle school teachers to increase knowledge of STEM fields. The courses are funded through a Massachusetts Math and Science Partnership grant from the state's Department of Elementary and Secondary Education. Our faculty also invite students to participate in their own research projects, giving students the opportunity to gain hands-on experience while utilizing the tools of our science facilities.

Fitchburg State also supports cross-disciplinary research, such as the National Endowment for the Humanities (NEH)-funded project now in process by members of our mathematics and computer science faculty. The faculty members were awarded an NEH Digital Humanities Start-Up Grant to support the development of a digital image analysis tool for studying paintings. When complete, the tool will be powerful enough to support advanced academic research in computer science, cognitive science, art history and the philosophy of art. At the same time, the tool will provide a user-friendly interface that is accessible to students and researchers with little or no background in computer science. The research team membership transcends not only departments on this campus, but includes individuals from the Fitchburg Art Museum and Bates College.

We have also collaborated with other institutions to create opportunities for students. In the STEM field, we have established an agreement with the Lake Eric College of Osteopathic Medicine (LECOM) in Pennsylvania to facilitate the admission of our students into several of their doctoral programs. Successful students are given provisional acceptance to the LECOM while still on our campus. The agreement was launched two years ago and our first graduates in the program will enroll at LECOM next fall.

Thank you for joining us in the cultivation and success of STEM initiatives in Massachusetts and I encourage you to learn more about the work we are doing at Fitchburg State University.

Sincerely,

Richard S. Lapidus
President

GENERAL DYNAMICS
Mission Systems

November 1, 2016

Dear STEM Stakeholders:

Welcome to the 2016 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 job 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 paid 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
Director of Engineering, Maritime and Strategic Systems
General Dynamics Mission Systems

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

Building a world that works *better*

Our Developing Skills™ Initiative empowers people to become globally productive citizens. The GE Foundation is working across the state of Massachusetts to cultivate a more diverse STEM and healthcare workforce by supporting the development of skills needed for the innovative economy of tomorrow.

The GE Foundation is proud to sponsor the Massachusetts STEM Summit 2016.

GE Foundation

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November 1, 2016

Dear STEM Stakeholders:

Thank you for joining us at the 2016 Massachusetts STEM Summit. As in the past, this year's Summit brings together a variety of participants focused on improving and enhancing STEM education. With your help and cooperation, we will provide our students with the best opportunity in the nation to be impactful.

Our goal at iRobot is to make practical robots that solve real problems. The opportunity for robots is huge, and in the 26 years iRobot has been building robots, we are only beginning to see their potential. No matter how intelligent our robots seem, we cannot achieve greatness without great people. Our commitment to STEM insures our students are inspired to take on the challenges presented in today's world.

The iRobot STEM program provides inspiration to our young aspiring engineers. Critical to that mission is working directly with students and teachers. We share our success, our failure, our "aha" moments, and our iterative engineering process. In doing so, we go beyond simply writing a check to a school or sponsoring a team. We leave our students with a glimpse into where STEM can take them. We leave them with a sense of what they can do to be a part of an evolving future.

At iRobot, we feel you get back what you put in. Inspiring students will change the future.

Sincerely,

Colin Angle
Chairman, CEO and Co-Founder of iRobot

MASSACHUSETTS
LIFE SCIENCES CENTER

Investing in the State of Innovation

November 1, 2016

Dear STEM Stakeholders:

The Massachusetts Life Sciences Center (MLSC) is pleased to once again be supporting the Massachusetts STEM Summit. We are also proud to be represented on the Massachusetts STEM Advisory Council as it works to ensure that all students in the Commonwealth receive an education that best prepares them for careers in the innovation economy.

Our state is the global leader in life sciences, and has become the place to be for companies that are innovating in fields such as biotechnology, pharmaceuticals, medical devices and diagnostics. The number of life sciences companies in Massachusetts is growing rapidly, and our home-grown companies are expanding, creating a rise in demand that we must continue to meet by way of investment in high caliber education and training across the state. Students and future workers must be adequately prepared to compete for, and be successful in, STEM-related careers. We are grateful to the Baker administration for their dedication to investing in STEM education, including the programs offered by the MLSC.

At the MLSC, we earnestly continue to invest in the Massachusetts life sciences education system. Three things we know a child's education requires, particularly in the life sciences: proper capital equipment and facilities; skilled, inspired teachers; and curiosity. We want to ensure that all Massachusetts students have these three elements, and have equal opportunity to become our community's next generation of scientific leaders. Our commitment is resolute, providing the funding for lab equipment, supplies, curriculum, teacher training, apprenticeships, and paid internships, all to build a clear education & workforce development pathway into the life sciences. To learn more about our programs, visit our web site at www.masslifesciences.com.

As we go about this work, we will maintain a particular focus on girls, students of color, and children going to school in economically-disadvantaged communities. While we have made strides in shrinking the achievement gap in our K-12 schools, our collective ambition for educational and workforce equity in the sciences still persists. Collectively we must engage all students and workforce ready adults in STEM subjects, and we must enable our teachers, programs, and schools to provide the highest quality STEM education to those who otherwise would not have access. It is our duty to ensure that we bridge the gap in STEM education access for underrepresented and minority youths in the Commonwealth.

I am certain that this year's STEM Summit will further mobilize our community to address these inequities, and strengthen Massachusetts' status as a global leader in STEM education. We look forward to participating in the Summit and to collaborating with you to make these goals a reality.

Sincerely yours,

Travis McCready
President and CEO

1000 Winter Street
Suite 2900
South Entrance
Waltham, MA 02451

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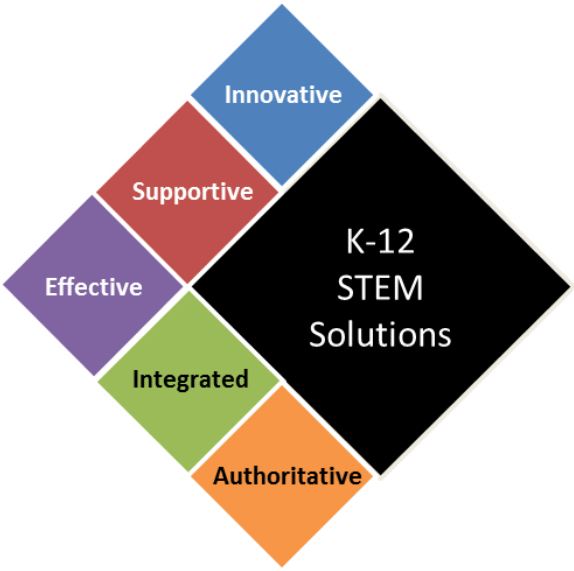
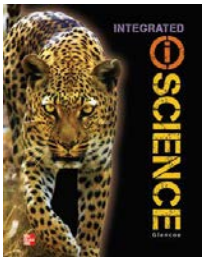
5 Guiding Principles for McGraw-Hill STEM K-12 Solutions



1. **Innovative:** digital first solutions that delight the user
2. **Supportive** of educators as they move to the future; both NGSS and non-NGSS, and PD opportunities
3. **Effective:** the leader in developing the next generation of science literate citizens
4. **Integrated:** weaving together science and non-science studies, different science strands and practices, and across grade levels and bands
5. **Authoritative:** the only full STEM provider, focused on full solutions that are based in research

Science and Technology/Engineering Standards Grades K-5 & 6-8



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http://www.mheducation.com/prek-12

nationalgrid

November 1, 2016

Dear STEM Stakeholders,

There are few causes more important to me than inspiring, attracting, and developing a skilled workforce. As a member of the Mass. STEM Advisory Council, it is my privilege to welcome you to the 2016 Massachusetts STEM Summit.

Science, technology, engineering, and math jobs are critical to our economy's success. Given that 60 percent of our industry's employees are eligible for retirement in the next decade, I'm deeply concerned about having skilled employees so we can meet the evolving needs of our society. Today's Summit is a step toward helping to make sure we advance students' STEM skills.

But we can't just discuss these plans; we also need to act. I'm proud to note that Bottom Line, one of the wonderful organizations National Grid supports, graduated their first class of Worcester students last spring – and one of these students now works for our company. We've also formed a new partnership with the organization "Science from Scientists," through which an interactive science show will be presented at the Ecotarium. Here in Worcester, there is tremendous opportunity to recruit and cultivate the future STEM workforce.

Our industry needs to inspire a new generation of engineers and other STEM professionals as we face unprecedented energy challenges. To this end, National Grid is proud to invest in several organizations in the Worcester community:

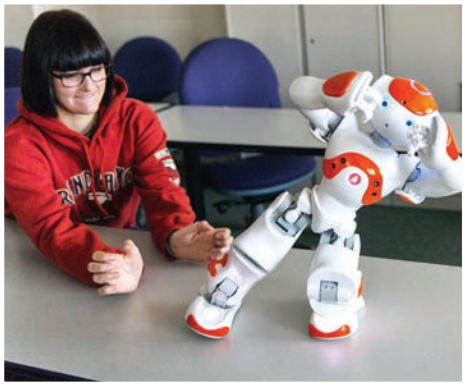
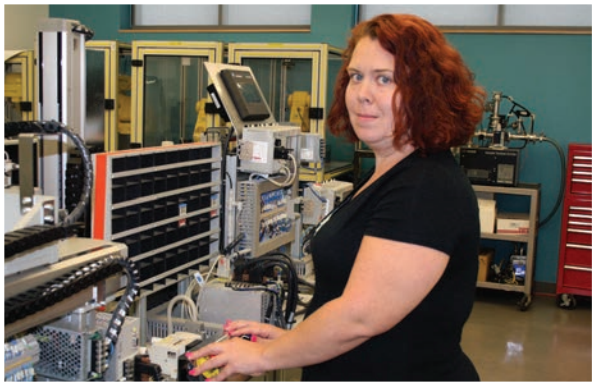
Girls Incorporated: Providing girls with high quality STEM training and support throughout the school year and summer months.
FIRST Robotics: Sponsorship of Central MA district event at Worcester Polytechnic Institute.
Bottom Line: Assisting students through college application process and mentoring 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 that will evolve into the action our communities so desperately need.

Sincerely,

Marcy L. Reed
President, National Grid, Massachusetts

YOUR QuEST FOR THE BEST TRAINING ENDS HERE

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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.

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—ANNIE XAYACHACK '17
Co-op in upstream purification manufacturing at Genzyme, a Sanofi company

Life is the only test.

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UML.EDU/HANDS-ON

UMASS LOWELL
Learning with Purpose

Donna C. Cupelo
Region President – New England

November 1, 2016

Dear STEM Stakeholders,

Verizon is thrilled to support the Massachusetts STEM Summit again this year. It is so critical that educators, business leaders, nonprofit partners, and public officials continue to collaborate to strengthen Science, Technology, Engineering, and Math (STEM) education for all students in the Commonwealth.

At Verizon, we understand how integral STEM is to innovation. Our employees rely on their STEM expertise every day to push the boundaries of what is possible and are committed to innovating a better world.

We believe it's our responsibility to leverage our resources – both technical and human – to engage students and educators in STEM so that the next generation is prepared to innovate, create and solve the world's most challenging problems. Verizon supports a wide variety of education initiatives focused on improving student interest and achievement in STEM education. Programs are designed to deliver hands-on experiential learning opportunities that use mobile technology and include coding, design thinking and entrepreneurship to underserved and underrepresented students to increase engagement and interest in STEM.

We are eager to continue the discussion with Summit participants to ensure our students have access to opportunity through STEM education. We are fortunate to partner with such a committed group of leaders who are focused on shaping the future of innovation right here in Massachusetts. Our collective future depends on it.

Sincerely,

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02135

617 300 2000
wgbh.org

November 1, 2016

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 University of Massachusetts Donahue Institute for their ongoing and extraordinary commitment to STEM education, and for convening this summit, now in its thirteenth year.

A pioneer in digital learning, public media producer WGBH has a long history of promoting STEM awareness and education both locally and across the country. This year at the Summit we are thrilled to showcase some of our latest work: *Bringing the Universe to America's Classrooms*, a collaboration with NASA to design and develop digital media-integrated instructional resources for K-12 classrooms. These resources will be distributed free of charge through PBS LearningMedia, a partnership between WGBH and PBS which now offers more than 120,000 free classroom-ready, curriculum-targeted digital resources.

Bringing the Universe to America's Classrooms will integrate dynamic multi-media content from NASA as well as WGBH signature STEM programs *Design Squad*, *FETCH!*, *NOVA*, *PEEP and the Big Wide World*, and *Plum Landing*. Our national panel of Teacher Advisors has been critical to the development of the resource prototypes over the past year, and we're very pleased to have some of the Massachusetts-based advisors join us here at the Summit to discuss their work.

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

Jonathan C. Abbott
President and CEO

Stepping into the future requires a foundation—and a pathway

At WPI, our commitment to Science, Technology, Engineering, and Math (STEM) starts early and goes further. We never stop thinking of new ways to engage students of all ages in the wonder of innovation. We know it takes hands-on discovery for every generation to step into a future rooted in STEM. That's why we encourage our students, faculty, and partners to imagine across boundaries and in all directions.

When exploring is always part of your life,
there are sure to be opportunities to make an impact.

WPI

NOTES

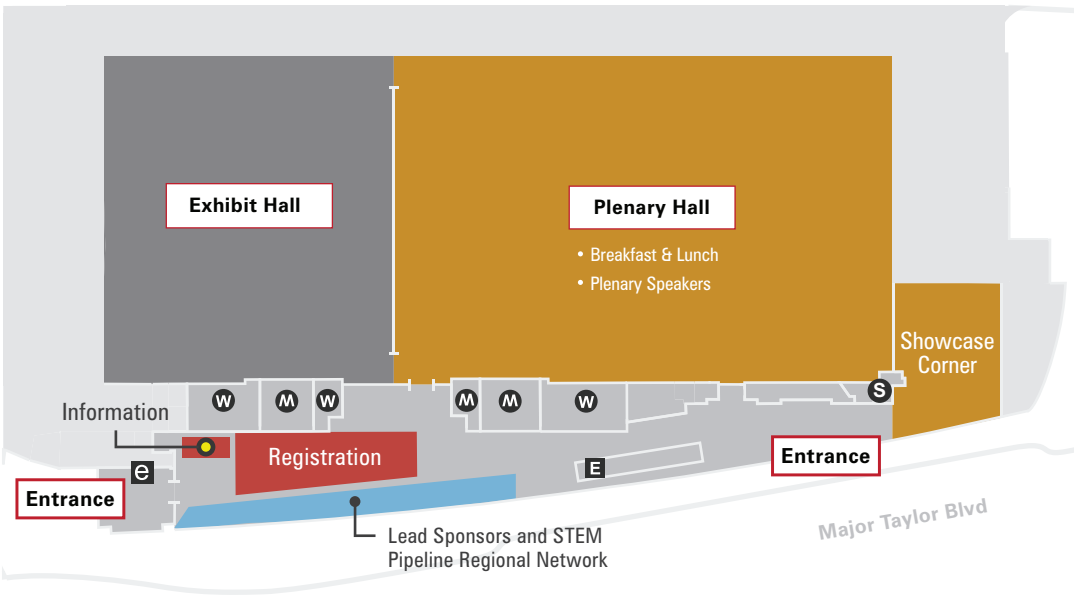
NOTES

NOTES

BREAKOUT SESSION ROOM ASSIGNMENTS

1ST LEVEL				
Location	AM Breakout I (9:45 – 10:35)	AM Breakout II (10:55 – 11:45)	PM Breakout I (1:45 – 2:35)	PM Breakout II (2:55 – 3:45)
Plenary Hall		**K-12 Education:** Bringing the Universe to America's Classrooms: Using Digital Media to Support Three-Dimensional Learning in Earth and Space Science (WGBH)		
Showcase Corner	**Early Education:** Exploring the "T" in the Early Childhood STEM Standards: Extending Technology beyond Screens	**K-12 Education:** iRobot Create® 2 and Scratch in Your Classroom	**Research & Evaluation:** STEM Program Evaluation: Focused Roundtable Discussions	**K-12 Education:** Real-World Learning: Teaching Science through Case Studies
2ND LEVEL				
Location	AM Breakout I (9:45 – 10:35)	AM Breakout II (10:55 – 11:45)	PM Breakout I (1:45 – 2:35)	PM Breakout II (2:55 – 3:45)
2nd Floor Conference Room	**K-12 Education:** Project Accelerate: A University – HS Partnership Bringing AP® Physics 1 to Underserved Students	**Early Education:** Cape Cod STEM Network Teacher-in-Residence Program: Making Connections Outside the Standards	**Workforce & Business:** Building a Diverse Healthcare Workforce: Creating a Pathway for Success	**Workforce & Business:** Careers in Fire Protection
3RD LEVEL				
Location	AM Breakout I (9:45 – 10:35)	AM Breakout II (10:55 – 11:45)	PM Breakout I (1:45 – 2:35)	PM Breakout II (2:55 – 3:45)
Grand Ballroom South	**K-12 Education:** Boston STEM Week: A Collaborative Effort to Bring Integrated STEM to Middle Schoolers	**K-12 Education:** A Reverse Science Fair: Building Relationships between High School Students and Graduate Researchers	**K-12 Education:** Let Your Inner Child Out in the STEM Playground	**K-12 Education:** Building Connections to STEM Careers through 21st Century Learning Conferences
Grand Ballroom Center	**Early Education:** Engineering in Your Classroom Block Area: Using Problems Encountered in Children's Literature to Solve Problems Together	**Early Education:** Using Literacy Experiences to Extend STEM Learning	**Early Education:** Games for Young Mathematicians: Mathematics Learning and Persistence in Preschool	**Higher Education:** Re-imagine Teacher Education for STEM Educators with Woodrow Wilson Academy of Teaching and Learning and MIT
Grand Ballroom North	**K-12 Education:** Teaching Students to Ask Their Own Questions in the STEM Classroom	**Early Education:** STEM Matters in the Earliest Years	**K-12 Education:** Resources and Strategies for Implementing the 2016 MA Science and Technology/ Engineering Standards	**Early Education:** Seeds of STEM: A Problem Solving Curriculum for Pre-K Classrooms
Meeting Room A	**K-12 Education:** Preparing to Teach STE in Elementary Schools: A Discussion for Stakeholders	**Early Education:** An Alternative to Exams in the Sciences: eReports for Better Learning Opportunities with Less Stress	**K-12 Education:** Developing and Designing Impactful STEM Programs Based on K-8 Teacher Needs: A Discussion Forum	**K-12 Education:** Including the Special Needs Student in STEAM Programming
Meeting Room B	**Higher Education:** Building STEM Majors' Capacity for Delivering Inquiry-based Mathematics and Science Lessons through UTeach	**Workforce & Business:** Managing Knowledge, Lore, and Connections	**K-12 Education:** Animal-based Pedagogy in Engineering Education	**K-12 Education:** CS Pathways: A Model of Inclusive Middle School Computing for Social Good
Meeting Room C	**Higher Education:** Communities and Opportunities for STEM Majors: MST and PRISM at Northeastern University	**Workforce & Business:** Clean Energy Corps: from Classroom to Company	**K-12 Education:** Invasive Species and Elementary Age Students: Using Literature and Theater as Educational Tools	**Workforce & Business:** Advancing Career Pathways in Automation and Quality
Meeting Room D	**K-12 Education:** Designing a Longitudinal STEM Career Pathway from 7th Grade through Community College	**K-12 Education:** Building Middle School Engagement in Math and Computer Science: Findings from the NSF ITEST Program	**Higher Education:** How Community College Students Form a STEM Identity	**K-12 Education:** Through the Eyes of the Protagonist: Using Story to Foster STEM Identity and Engage Girls in STEM
Meeting Room E	**Workforce & Business:** Leveraging Educator-Industry Partnerships to Increase Diversity in High School STEM Internships	**Higher Education:** Building Bridges through STEM between a College and Urban High-Risk Middle School Students	**K-12 Education:** Exploring Computer Science: Engaging High School Students and Teachers across MA	**K-12 Education:** Learning Math as a Creative Experience
Junior Ballroom	**Workforce & Business:** Connecting the Dots - Linking Opportunity and Insight from K-12 to the Workforce	**K-12 Education:** Writing in Science to Support Thinking and Inquiry in STEM	**Workforce & Business:** Best Practices to Develop a Skilled Workforce through Industry/ Academia Partnerships	**K-12 Education:** Building Effective STEM Communities

LEVEL 1



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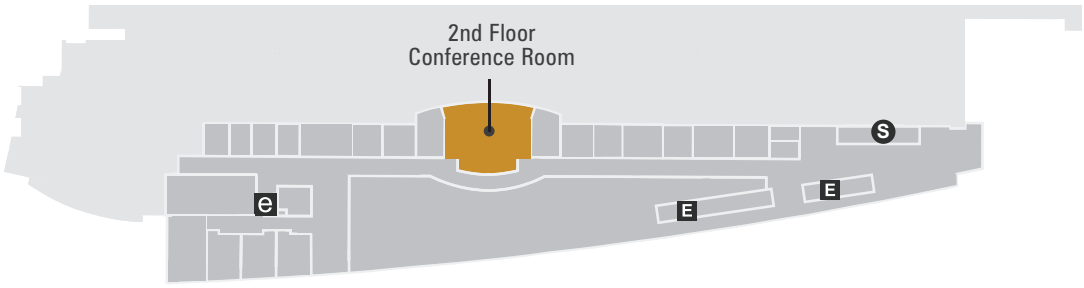

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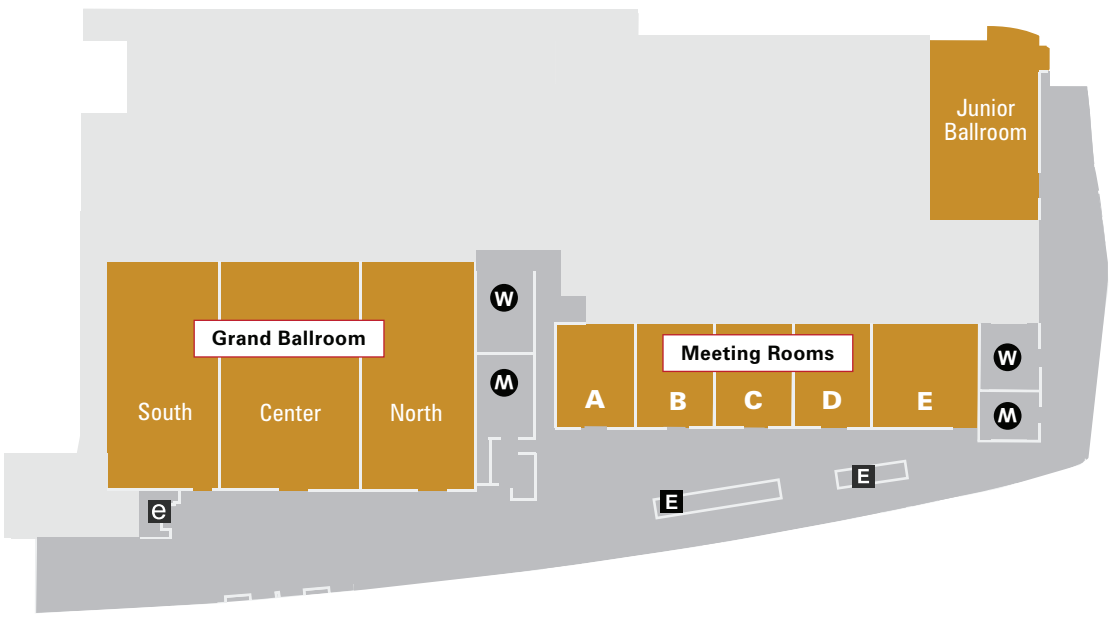

Breakout Session Location | W Women's Room | M Men's Room | E Escalator | e Elevator | S Stairs

Special Thanks

Cora Beth Abel, MA State Science & Engineering Fair
Rusti Berent, Ward's Science
Deb Boisvert, BATEC
Toni F. Borge, Bunker Hill Community College
Blair Brown, MA Executive Office of Education
Ronit Carter, Empowering Excellence
Jennifer Ceven McNally, Curry College
JD Chesloff, Mass Business Roundtable
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Jennifer Green, CLE Engineering
Felicia Griffin-Fennell, Springfield Technical Community College
Jane Heaney
John Henshaw, Mount Wachusett Community College
Colleen Hitchcock, Brandeis University
Amy Hoffmaster, Citizen Schools
Peter Holden, STARBASE Hanscom AFB
Isabel Huff, Springfield Technical Community College
Monica Joslin, MA College of Liberal Arts
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Eric Lieberman, MA Department of Early Education and Care
Catherine McCulloch, Education Development Center
Maureen McDonald, UMass Donahue/Head Start
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Anna Seiders, Everett Public Schools
Carlene Sherbourne, Worcester Child Development Head Start
Ryan Tainsh, Johnson & Wales University
Karla Talanian, Russian School of Mathematics

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