September 15, 2014

Massachusetts STEM Advisory Council: Quarterly Meeting
Council Update

- @Scale Update
- Lecture Series
- STEM Summit 2014
- STEM Nexus
Boston STEM Network

www.bostonstemnetwork.org
@BostonSTEM
State of STEM Report

ASSESSING THE STATE OF STEM IN BOSTON
Provides a baseline measure of student interest and achievement in STEM subjects and careers

Includes units and competencies for Boston Public School Science & Math curriculums for: elementary, middle and high school

Uses data from BostoNavigator to measure capacity of out-of-school time STEM and informal science opportunities

Describes origins of Boston STEM Network and past initiatives that address the State STEM goals

Will be used as a document to measure progress, inform decision-making and drive Network activity
Subcommittee Presentations

Fall 2014/Winter 2014
- Phase 1
  - Data
  - Defining STEM
  - STEM Networks

Spring 2015/Summer 2015
- Phase 2
  - Workforce & Training
  - Diversity
  - Global STEM
  - STEM and the Arts*

Fall 2015
- Phase 3
  - STEM Readiness*

Winter 2015
- Phase 4
  - Teacher training, PD, and support*
STEM Council Meeting
Dr. Jeffrey Leiden  |  September 15, 2014
Chairman, President & CEO, Vertex
Scientific Innovation & Our Economy – Why it Matters

- Biopharma grew 40% from 2002-11
  - >56k jobs; $6.5B in state payroll
  - 40% growth 2002-2011
  - 25% of companies formed in last 3 years are in greater Boston

- Best educated workforce
  - 122 colleges & universities
  - ~5,600 STEM graduates per year

- MA VC firms raised $5.4B in 2013 (3x 2012)
- Top 5 NIH funded research hospitals in the U.S.
- $3B in medical research funding

- Leader in public/private funding
  - 2nd highest concentration of tech jobs
  - 6.5% of the workforce; 209k jobs
  - 11k jobs added 2009-12
  - 13,500 firms
The Innovation Ecosystem: A Public/Private Partnership

Company Formation

Academic Research

Education

Company Growth, Retention, and Jobs

Research Funding & Collaboration

Corporate Research Funding

Angel/VC/Gov’t Funding

Mentoring and Networking

Additional Funding (public, private, gov’t)

Idea Generation

Reputation and Recognition

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The Council Has Made Significant Gains Within the Public Sector

✓ Established a governance system to prioritize, align and recommend funding for STEM education policy proposals

✓ Increased funding for schools, teacher development and STEM initiatives
  ▪ $1.5M for the STEM Pipeline Fund for FY 2014

✓ Increased public awareness including identifying role models who help educate parents, guardians and the business community

✓ Established 8 regional STEM networks, with the 9th to be formed on the Cape and Islands which are instrumental in building support for STEM throughout the state

✓ Promoted and scaled best practices initiatives to increase student preparation for and interest in STEM through @Scale
Coordinated Business Engagement Has Lagged Behind the Public Sector

The Business Engagement Council Will:
- Work with the Council to strengthen industry partnerships and align public-private efforts to advance STEM talent

By:
- Convening a diverse group of business leaders representing STEM related companies who have demonstrated a commitment to STEM education and experience with initiatives that have successfully affected change.

Success Will Be Determined By:
- Level of attention and investment from the private sector
- Support from companies of all sizes across the Commonwealth
- Reaching students beyond the urban areas
- Creating a coordinated public-private effort
- Opportunities to learn beyond the classroom (experiential, mentorships)
Keys to Garnering Business Support: Less is More

For the business leader, STEM initiatives must be:

1. **Focused**: more investment in fewer initiatives
2. **Repeatable**: able to be replicated across the Commonwealth
3. **Successful**: demonstrated high impact with proven track record (strong metrics)
4. **Educational**
Business Initiative: MassCAN

Partnership of educators, industry professionals, and non-profits collaborating to inspire and educate Massachusetts students in computing and prepare them to lead and innovate in a future economy that will be dependent on and driven by computing technology.

Standards
What is taught

Curriculum
How computing is taught

Professional Development
Who teaches computing

Public Awareness
Why to study computing

- Secured seed funds
- Raised long-term funds
- Expanded coalition & strategy

National Partners
Massachusetts Partners
Case Study: Boston PIC

Organizing private sector employers from the region’s leading companies to neighborhood small businesses to participate in the Summer Jobs Campaign.

✓ Placed 2,600 high school students in paid, employer-supervised positions
  ▪ More than 650 STEM-related positions
✓ More than 300 Boston employers provide summer jobs
✓ More than 3,200 students prepared for summer jobs and internships through Job Readiness Workshops conducted by PIC career specialists
  ▪ Students & employers are supported throughout the program

In 2014, Boston allocated nearly $4 million and receives another $2.6 million from the state to fund about 7,000 youth jobs…But getting private employers to match public efforts has been a challenge. - Aug. 18, 2014
Next Steps

- Convene business leader roundtable on Oct. 6
- Review proposals from two initiatives; determine needs
- Generate business support
- Provide an update and more details at the Oct. 22 STEM Summit
We have a lot of data in the STEM Dashboard. The Data team will work to make this data useful to our key audiences and support the data needs of other committees.

We also want to work on recommendations to address remaining data gaps.
Audiences & Purposes

**Level I:** STEM Council, Pipeline Fund, Regional Networks
- Policy and Operational Decisions

**Level II:** Governor, Legislature, Key Public Officials
- Executive Oversight & Fiscal Accountability

**Level III:** Employers, Educators, Public
- Align Initiatives with STEM Plan & Advocacy Tool
Requirements for Data

- Focused directly on MA STEM education & workforce and linked to 5 STEM Plan Goals
- Annual or other cyclical regular sources
- Publicly available
- Accessible & meaningful for wide array of audiences and purposes
- Free or low cost
Increase % of high school students planning on STEM majors
Measured by SAT test taker data
Recent status and progress toward target:

<table>
<thead>
<tr>
<th>Planning STEM majors</th>
<th>2009</th>
<th>2011</th>
<th>2013</th>
<th>Target 2016</th>
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<tr>
<td></td>
<td>35%</td>
<td>37.7%</td>
<td>40.5%</td>
<td>45%</td>
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Illustration: Goal 2

- Increase PreK-12 student achievement.
- Measured by % of proficient & advanced on Math & Science MCAS
- Recent status and progress toward target:

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2013</th>
<th>Target 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math MCAS</td>
<td>77%</td>
<td>80%</td>
<td>85%</td>
</tr>
<tr>
<td>Science MCAS</td>
<td>67%</td>
<td>71%</td>
<td>72%</td>
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</tbody>
</table>
STEM Dashboard

Conceptual Model

- Teachers
- K-12 Preparation
- K-12 Interest & Achievement
- STEM Degrees & Certificates
- Employment in STEM Careers

![Graphs and charts showing data trends over years 2011 to 2013]

- 1st Time MTEL takers who passed STEM subject tests
- Scoring proficient or advanced in 10th grade MCAS-Science
- Scoring proficient or advanced in 10th grade MCAS-Math
- SAT college bound seniors ranking STEM major 1st choice
- Share of college certificates and degrees in STEM fields
Questions for Council Members

- If we make changes to the Data Dashboard, what are the most critical needed in the near term (12 to 24 months) versus longer term (24 to 48 months)?

- How often, at what level of detail, and to whom should the data be communicated?
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