ATTACHMENT A
Report of the Cambridge STEAM/OST Working Group

STEAM Summit

Cambridge City Council

December 10, 2014

Slide 1

1 This would not be redundant with Ben's slides but would focus on critical information related to the HS and other schools.
Emily Dexter,

2 Here's another way to simplify the information to focus on the problem we are trying to address.
Emily Dexter,

3 Could this slide be cut? When there are too many slides, the audience stops listening to the presenter.
Emily Dexter,

4 This would be an alternative to the previous slide. This focuses on the issue of students not being interested or prepared for STEM majors, which we are trying to address. You could, in speech, mention reasons for this: lack of interest or low test scores.
Emily Dexter,

5 I might title this "Cambridge STEAM Network". Also, I changed advisory "committee" to advisory "group" because "committee" can have specific connotations I think we want to avoid for now.
Emily Dexter,

6 You'll notice some large bullets in this presentation! When it went through email it lost some formatting and the bullet formatting got messed up. I redid the bullets, but couldn't figure out how to make them smaller when working in Google Docs. If anyone knows, perhaps fix these if they look too big.
Emily Dexter,

7 It might be worth taking out the numbers (of jobs) and just leaving the percents to simplify. The percents are actually the most interesting. (Or perhaps put the number 103,440 at the top near 24%. I.e. 24% of Workforce (n=103,440 workers).

Also, this graphic is cut off at the bottom.
Emily Dexter,

8 This slide overlaps a lot with the information in the Interships section, which might steal Ben's thunder a bit. His slides talk about inventoring and expanding internships, having a research and evaluation component, training hosts and senders, etc.

Maybe cut it down to something like:

Recommdations:
1. Strong collaboration between the STEAM office and the school department, as well as charter, independent, and denominational schools in Cambridge.

2. Provide STEAM professional development for teachers and counselors.

3. Add internships as a graduation requirement.
Emily Dexter,

9 I think if you want them to focus on infrastructure problems--no central office, no coordination, few internships--you should take the demographic information out. (Top 2 bullets.) This information is well known.
Emily Dexter,

Slide 1 (Continued)

10 This is a lot of info for one slide. Could it be reduced to just percent undergrads in STEAM? The presentation isn't really about the quality of academic preparation in schools (measured by test scores), or about the need for college.

to me the Undergrads in STEAM is the most powerful of the four.
Emily Dexter,

11 I like this slide to emphasize we are not talking about the traditional STEM. But Sue and Joan may not want it in.
Emily Dexter,

History of the STEAM Working Group

Youth Perspective on STEAM

Pharaoh Saunders:
My Brothers Keeper Hackathon

Tyler, Tahytana, Ashley Fortune and Antoniae Leaks:
Community Art Center

MBK: Hackathon Philadelphia

Community Art Center: Astronaut's Visit

STEAM

(Science, Technology, Engineering, Arts, and Mathematics)

Innovation Economy

Creative Economy

Human Rights

Engaged Citizenship

Community Works

21st Century Skills

Image retrieved from Industry Lab website

Image retrieved from Industry Lab website

Artist: Cat Tweedie. Image retrieved from leapmetal.com

Image retrieved from Cambridge Creativity Commons

Cambridge EL STEAM Network Affiliates

CPS Cambridge Public Schools

Cambridge Commission on the Status of Women

Cambridge Community Foundation

The Department of Human Service Programs, Cambridge, Massachusetts

CCTV 25 Years

Microsoft Research Cambridge

Agassiz Baldwin Community

Cambridge School Volunteers

Harvard Museum of Natural History

cambridge creativity commons

MIT museum

Lesley University

Cambridge innovation Center

The Young People's Project

Science Club for Girls

MIT STEP Education Program Teacher Cheller

MASSART Massachusetts College of Art and Design

Breakthrough Greater Boston Boston•Cambridge

Kendall Square The Future Lives Here

the community art center

Whitehead Institute

Cambridge Community Center Learn. Grow. Connect.

TERC

Edgerton Center Build It, Learn It, Share It

Cambridge Arts

East End House

Expressive Technologies Lab

The Media Arts Studio Cambridge Educational Access Television

Draper Laboratory

empowstudios Tech | Arts | Play

Experience the art

Cambridge Science Festival

The Possible Project

Tufts University

biogen idec

MMMMaven

The Agenda for Children

Kinetic Sculpture

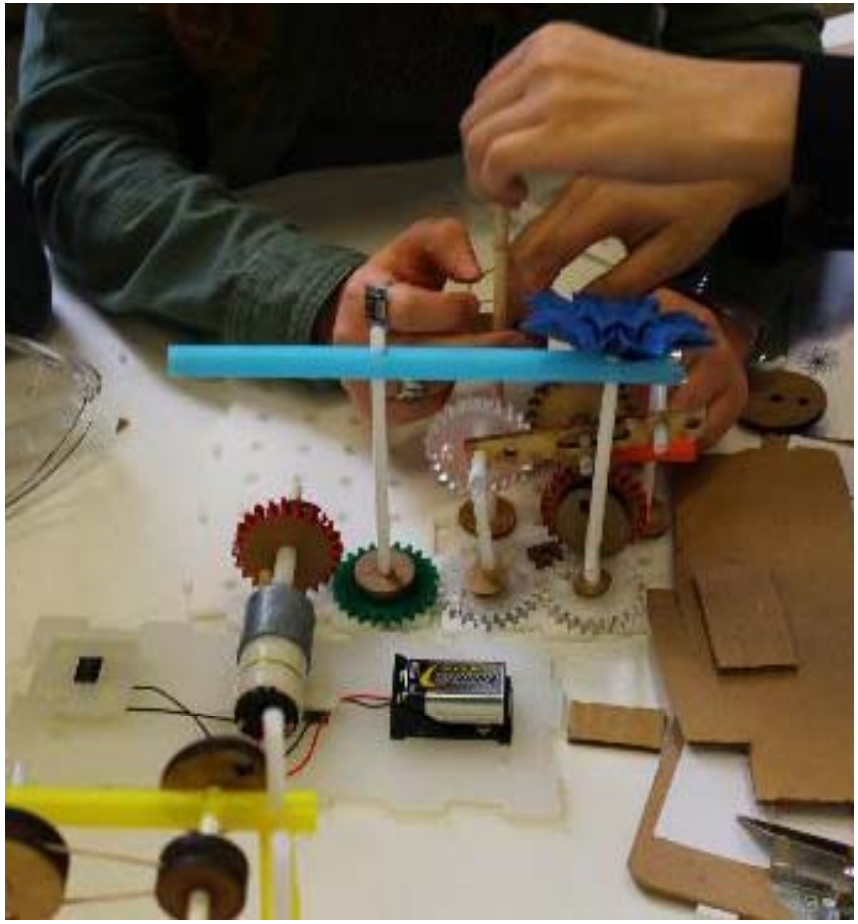


Image courtesy MIT Museum

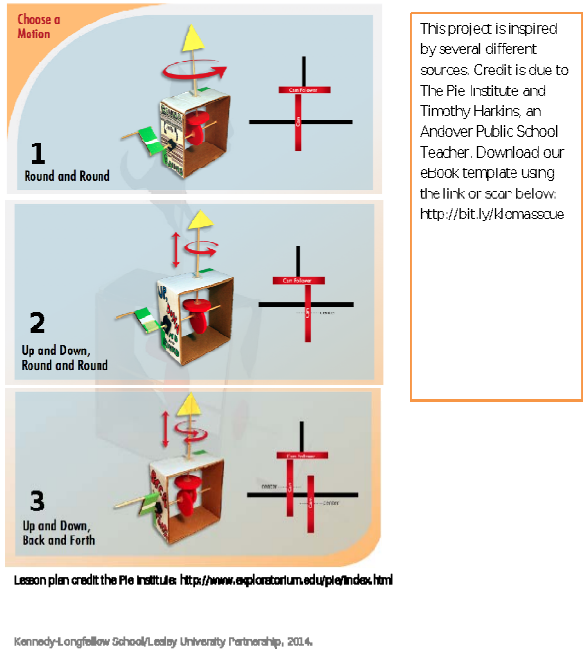


Image K-Lo/Lesley Technology Partnership

Design Principles for STEAM Learning

- Attend to intellectual resources and goals of young people
- Transdisciplinary
- Collaborate/Co-work
- Learn through close observation, iterative questioning, & *making*
- Practice risk-taking
- Establish pathways

STEAM in Cambridge:

Current Snapshot

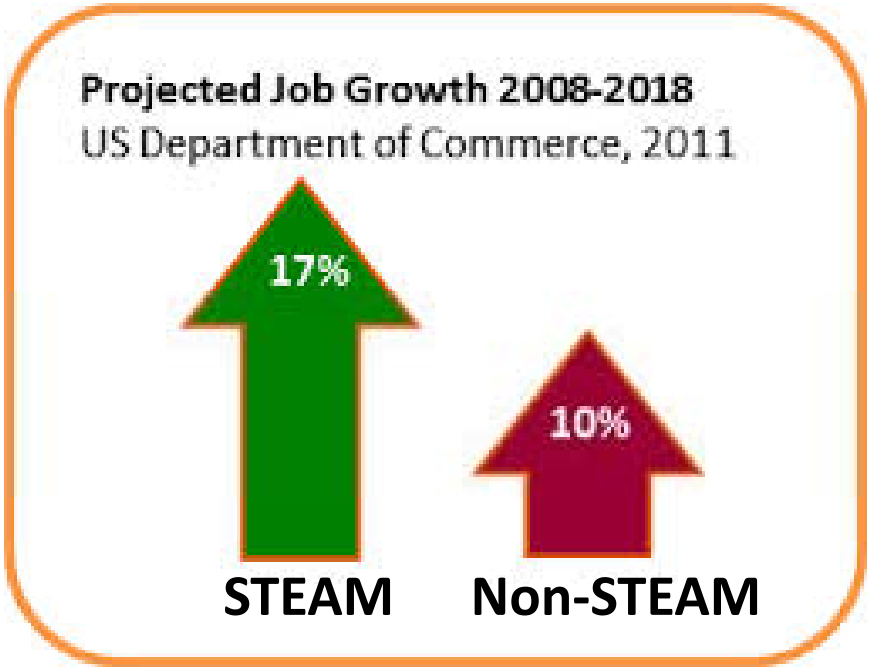
City of Cambridge

RINDGE SCHOOL OF TECHNICAL ARTS

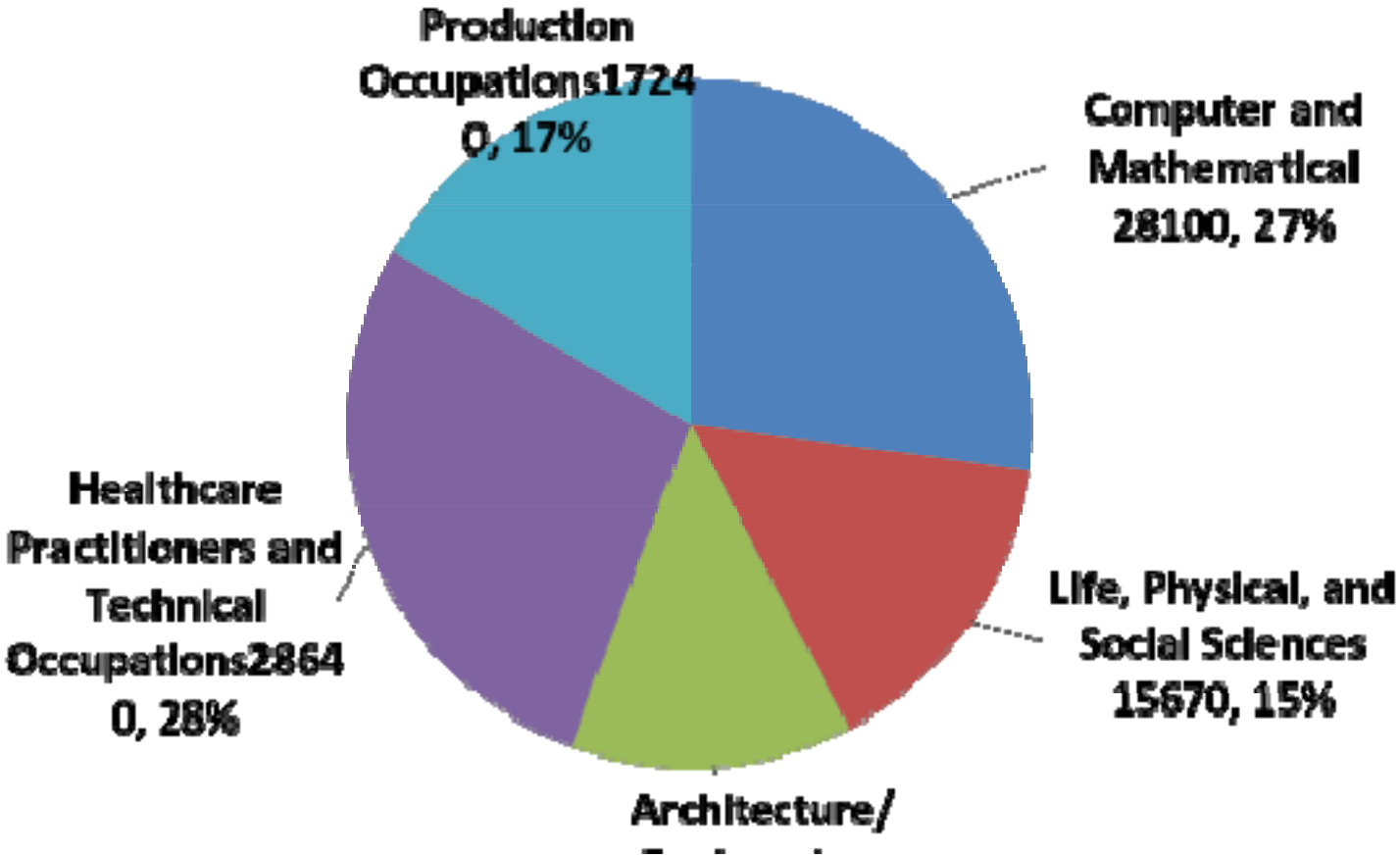
U.S. Employment Projections

US Bureau of Labor and Statistics Estimates for 2018:

- 8.6 million STEM jobs in United States (300,000 in Massachusetts)
- Professional-and-related occupations includes all artists (+17%)



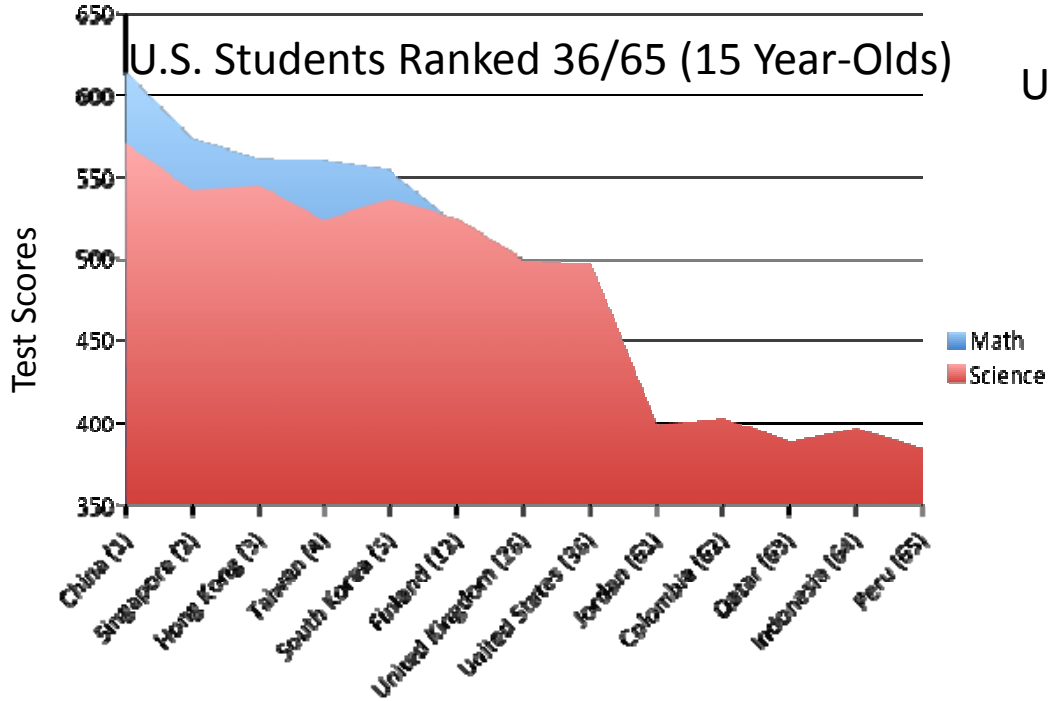
STEM Employment Metro North 24% of Total Workforce



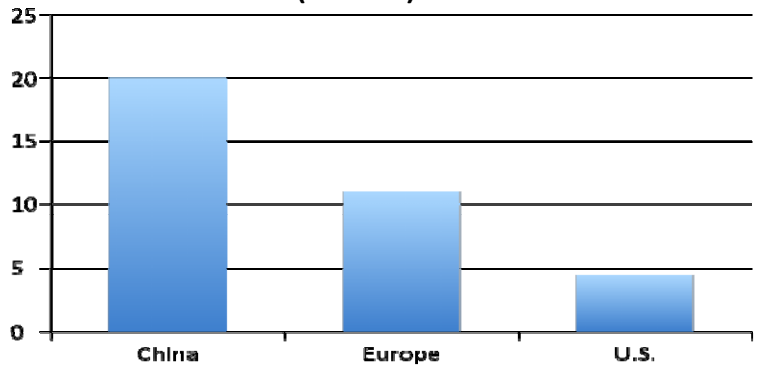
The above chart represents 103,440 workers of the total 424,180 workers in the Metro North region - that is 24% of the total workforce in the Metro North region. STEM using Five High-Level Occupations - Number of STEM Jobs in May 2013 for Metro North

1Executive Office of Labor and Workforce Development Occupational Employment and Wage Statistics, Annual Data for Massachusetts, May 2014.

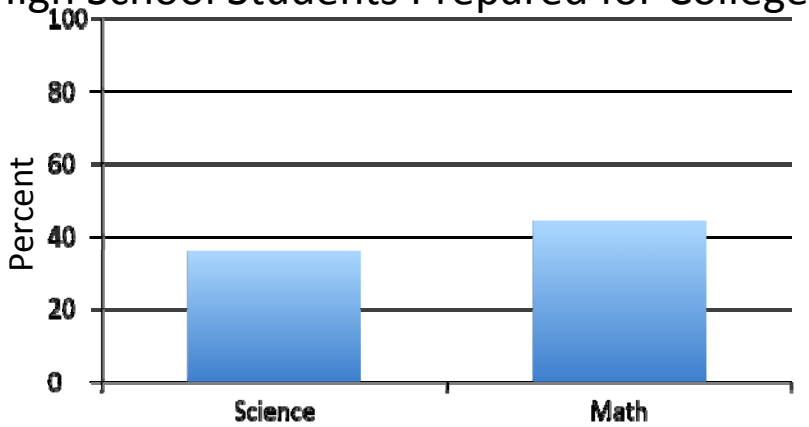
U.S. Students: Average Test Scores and Declining STEAM Pipeline



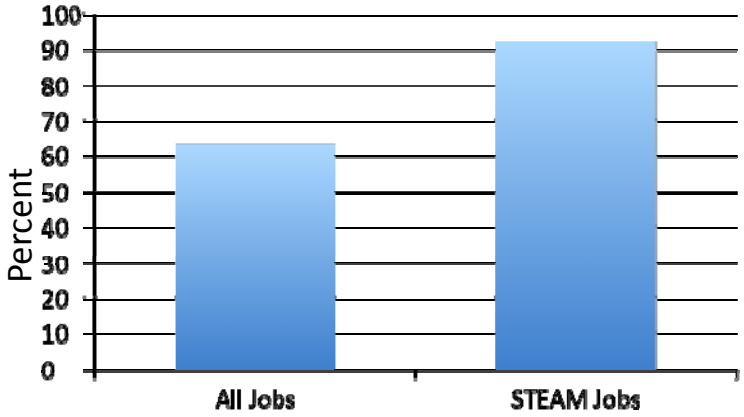
U.S. Students are Pursuing STEM Degrees (2012)



High School Students Prepared for College (2013)



Jobs Requiring Some College (2018)



A National Call to Action

"Our future depends on reaffirming America's role as the world's engine of scientific discovery and technological innovation. And that leadership tomorrow depends on how we educate our students today, especially in math, science, technology and engineering."

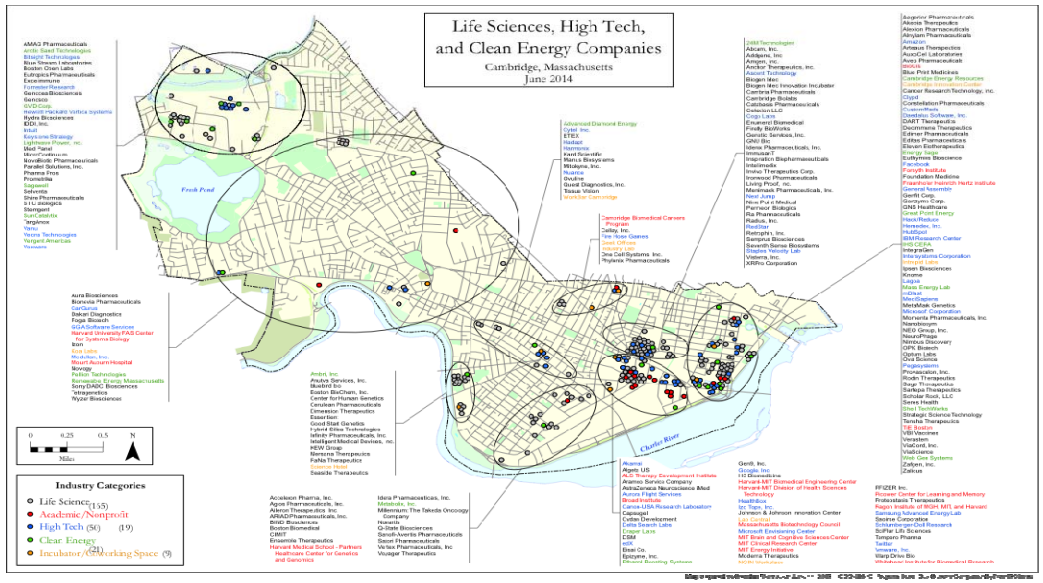
—*President Barack Obama*

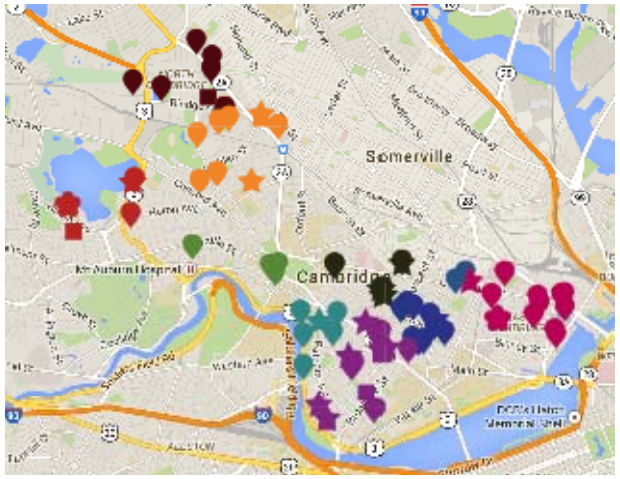
A strong STEAM pipeline is critical.

Real People, Real Jobs

Casey, Bob. "STEM Education: Preparing for the Jobs of the Future." *Joint Economic Committee*. 1 Apr. 2012. Web. 30 Oct. 2014.

Cambridge is a STEAM Haven





Largest collection of public art in Massachusetts; 15+ museums

- Center for research and innovation
- 100 Biotech companies
- 450 Startups
- Major Venture Capital firms
- $4 billion per year in academic R&D
- Kendall Square: World's highest density of programmers

www.pinterest.com

- Fogg Art Museum
- MIT Museum
- A.R.T
- Peabody Museum
- Jose Mateo Ballet Theater

Existing Infrastructure: Work-Based Learning/Opportunities

City of Cambridge

- Mayor's Program (MSYEP)
- Breakthrough Greater Boston
- WorkForce Program (CHA)
- Just A Start/TeenWork
- Summer Jobs Campaign
- CCS CityLinks Program
- RSTA Co-op
- CRLS Senior Internship

Museum of Science

biogen idec

Cambridge Chamber of Commerce

DRAPER LABORATORY

RINDGE SCHOOL OF TECHNICAL ARTS

New England Aquarium

CfA Harvard-Smithsonian Center for Astrophysics

Cambridge innovation Center

Massachusetts Institute of Technology

Cambridge Rindge and Latin School:

A diverse student body and technical career education program

HOWEVER:

- Cambridge students have been *underrepresented* in high school internship programs
- *No centralized office* that connects students with opportunities
- *Multiple efforts* are overlapping and uncoordinated
- *A few individual teachers* facilitate internships for fewer than 20 students per year

www.cpsd.us

RINDGE SCHOOL OF TECHNICAL ARTS

Components of Success

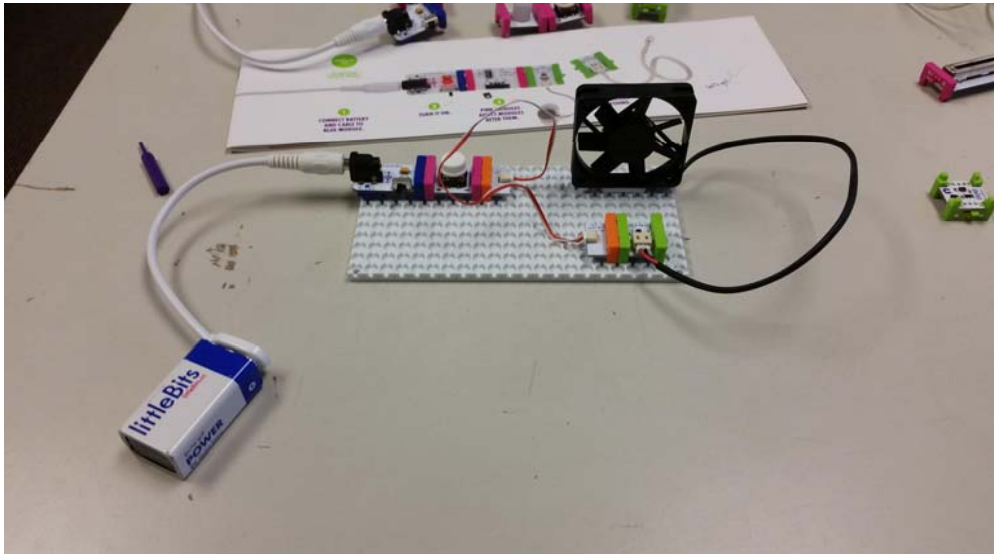
- Progressive Curriculum In- and Out of School
- Graduation requirement
- Strong collaboration with school department
- STEAM-based professional development for teachers, guidance counselors, and out of school time staff

STEAM in Cambridge

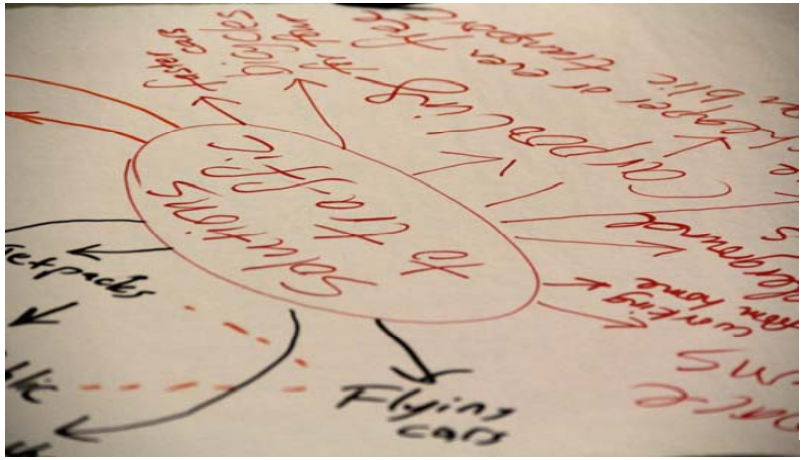
Better Practices Subgroup

Understanding the better practices of STEAM Learning

Agenda For Children’s Symposium: K-LO’s Maker Space



Agenda For Children's Symposium: Art Science Prize



State by state Research:

STEAM Portal Findings

1. Badge System

- City-wide digital badge system
- Badges will reflect classes taken, skills mastered, or tasks performed
- Badges will be created by the community

2. Searchable Database

- Online database of programs, searchable by location, cost, age, time of year, STEAM topic, and other conditions
- STEAM-specific internships and youth jobs will be posted
- Volunteers will be able to search for programs that match their skills

Example of Searchable Database

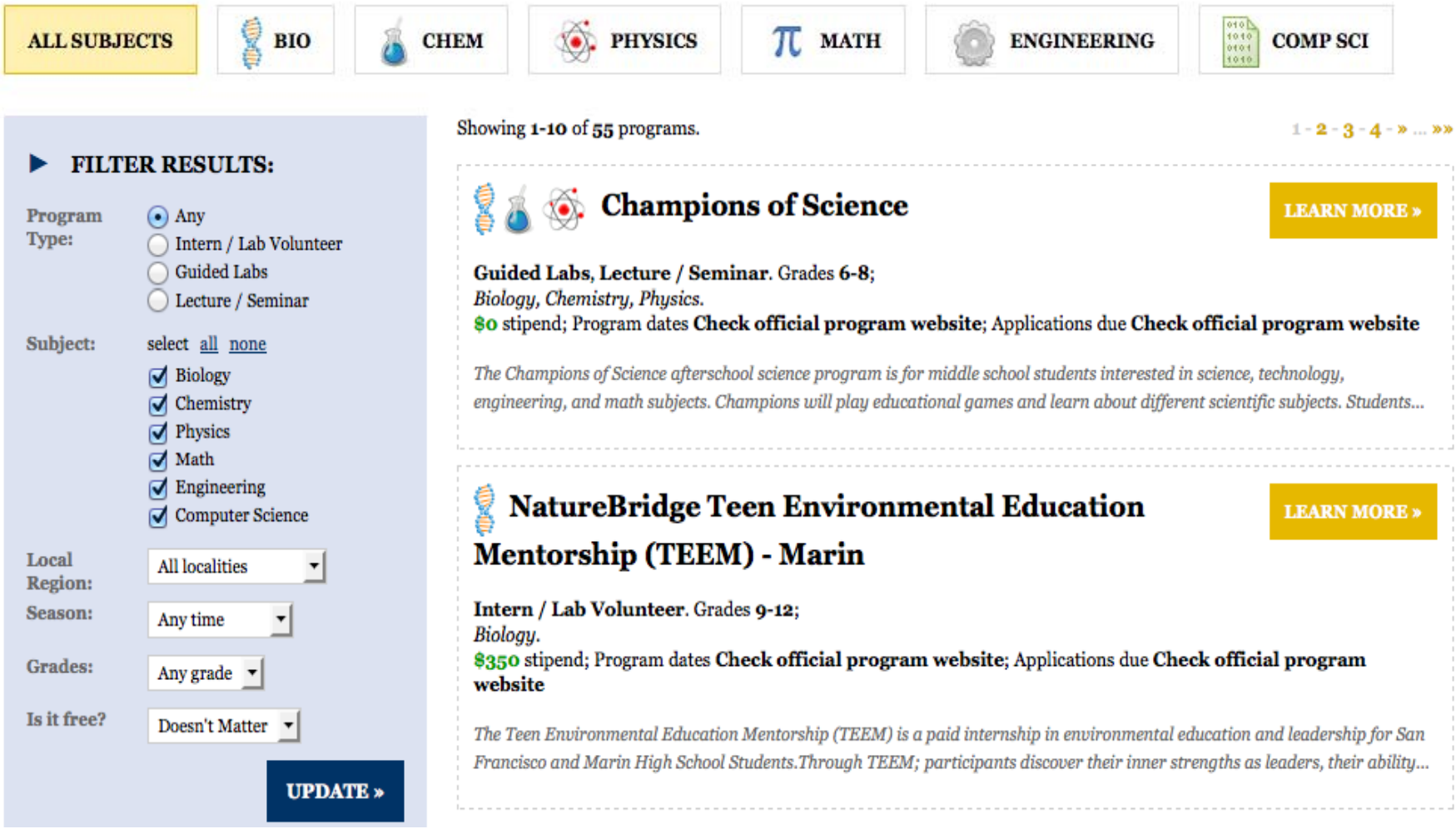


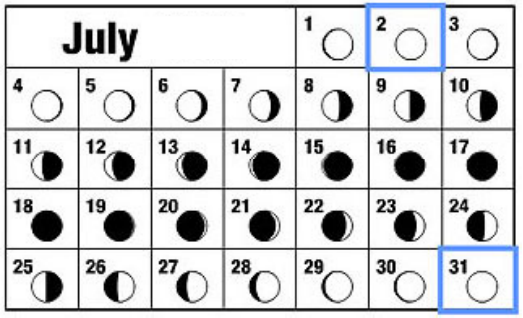
Image retrieved from YouSTEM.org

3. Automatic and Curated Portal Updates

- Avoids the major problem facing most portals: obsolete information
- STEAM programs can curate their information to ensure that material is up-to-date
- Sends out periodic reminders to program directors to update program information and expunges out of date information automatically

4. Integrated Events Calendar

- Citywide STEAM events calendar
- Events can be added directly by programs in the network
- Integrates with Google Calendar and popular notification services



INTERNSHIP & APPRENTICESHIP SUBGROUP:

AN INTERNSHIP FOR EVERY LEARNER

4 Steps to Creating Internships for Every Student

1. Conceptualize needs of learners with different skills, experience, and interests

1. Inventory & categorize existing internships

1. Create new internships to expand options

1. Conduct research & evaluation to improve and revise internships

1. Conceptualize:
Different learners have different skills & interests

Learners	**S** Science, Ecology, Medicine	**T** Tech, Web, Digital	**E** Engineering, Making	**A** Arts, Design	**M** Math, Statistics, Data
STEAM Novice High Support Needed					
STEAM Intermediate Moderate Support Needed					
STEAM Advanced Can work at a high level					

2. Inventory and categorize existing internship programs

Learners	S Science, Ecology, Medicine	T Tech, Web, Digital	E Engineering, Making	A Arts, Design	M Math, Statistics, Data
STEAM Novice High Support Needed	City Sprouts				
STEAM Intermediate Moderate Support Needed	Aquarium	Website Design		Set Design	Math Worker
STEAM Advanced Independent & Takes Initiative	Biotech Astronomy	High Tech	MIT Internship	Art Museum	Data Project

3. Create new internships to expand opportunities for all learners

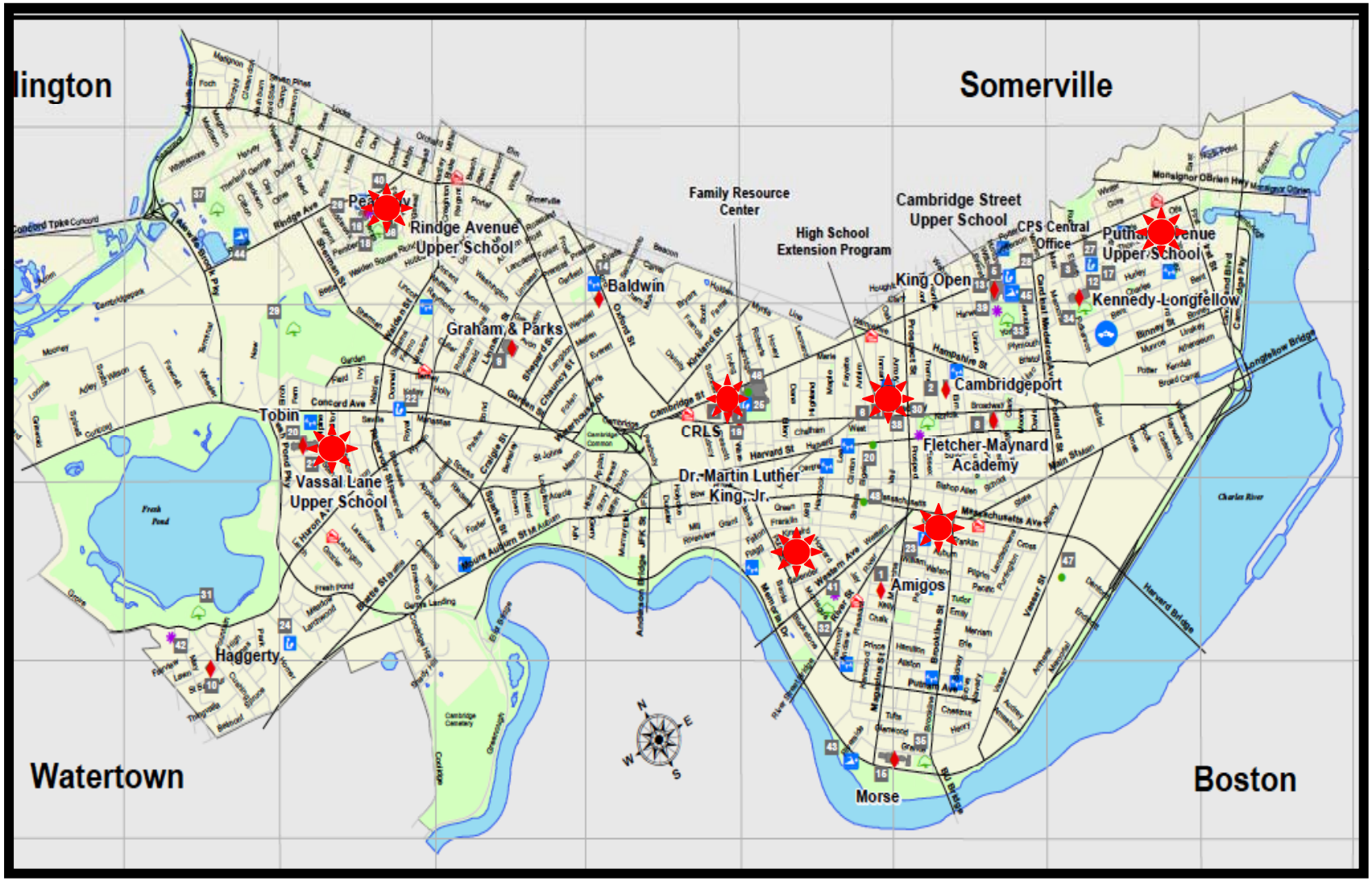
Learners	S Science, Ecology, Medicine	T Tech, Web, Digital	E Engineering, Making, Manufacturing	A Arts, Design	M Math, Statistics, Data
STEAM Novice High Support Needed	City Sprouts *Animal Shelter*	*Afterschool Aide in for Tech Club*	*Maker Space Project*	*Digital Artist Assistant*	
STEAM Intermediate Moderate Support Needed	Aquarium *Hospital Internship*	Website Design	*Water Dept. Internship*	Set Design	Math Worker
STEAM Advanced Independent & Takes Initiative	Biotech Astronomy	High Tech	MIT Internship *Architect Asst.*	Art Museum	Data Project

4. Research and Evaluation:
An R&D Model

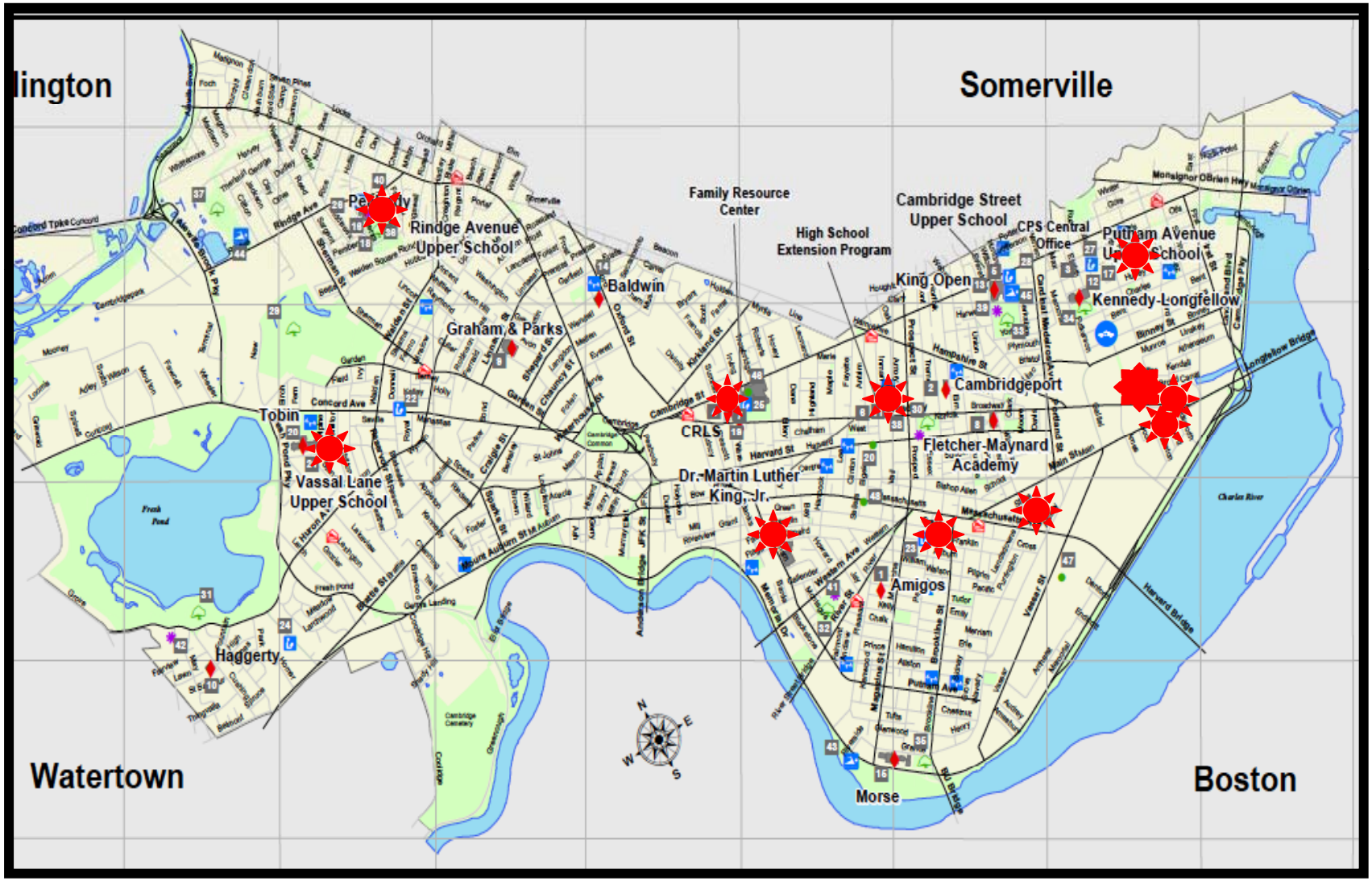
- Identify characteristics of powerful internships
- Determine training needs for learners and hosts
- Adopt an “R&D” mindset, aka “design research” or “Real World Learning innovation lab”
- Revise new and existing internships based on research and evaluation findings

Internship Learning in a STEAM City

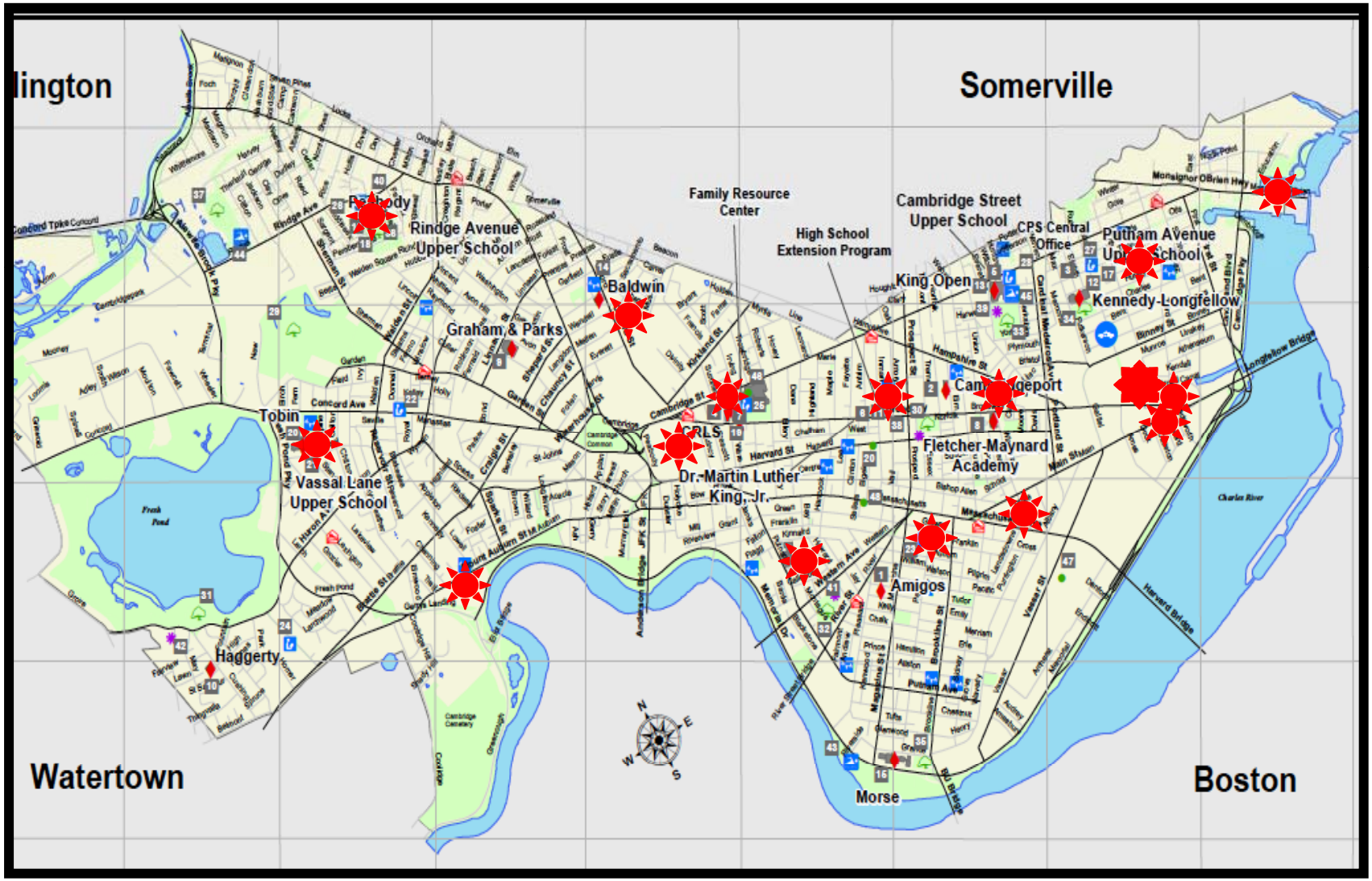
Learning happens in schools



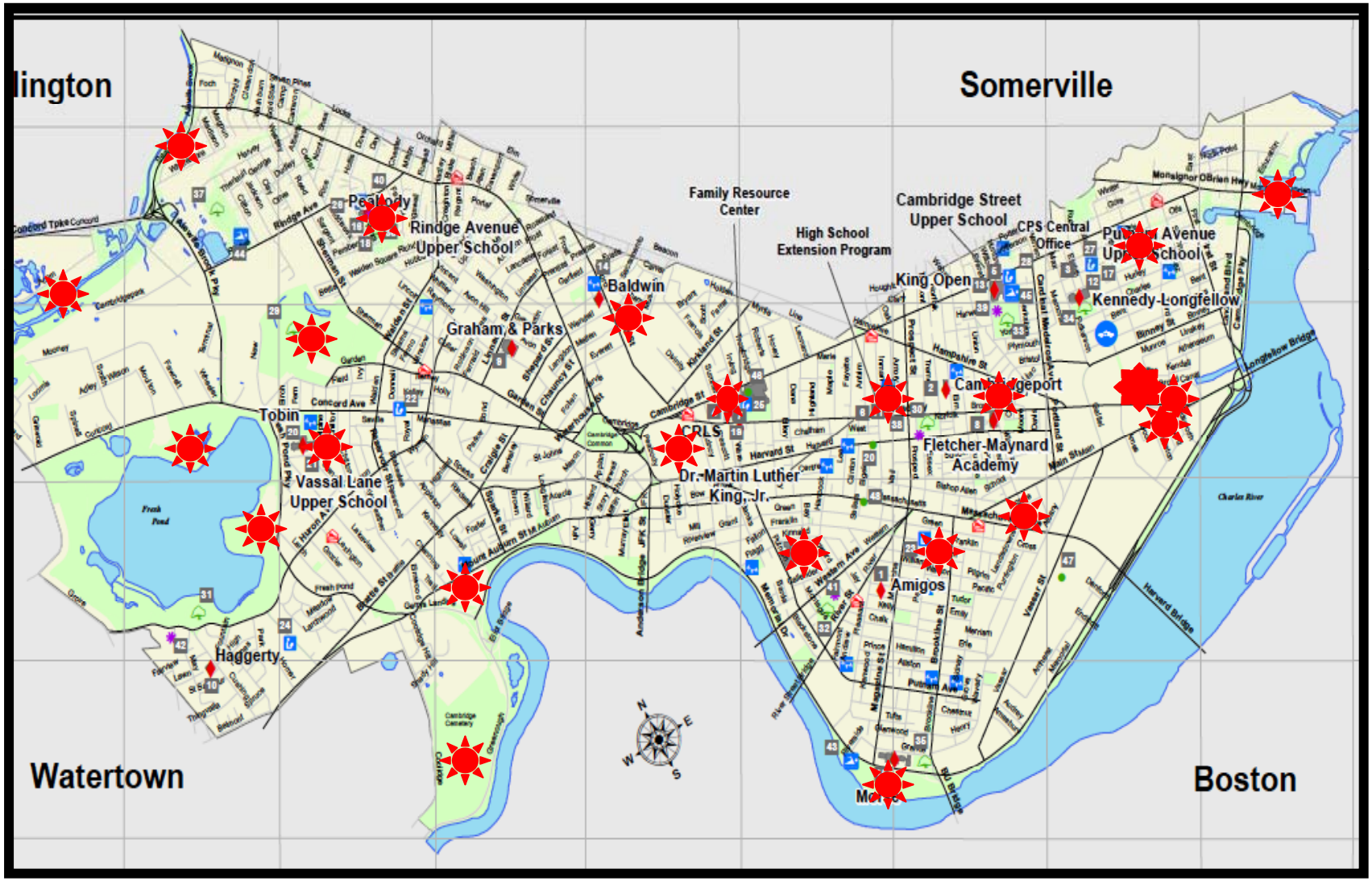
In tech and biotech companies



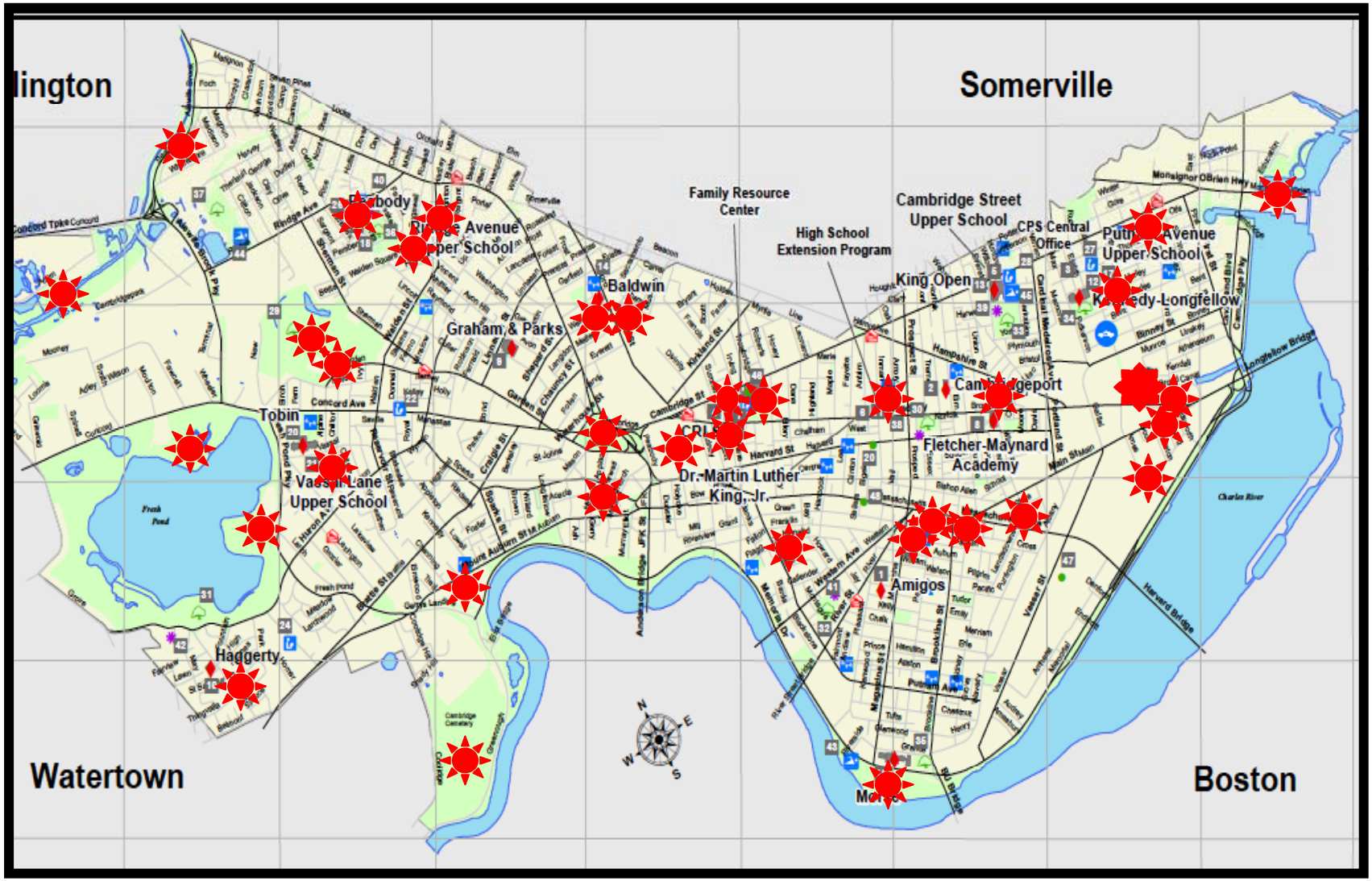
In museums and hospitals



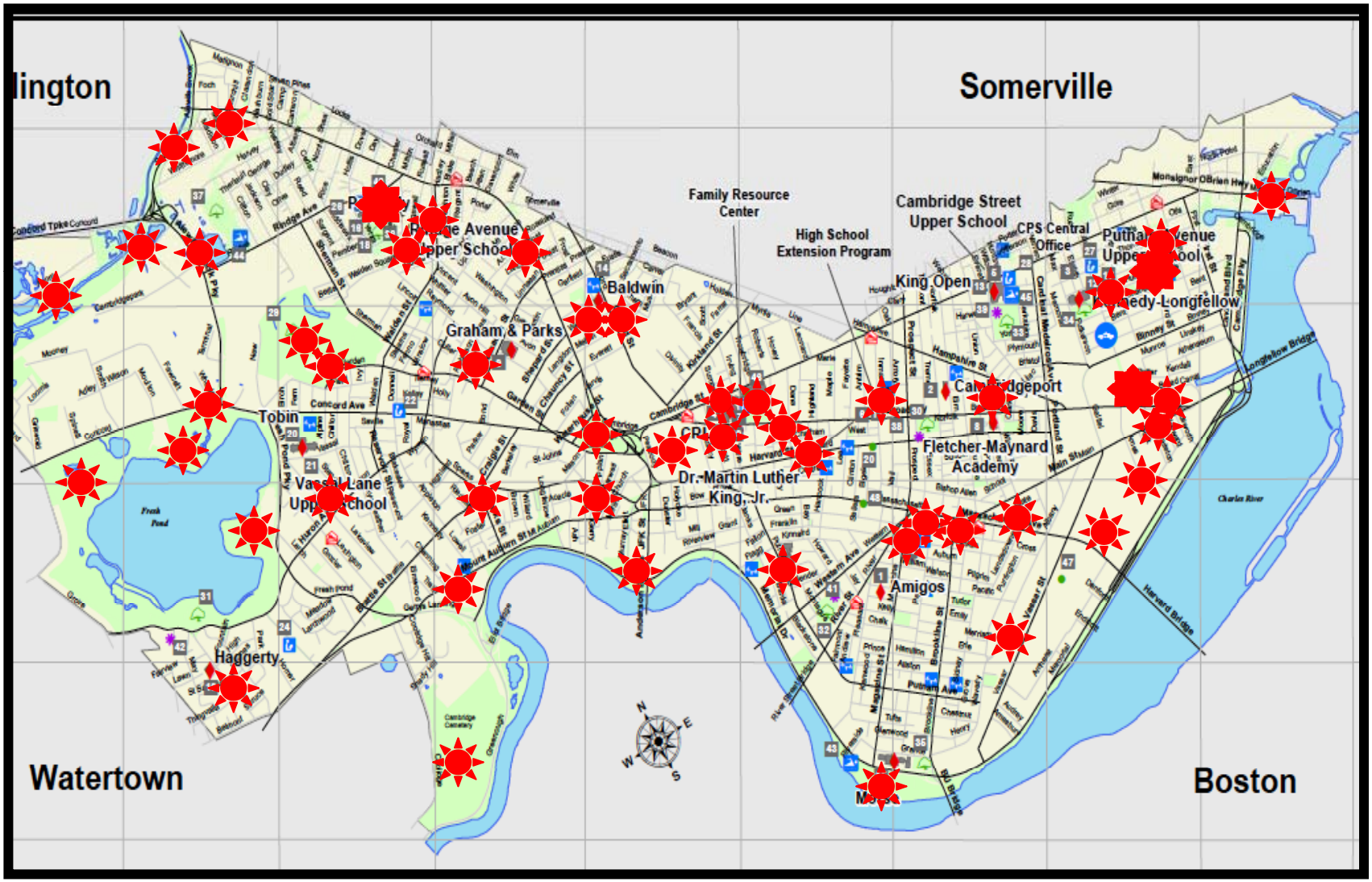
In parks and ecological sites



In arts & media organizations



Internship Learning in a World Class STEAM City



STEAM
Messaging & Outreach
Subgroup

Focus Group
at the Margaret Fuller House

Recommendations from Parents

- Better communication
- Mentorship programs
- A STEAM Center for the community
- WOW Projects
- Overnight Stays at Universities
- Easier Access
- Internship Opportunities

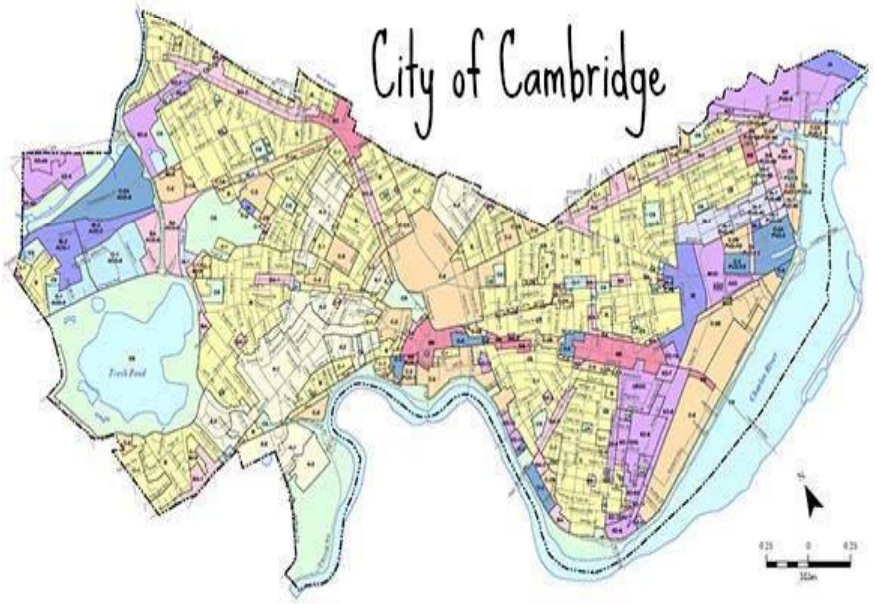
Learners Subgroup Report

THE CAMBRIDGE CHALLENGE

An Example “Wow” Project to Engage All of Cambridge in STEAM

How do we get our kids and community engaged in STEAM activities?

By asking them to use STEAM thinking to deal with a real issue that their own city is facing or will face.



Like the
self-driving car!

How would self-driving cars affect our future?

Do you have an idea? Join the **Cambridge Challenge**. Design a project related to the self-driving car.

To participate, you will:

- Write a proposal as an individual or group
- Be assigned a mentor from a university, company, or art and design organization
- Submit Alpha, Beta, and Production versions of your project to a panel of expert judges

Prizes will be awarded in multiple categories and age groups

Imagine this as a yearly challenge, with new challenges each year.

Preparing for new diseases

Preparing for climate change

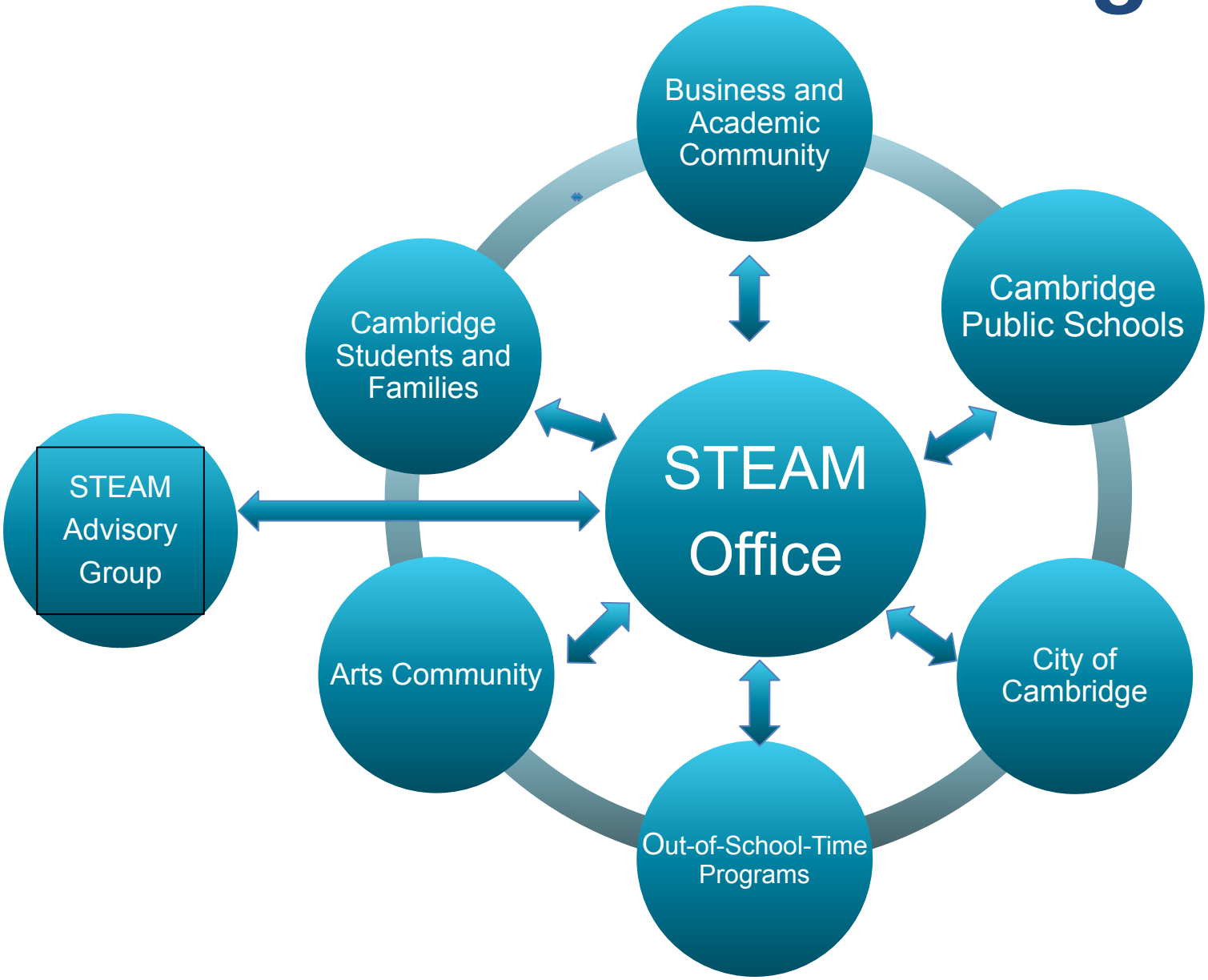
Making Cambridge renewable

Beautifying the city

EF Glocal Challenge: A Success Story

Cambridge as a World Class STEAM City: The Role of the Public Schools

STEAM in Cambridge



- **Cambridge Public Schools (CPS) is in the midst of internal strategic planning around STEM teaching and learning across the district.**

- **CPS will continue to cultivate students' access to a progression of STEM and STEAM learning experiences starting in Kindergarten, and throughout every grade until their graduation from CRLS.**

- **CPS is interested in expanding students’ access to a wider range and depth of hands-on STEM learning experiences through the involvement of committed partners, programs and providers.**

- **CPS has learned that deliberately-designed, authentic and invested partnerships are needed to promote meaningful STEM learning experiences for all CPS students.**

- **In order to develop and sustain the coordination of committed, far-reaching, symbiotic partnerships, a full time CPS point position is needed.**

- **The CPS ICTS Office provides technical support for any initiative that the district sets out to implement around the coordination of STEM learning in schools.**

STEAM Working Group Recommendations

8 Recommendations

1. Make a *citywide commitment* to become a world class STEAM city, with equity of opportunity a core value.

1. Form a standing *STEAM advisory group* with short-term and long-term vision.

1. Establish a *STEAM* Coordination *office* to coordinate partners, activities, opportunities, and events.

4. Commission the design of a *STEAM portal*.

5. Create a STEAM Center for learners of all ages.

6. Create a comprehensive network of internships to match the skill level and interests of all learners.

7. Design a communication and marketing campaign to ensure access to all.

7. Launch an outreach process shared by STEAM stakeholders and industry.

ACCESS ~ EQUITY ~ CITIZENSHIP ~ CREATIVITY

Questions & Discussion

ATTACHMENT B
Activities of the Better Practices Subgroup

OVERVIEW

The City of Cambridge determined that it wanted to focus on becoming a world class STEAM City. The City invited STEAM educators representatives and interested residents to form a working group to draft recommendations. The working group divided into four subgroups: Better Practices, Learners, Internships and Apprenticeships, and Messaging and Outreach.

The Better Practices subgroup is researching so called best practices of STEAM learning environments both within Cambridge and in other cities and states.

COMPLETED GOALS AND OBJECTIVES

1. Created and distributed a detailed survey to a great number of STEAM programs asking for a program description and what programs consider to be their internal best practices. From this survey we started constructing a searchable database. To date, 26 organizations have responded to this survey, ensuring that Cambridge will benefit from the experiences of other STEAM/STEM cities. (Access the survey at http://bit.ly/1vMI9O9 - a 2 page, 24 question survey.)

2. Compiled a report on the survey responses and on trends amongst STEAM respondents.

3. Compiled research about STEAM programs and portals in other cities and states. (Full research at http://bit.ly/12LeVmM - a 24-page report.)

4. Held STEAM-related workshops as part of the Agenda For Children's symposium.

5. Created a working definition of "better practices," i.e. characteristics of high quality STEAM programs. (See next page.)

For links to supporting documents not linked here, or to relay questions, please email CambridgeBetterPractices@gmail.com.

WORKING DEFINITION OF "Better Practices"

- Learner centered: focusing programs so that learners are at the center, and learners' interests are the driving force of curriculum and activities.
- Non-school activities align with the school curriculum to bring more value and coherence to the STEAM programs and the experience of their learners.
- Universal Design (for student/participant recruitment, organization, facilities, program design, and curriculum and instruction) is employed to ensure access for all learners.
- Learning environments foster a cycle of inquiry and *making;* i.e. Design, Build, Test, Try Again, Share.
- Provide opportunities for learners to acquire the skills and habits of mind that will allow them to succeed in STEAM-related careers and post-secondary opportunities. (E.g. perseverance, critical thinking, risk taking, creativity.)

ORGANIZATIONAL BETTER PRACTICES

- Inclusiveness and outreach: organizations are *actively* striving to engage all learners and families, particularly those from under-served communities.
- Participate in a community of practice and reflection among providers, educators, and facilitators.
- Volunteers and mentors can relate socially and culturally to the learners and vice versa.
- Organizations refer learners to other programs when unable to meet their needs or seeking to actively expand learner opportunities.

~

ATTACHMENT C

RECOMMENDATIONS FROM THE INTERNSHIPS & APPRENTICESHIPS STEAM SUB-GROUP

1) **TWO LEVELS: ON-THE-GROUND LEVEL AND LONG-TERM VISION LEVEL**
The Cambridge citywide STEAM Initiative should be conceived of as having two levels: 1) An *On-the-Ground level* of ongoing local programming for internships and other Real World Learning opportunities for Cambridge learners of all ages and circumstances; and 2) A long term *Great STEAM City Vision level*. At the vision level, Cambridge would connect STEAM with issues of citizen literacy, civic engagement, workforce development, evolving 21st century skills, and economic relevance in this new technical age. Cambridge would also seek partnerships with other high technology cities nationally and globally to share information on how to develop "SMART CITIES" and STEM/STEAM programs. *The STEAM initiative should have two advisory groups, one to focus on short-term program issues and the other to focus on a long-term vision and national and global partnerships.*

2) **INTERNSHIPS (Academic year and summer).** Begin with an emphasis on high school students and then expand to focus on adults and seniors and to middle and elementary school students.

   a) ***Conceptualize:*** **Identify ideal, desired types of internships needed for different types of learners.** There should be internships across a range of subjects and settings and appropriate for learners with different interests, levels of STEAM knowledge, ability, and motivation. Consider expectations for behavior and learning outcomes and "deliverables" for student interns and host organizations. When students are placed in internships, it should be made clear what the main goals of the internship are *for the student* and how much support is required from the host and sending organization. *It is important that internships not be designed only for students who are highly motivated, already interested in STEAM topics, or high achievers in school.*

   b) **Identify existing programs and organize information in a portal:** Identify existing city and community programs currently placing learners in internships *("sending" organizations*) and organizations currently offering internships to students ("*host" organizations*). Categorize sending organizations in terms of the types of learners they serve and the supports they offer. Categorize host organizations in terms of the topic, intern requirements, supports provided, and supports required from the sending organization. Organize all information in a web-based portal to facilitate student-internship matches. *Identify gaps in the current available internships.*

   c) **Use *design research* to design new internships and improve existing internships.** New internships should be created by a *design research team* that includes students, educators, researchers, and staff from sending and host organizations. Design research is a process by which multidisciplinary teams of practitioners and researchers collaborate to design, test, and refine prototype internships in order to create models of high-quality internships. These models can also be used to revise and improve existing internships and can be

shared with other STEM/STEAM cities. Use the MYSEP and other already-funded programs as design research sites where internships can be studied and new models developed.

3) **CONNECTING WITH CAMBRIDGE SCHOOLS:** Cambridge schools include public, charter, independent, and denominational schools. It is very important that STEAM internships be connected to students' academic curriculum in terms of *what* STEAM-related topics they learn about and *how* they learn STEAM topics. It should not be underestimated, however, how challenging it can be for different agencies to collaborate. *Collaborations require mutual commitment, expertise, and staff time,* whether that is available because responsibilities are reallocated or because new positions are created*. Interagency collaborations are hard work, they require staffing, but they are very valuable for students*.

   a) **Community Charter School of Cambridge (CCSC).** *CCSC already requires all 12th grade students to complete an off-campus Senior Internship of at least 100 hours.* Students also must present at the Senior Internship Exhibition Night and earn a passing grade for their presentation. *CCSC can serve as a valuable resource to Cambridge's STEAM initiative.*

   b) **Current CRLS staffing and capacity**. *Currently there is no central internship office at CRLS that connects and supports students in internships, nor is there enough staff time to support a comprehensive program.* For this reason, CLRS students miss out on many opportunities. Only an estimated 20 CRLS students per year enroll in internship programs. RSTA has its own coop program, and CRLS does have an Enhanced Senior Year program coordinated by CRLS teacher Kathleen FitzGerald. Science teachers Barbara Dorritee and Paul McGuiness have also sought to connect students with internships . Though CRLS's eight guidance counselors could link their students with internships that complemented their coursework, that is currently not an explicit part of their role or training. CRLS educators might benefit from more opportunities to learn about Out of School youth learning.

   c) **CRLS's 2013 NEASC Review.** Link city-wide internship efforts with CRLS's NEASC-related improvement plan, which includes an emphasis on 21st century learning and equal opportunity to learn for all students. CRLS principal Damon Smith and assistant principal Bobby Tynes are both interested in Real World Learning and career-awareness pedagogy.

   d) **Create a four-year *internship curriculum* for high school students to complement the academic curriculum.** Create specific milestones, competencies, or requirements for each year of high school. Link these with 21st century skills. Students who start developing career skills and interests early in high school will graduate with career-related skills, more confidence, and clearer goals for their future.

   e) **Research how CPS already integrates career awareness into the K-12 curriculum**. *Use DESE's K-12 Career Development framework/continuum. (Attached)*

   f) **Research the CPS STEM and arts curricula, including how they aligned with the Common Core Standards and the Next Generation Science Standards.** Find out what Real World Learning experiences, independent studies, and internships are currently integrated into the K-12 STEM and arts curricula. In discussing expanding RWL opportunities with CPS

educators, be mindful of how Common Core and NGSS may determine what CPS can and cannot incorporate into their curricula.

ADDITIONAL RECOMMENDATIONS

1) **DEFINING *STEAM* and STEAM vs. STEM:** The definition of STEAM and its component disciplines should not be rigid and confining. *Science, technology, engineering, the arts, and mathematic*s are all terms with broad meanings. In terms of STEAM vs. STEM, though, how do the arts fit in? Given the high remuneration for STEM jobs and the low remuneration for some jobs in the arts, the STEAM group should define what STEAM means in the context of college and career exposure and skills. Does it just mean *STEM plus the arts*? *The fusion of art with one or more of the STEM disciplines*? *The arts approached through a science and technology lens? STEM activities pursued through a creative arts lens? Using the arts to draw students into STEM?* The arts and sciences both emphasize close observation, interdisciplinary thinking, and making creative leaps from known to desired outcomes. *Clarifying the acronym—STEAM—and developing a model in which the arts, humanities, and civic consciousness are incorporated to expand the concept of STEM would be a major Cambridge contribution to the field of education and workforce development.*

2) **DOCUMENT OUTREACH AND AFFIRMATIVE ACTION:** In order to ensure access to STEAM opportunities for Cambridge learners from marginalized groups and those underrepresented in STEAM, *the STEAM coordinator should document and record specific actions and strategies that will be taken to affirmatively recruit and support learners from these groups.* These students may have unique STEAM experiences and knowledge that differ from that of students from mainstream, overrepresented groups and that can be used in recruitment efforts.

3) **FUNDRAISING:** Consider funding in two waves: 1) Short-term funding for prototypes and immediate initiative (including via existing programs such as MYSEP), and 2) Long-term sustainability funding through industry and academic support. Identify special grants programs, e.g. NSF, DOE, DOL, or the White House (i.e., My Brother's Keeper). Investigate state-sponsored innovation programs. Large foundations (Gates, etc.) could be targeted for long-term big vision projects.

STEAM COORDINATOR
JOB DESCRIPTION

Ideal Candidate

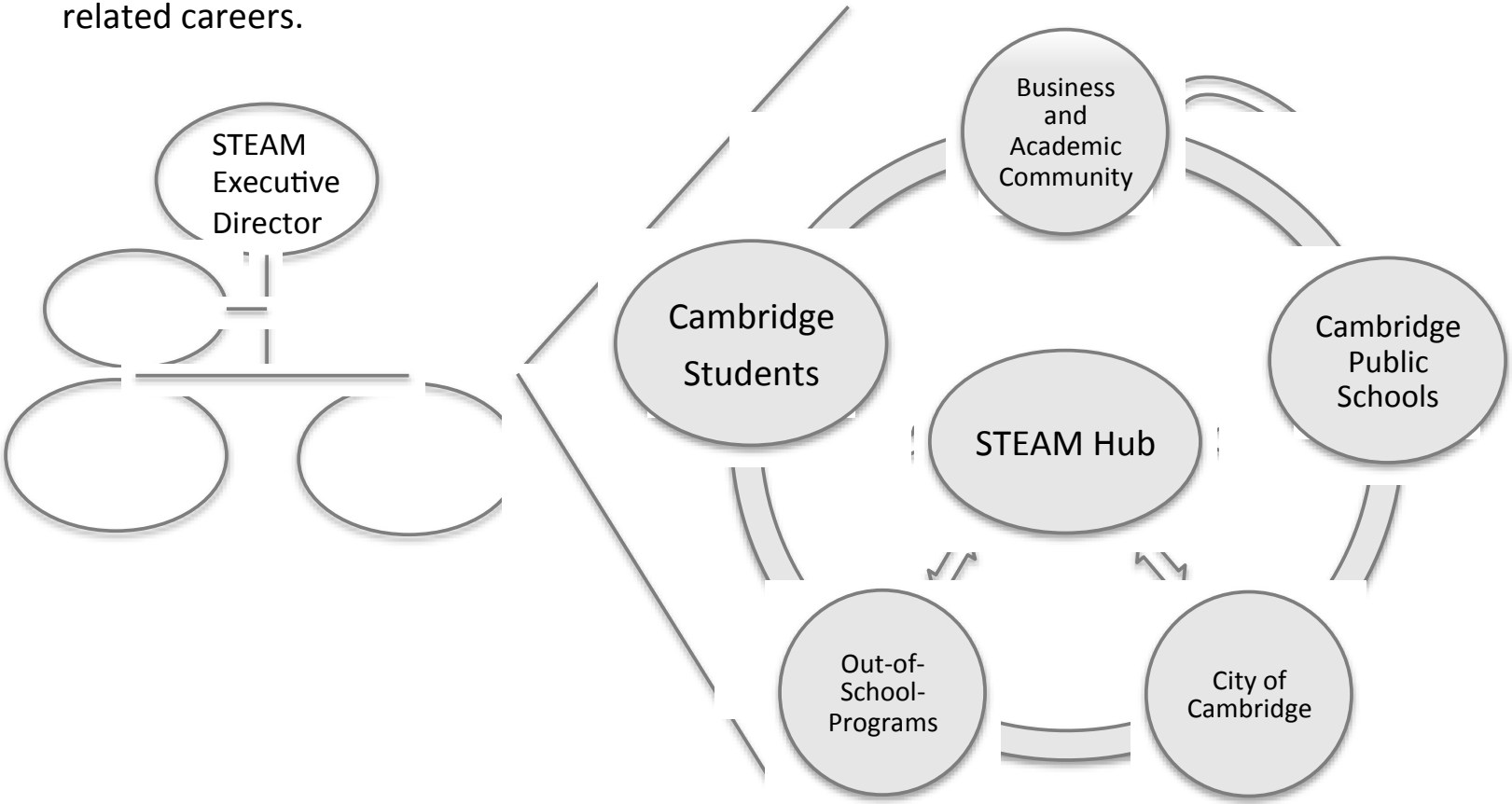
- Proven track record for results, collaboration, leadership
- Advanced degree in STEM field
- Experience in corporate context; understanding culture, expectations, environment
- Experience in diverse educational environment with sound pedagogical approach
- Strong professional network
- Ability to successfully engage all stakeholders students, school, business/academic communities, city, families
- Practical, flexible, and logical approach based on solid grasp of complexity of challenges

Job Description

- Engage all stakeholders: students, schools (guidance counselors, teachers, deans, principal), district leaders, business and academic community, and City) to leverage resources and expertise to create STEAM opportunities for all Cambridge students
- Broaden scope and breadth of STEAM opportunities to ensure that students engage in appropriate, engaging, well-supervised environments with clear and well-communicated objectives, deliverables, milestones of achievement, assessments, and evaluation
- Develop progressive, engaging K-12 STEAM curriculum with in-school and out-of-school components and links to current, real-world challenges
- Expand school professional development (PD) programs around STEAM careers, corporate culture, etiquette, etc. for teachers and guidance counselors
- Develop training programs to prepare and train students for professional environment with clear and consistent expectations for behavior
- Ensure high levels of engagement by tailoring training and placement opportunities to fit student interest and experience
- Evaluate programs to ensure that students are meeting benchmarks before moving to next level
- Devise systems for (1) communicating with students and families about opportunities and (2) allowing students to navigate opportunities and match individual interest to appropriate STEAM programs and internships
- Manage public relations, marketing, outreach and engagement with all Cambridge families
- Secure funding by business and academic community to ensure long-term success and sustainability of initiative

Proposed STEAM Hub in Cambridge

To create and facilitate STEAM opportunities for all Cambridge students to explore potential careers, to develop and enhance skills, and gain real world experience through a reciprocating network of schools, community leaders, business and academic communities, and the city for the purpose of preparing and training students for STEAM-related careers.



FUNCTION OF STEAM HUB

- Broaden scope, access, and reliability of student STEAM opportunities to ensure that all students engage in appropriate, engaging, meaningful, and well-supervised environments with clear and well-communicated objectives, deliverables, milestones of achievement, assessments, and evaluation

- Develop a progressive, engaging K-12 STEAM curriculum with in-school and out-of-school components and direct links to current, real world challenges

- Devise user-friendly and reliable system for students and families to access information about opportunities

ELIMINATE BARRIERS, CREATE EQUITY, DEEPEN EXPERIENCE, URGENCY, ENCOURAGEMENT, PREPARATION, SELF-GUIDED, COLLEGE, DEVELOPMENTAL, TRAINING, CURRICULUM, WORKFORCE, SUCCESS, GROWTH, EFFICACY, CAREER, SELF-

STEAM EXPERIENCES, ACTIVITIES, OPPORTUNITIES

LEARNERS

children

young people

young adults

adults

THE LEARNER

interests

experience

agency

identity

skills

motivation

knowledge

confidence

STEAM FIELDS

anatomy, art, archeology, architecture, astronomy, biology, botany, chemistry, computer science, conservation, design, digital art, dance, data analysis, drawing, ecology, engineering, environmental science, filmmaking, forestry, genetics, geology, health sciences, horticulture, life sciences, maker science, mathematics, metallurgy, microbiology, music, neuroscience, painting, photography, robotics, physics, sculpture

STEAM SETTINGS

arts organization,

city agencies,

companies,

contests, ecology

centers,

nonprofits, games,

festivals, hospitals,

labs, libraries,

maker spaces,

observatories,

OST,

∞ STEAM Internship Student Profile ∞

Name _____
Age/DOB _____
Grade _____
School _____
School/OST Contact Person:_____
_____

Address _____
Phone(h) _____
Phone (c) _____
Email: _____
Home Contact Person: _____
_____

Student Situation and Goals/Purpose of Internship: _____

_____

Interests: _____

Relevant OST or In-School Experiences:_____

_____

Academic Skill Level: (at, below, above, extremely above, or severely below grade level)
Reading/Writing: _____
Math_____
Speaking/Listening: _____
Social/Interaction Skills: _____
Level of Support Needed: _____
Internship Possibilities: _____
_____
Supervisor and Support Persons: _____

Comments/Notes: _____

STUDENTS	∞ STEAM OPPORTUNITIES ∞				
	Science/Medicine	High Tech/Web	Engineering	Arts-Related	Quantitative
Novice Little work experience or experience with STEAM subjects. Needs consistent support from both sending and host organization. May not have developed STEAM interests yet. Academic skills range from below grade level to grade level.	Animal care assistant at ASPCA	**Teaching assistant for afterschool coding class**	Internship at Cambridge Water Department	Drafting internship with community mural project	
Intermediate Some work experience. Moderate interest in one or more STEAM subjects. Needs moderate support from sending and host organization. Academic skills are on grade level or above.	**Assistant for summer 3rd-5th grade science program**			**Beyond the 4th Wall or Underground Railroad theater tech Internship**	**Afterschool math tutoring in community center**
Enthusiast Engaged, enthusiastic student. Independent, mature, self-motivated. Solid academic skills. Requires check-ins and follow-up.	**Cambridge City Hospital Internship**	**Social media design project for Peabody Museum**	**Robotics internship at MIT museum**		**Data analyst for visitor services department of Science Museum**
Advanced in STEAM High level academic skills and strong interest in a STEAM-related topic. Needs an advanced opportunity to do high-level work. Requires	**Ecology internship with Harvard ecologist**	**Coding internship at Google**		**MFA Restoration Internship**	**Data analyst for genome project**

check-ins and challenging follow-up.					

Career Development Spectrum

The process through which an individual comes to understand his or her place in the world of work

CAREER AWARENESS

Students are aware of the broad range of career and/or occupations in the world of work

- ★ Career Speakers
- ★ Career Days/Fairs
- ★ Career Interest Inventories
- ★ Company Tours

CAREER EXPLORATION

Students engage in some in-depth exposures to career options

- ★ Job Shadowing
- ★ Job Rotation
- ★ Informational Interviews
- ★ Job Skills Portfolio
- ★ Community Service
- ★ Leadership in Career Clubs
- ★ Contextual Learning Coursework
- ★ Labor Market Research

CAREER IMMERSION

Students engage in structured work and learning experiences connected to teaching and learning

- ★ Internships
- ★ Capstone Projects
- ★ Entrepreneurial Enterprise
- ★ Clinical Experiences
- ★ Part-Time Employment
- ★ CVTE Cooperative Education
- ★ Apprenticeship

SUCCESS AFTER HIGH SCHOOL

Massachusetts Department of Elementary & Secondary Education

CAMBRIDGE STEAM INTERNSHIP DESIGN RESEARCH

CONCEPTUALIZE

Identify ideal types and categories of internships required to meet the needs of Cambridge learners.

INVENTORY *"sending"* organizations and programs that currently place and support students and other learners in internships.

INVENTORY "host" organizations that currently offer internships. (Universities, companies, museums, etc.)

Identify types of learners these host and sending programs serve, and the types of internship activities and topics the host organizations offer.

GAPS & WEAKNESSES

Identify gaps and weaknesses in existing network of sending and host internship programs.

DESIGN RESEARCH

Use design research to create and test new prototype internship models. Use MYSEP and other funded programs as pilot sites.

Create new internships and refine existing internships based on design research models.

Scale-up successful prototype internships and share ideas with other STEAM & STEM cities.