
Systematic Approaches to STEM in Out of School Time in Chicago: Proceedings Report

Meeting Date: July 6, 2014, CME Group Foundation

Report Date: September 15, 2014

Stephanie Levi, Ph.D.



Meeting Vision:

To bring together Chicago's leading funders to strategize how to support high quality STEM OST programming throughout Chicago.

Meeting Goals:

- To be brought up to date on the Mayor's citywide STEM strategy;
- To enable funders to discuss their priorities, needs and goals regarding STEM OST, as well as progress on research regarding the funding community's giving to STEM in OST, initiated after the February 28, 2014 gathering;
- To establish action steps to be taken by the funding and STEM OST communities in order to begin to implement the ideas harvested during the meeting

Report Overview:

1. Introduction
2. Remarks by Elizabeth Swanson
3. Background and context with Gabrielle Lyon, Ph.D.
4. Proceedings on the Office of the Mayor's STEM plan
5. Guest questions about the Mayor's STEM plan
6. Funder Discussion: Reflections and Analysis
7. Next Steps
8. Appendix A: STEM Funders Network (from February 28, 2014)
9. Appendix B: Opportunities and Challenges Identified during February 28, 2014 Funder Discussion
10. Appendix C: Meeting Attendee Contact List

Proceedings

The morning began with welcome remarks from the morning's moderator, Matthew Blakely, Director of the Motorola Solutions Foundation.

A Broad STEM Vision for Chicago

Elizabeth Swanson, Deputy for Education, City of Chicago Office of the Mayor provided context for meeting attendees by sharing the history and vision for STEM in Chicago in OST, emphasizing the importance of cradle-to-career efforts. Roughly 450,000 STEM jobs are available in the Chicago region, and 60% of those require education beyond high school. While a cohort of 80,000 students moves from 8th to 9th grade, only about 1200-1500 of these students will be ready to fill these jobs upon graduation. Chicago must prepare the next generation STEM workforce to fill those jobs, which will define the cutting edge of innovation for the city and well beyond. As Ms. Swanson described, city-wide STEM strategy described subsequently during the meeting was developed by mapping backwards all STEM activities in Chicago from career to early childhood, facilitating a broad look at the STEM landscape from cradle to career.



In addition to the extensive research conducted to support the Office of the Mayor's understanding of Chicago's STEM landscape, additional work is ongoing to support the development of the city-wide STEM strategy, and STEM in Chicago. Recently, five new STEM schools opened throughout the city, and each has a corporate partner to provide students with the practical experience they need to be STEM career-ready. In addition, Ms. Swanson noted that the recent College to Career initiative at CCC has been very successful. Two additional initiatives are strengthening STEM in education in Chicago as well. The THRIVE initiative, which focuses on collective impact, and places outcomes on a meaningful continuum (see the illustration below), and a body of work that underlies Chicago's THRIVE initiative, which is focused on the construction of a data aggregator for youth education, including STEM, for the past 15 years. These data can be leveraged by the Department of

Vision		Chicago is a city where all succeed in education, career and life.								
Mission		To prepare all of Chicago for a vibrant future for aligning efforts and outcomes from cradle to career.								
Mile-Stones	Enter Kindergarten prepared to succeed.		Advance in school and succeed in learning.			Graduate from high school—college and career ready.		Enter self-sustaining careers.		
Outcomes	Enter K Ready based on KIDS Assessment	Enter K without chronic health issues	Proficient in 3 rd Grade Reading and Math	Engaged in Enrichment and Academic Activities	Freshmen On Track	High School Graduation	College and Career Readiness	College Completion	Completion of credentials of economic value	Employment at living wages
Contributing Indicators	-Prenatal care -Birth weight -Enrolled in Medicaid with high quality medical home -Enrolled in high-quality 0-3 programs -Enrolled in high-quality pre-k programs		-K-ready -% of K-3 attendance above 95%	-Adult figure attachment other than parent	-On-time promotion in 3-4 -6 th grade attendance -8 th ready for HS -Overage for ninth grade	-Freshmen on track -Attendance -Connection to caring adult -Arrests, suspensions and expulsions	-HS GPA -Dual credit and dual enrollment -Make concrete plans for the future -Participate in jobs and internships	-Retention after first year, junior year -Financial aid -No/limited remedial courses	-Opportunity youth -Unemployment rate -Under-employment rate -% of 18-24yo w/ felony convictions	
Contextual Indicators		-Achievement Gap -Out-of-School Safety -Poverty Rate			-Crime/Violence Rate -ACES -Risky health behaviors			-Teen birth rate -Undocumented learners -Reduction in racial and economic disparities -Livable jobs index		

Family Services, libraries, City Colleges, city parks, and other entities to collectively support Chicago's youth on an individual and collective basis. Over time, these initiatives will help the city understand which interventions are working.

The city's leadership envisions non-profit data being exported to the larger data collection system to support this work. Ideally, these data will include

tutoring and supplemental instruction data and the like. These systems would support everyone's understanding the youth being served, their needs, and what interventions will best serve them.

Finally, Ms. Swanson outlined a final new initiative that is supporting youth success in Chicago: the Chicago City of Learning. The Chicago City of Learning is a MacArthur Foundation-funded initiative to connect OST and in-school learning, not just in the city, but at cultural institutions and other sources of informal learning as well. The program introduced the concept of digital badging, which is used in OST and can link to in-school learning. Badges carry a wealth of information, including program curricula, a direct link to a website for kids' badges, the skills linked to a badge and activity, project completed by students, and the like. There are incentives attached to badges for youth, such as admission to cultural events and institutions, and the badges facilitate the collection of a wealth of data from the city and practitioner perspective. Namely, the data collected can facilitate an understanding of what kinds of pathways students are choosing, badges can be attached to students' records at CPS, and will ideally be linked to institutions of higher education. Currently, there are 200,000 youth in programs, and of these, 100,000 youth received badges.

STEM Programming as a Collective Activity: Chicago STEM Pathways Cooperative

Gabrielle Lyon, Ph.D. contextualized the work of the Chicago STEM Pathways Cooperative in light of the morning's agenda. STEM access is a social justice issue, as those who can access transformative experiences in STEM are poised to enjoy STEM and pursue the numerous study and employment opportunities available in STEM fields. OST programs offer students numerous benefits, including STEM knowledge and skills, a higher likelihood



of graduating from high school and pursuing a STEM career, a variety of skills including communication, teamwork, project management, problem solving, and critical thinking skills, among others. Traditional STEM programs target the top 10% of students, as well as those who self-identify as already having an affinity for STEM. Additionally, the large pool of government funding available for STEM programs is mostly awarded to universities and similar institutions. More traditional programs that adhere to these descriptors

support the top tier of students, but that leaves the majority of students without the experiences they need - and many of these students are from traditionally underrepresented groups in STEM and may excel in STEM but need appropriate supports. As a result, a variety of outcomes may result:

- Chicago student achievement in school will remain below average;
- Students who fail to access STEM OST interventions will remain significantly underrepresented in STEM college majors and careers - particularly African Americans, Hispanic students, and young women;
- Investment by funders and policy makers in STEM education efforts will lack systematic impact;
- Area companies will not have the local talent pool they need;
- Chicago's young people will fail to experience the wonders of discovery or fully explore the world around them

Funding patterns and coordinated efforts can change the field, however. Billions of dollars have been invested into STEM fields since the launch of Sputnik in 1957, but increased coordination among funders to support STEM in OST in Chicago stand to improve outcomes so that STEM is accessible and forerunning in the city. As Dr. Lyon pointed out, the initial funding for the work of the Chicago STEM Pathways Cooperative did not come from funders in Chicago. Rather, funding had to be sought in California from the Noyce Foundation to initiate this critical work in our own city.

“STEM access is a social justice issue, as those who can access transformative experiences in STEM are poised to enjoy STEM and pursue the numerous study and employment opportunities STEM fields offer.”

Dr. Lyon then described the history and details of the Chicago STEM Pathways Cooperative project, and presented compelling arguments for

the need for coordinated STEM Pathways in Chicago, which are defined as the collection of STEM experiences a young person has between Kindergarten and 12th grade. The groundbreaking research that the Pathways Cooperative conducted and presented in 2011-2012 was described, including methodology and major findings. These findings included:

- A striking underrepresentation of Latino students in Chicago's STEM OST space;
- A dearth of engineering programs in the OST field;
- A much smaller proportion of programs offered in the summer months;
- Program providers who are highly engaged but not well-coordinated;
- Data that are hard to access and sometimes do not exist;
- Networks of like-minded agencies that already exist, and could be leveraged for improved coordination

The vision that culminated from the Pathways Cooperative first phase of work centers around Chicago as an ecosystem of STEM opportunities accessed easily by a self-guided student or a guided experience supported by a counselor or adult. The product of this vision includes a clearinghouse for the entire city of Chicago to facilitate access to STEM experiences in OST by all, including students and families, practitioners, teachers and other CPS staff, funders and policy-makers. The primary points of action of the gathered audience for the meeting include facilitating access to this information for youth and data for practitioners, funders and policy makers, collecting meaningful data to learn about STEM in OST, and supporting coordination among OST programs, CPS, funders, the business community, and policy makers.



During the February 2014 meeting, Dr. Lyon posed the questions that may guide the development of Chicago STEM Pathways Cooperative vision to execution, which bear repeating here. These include:

- How should we organize ourselves?
- What skills matter for young people to develop across their STEM program experiences?
- What will the mechanisms be for involving underrepresented and disenfranchised students?
- What measures matter?

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- How do we ensure that programs are high quality and accessible?

Finally, Dr. Lyon presented the Cooperative Pathways team's recommendations, including:

- The creation of a citywide STEM OST clearinghouse and a coordinator to create a public portal for young people, parents, educators and youth-advocates;
- Better coordination between OST providers, Chicago Public Schools and families;
- A concerted focus on the most vulnerable students, and strategic engagement of the most economically disadvantaged parents and families;
- Creation of multi-lingual programs to reduce barriers to entry;
- Implementation of reduced-fare public transportation on weekends to reduce barriers to entry for high school students;
- Increased free and low-cost programs in public venues to reduce barriers to entry;
- Prioritized funding that enables organizations to coordinate services and learning among youth organizations;
- Establishment of a common language for describing goals and outcomes to facilitate collection of longitudinal data, program management and analysis of meaningful youth participation;
- Use of data about the current landscape to set priorities within organizations and across existing networks;
- Provision of enhanced professional development

The presentation concluded with Dr. Lyon sharing the details about the Chicago STEM Pathways Cooperative [blog](#), [LinkedIn group](#), and [Twitter feed](#) to support continued engagement and momentum around this important work.

City of Chicago Office of the Mayor's City-Wide STEM Plan



Brian Battle, Associate Principal, Civic Consulting Alliance, presented the city-wide STEM strategy for the City of Chicago Office of the Mayor.

The city-wide STEM strategy has a goal to triple the number of youth prepared for jobs in STEM fields by 2018.

To address the fact that the numerous STEM activities currently found throughout Chicago are largely uncoordinated, the plan seeks to

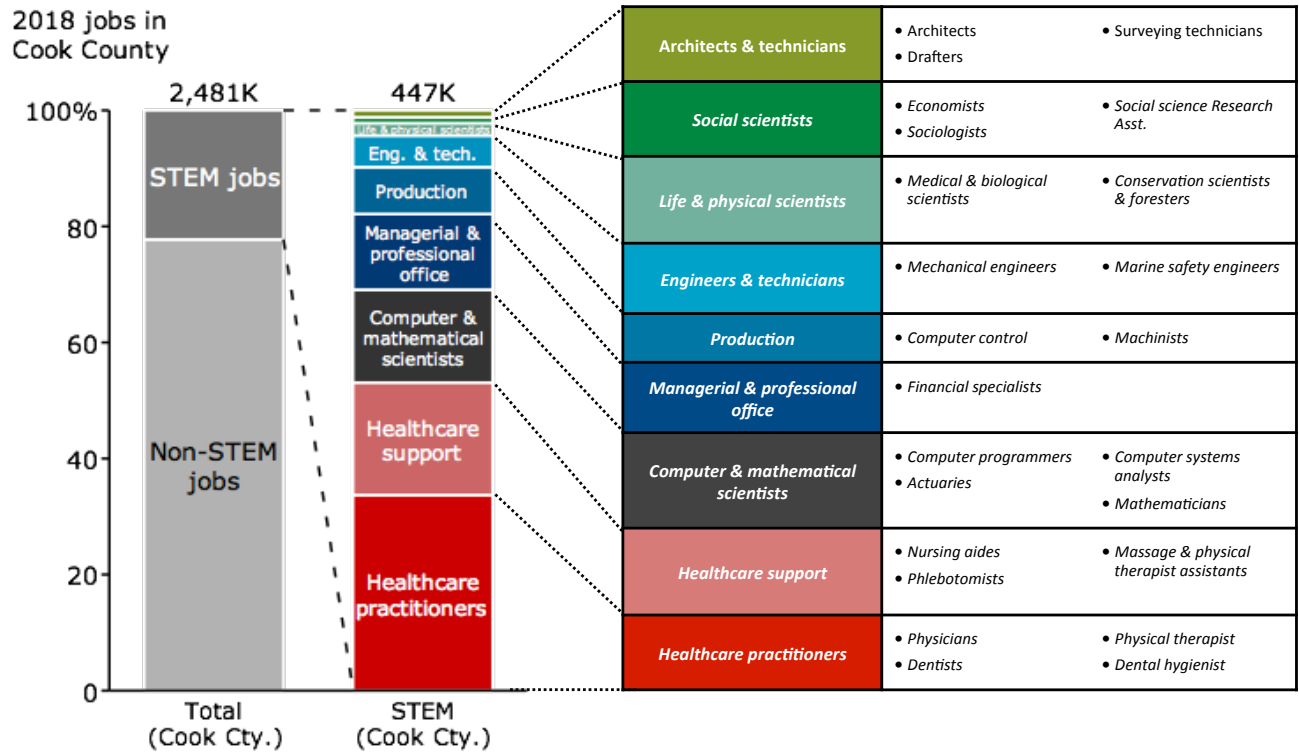
complement activities within Chicago Public Schools (CPS) and the City Colleges of Chicago (CCC) with more and better coordinated partnerships with universities, business, non-profit service providers, and cultural institutions in order to:

- Attract and deploy resources to where they can have the most impact on the opportunity of students to access STEM careers;
- Provide opportunities to all students, regardless of ethnicity, gender, or neighborhood

The city-wide STEM strategy project began in November 2013, and consisted initially of a research phase, followed by the preliminary version of the strategy. In January 2014, the leadership team gathered input from dozens of stakeholders and updated the strategy to reflect their input. Simultaneously, the leadership team evaluated how current CPS initiatives map to the high-level implementation plan for the city-wide STEM strategy to best leverage work already underway. As of the meeting, implementation plans were being detailed.

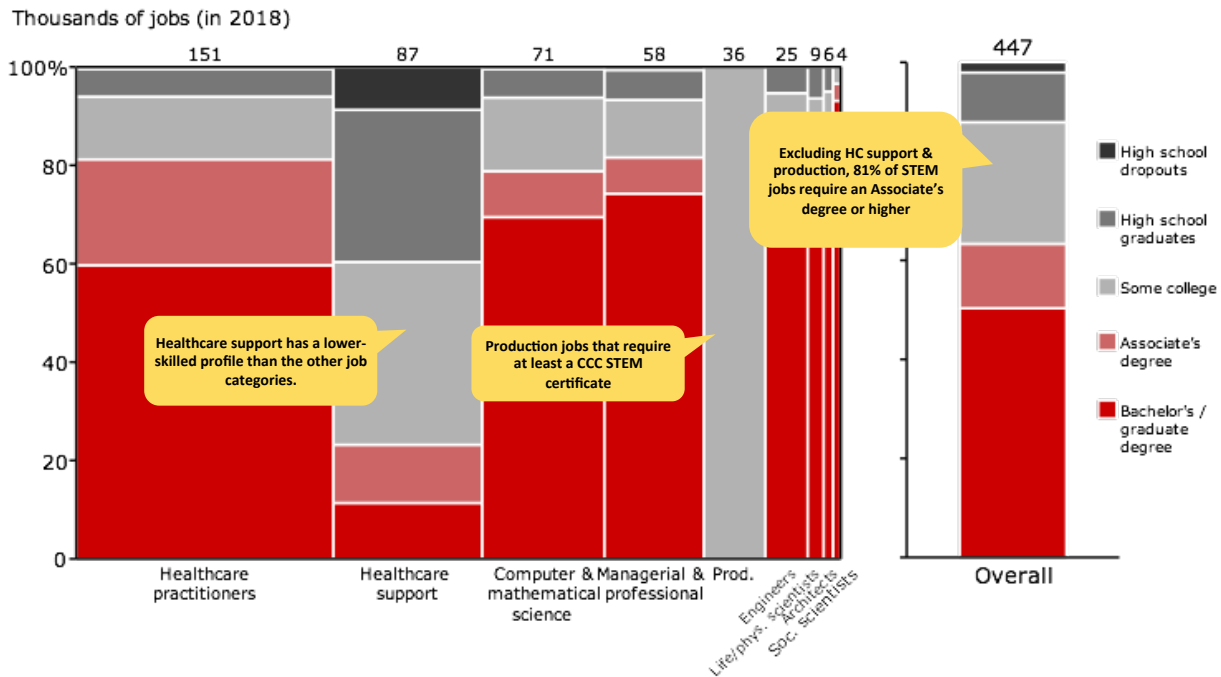
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Cook County is projected to have ~450K STEM-related jobs in 2018



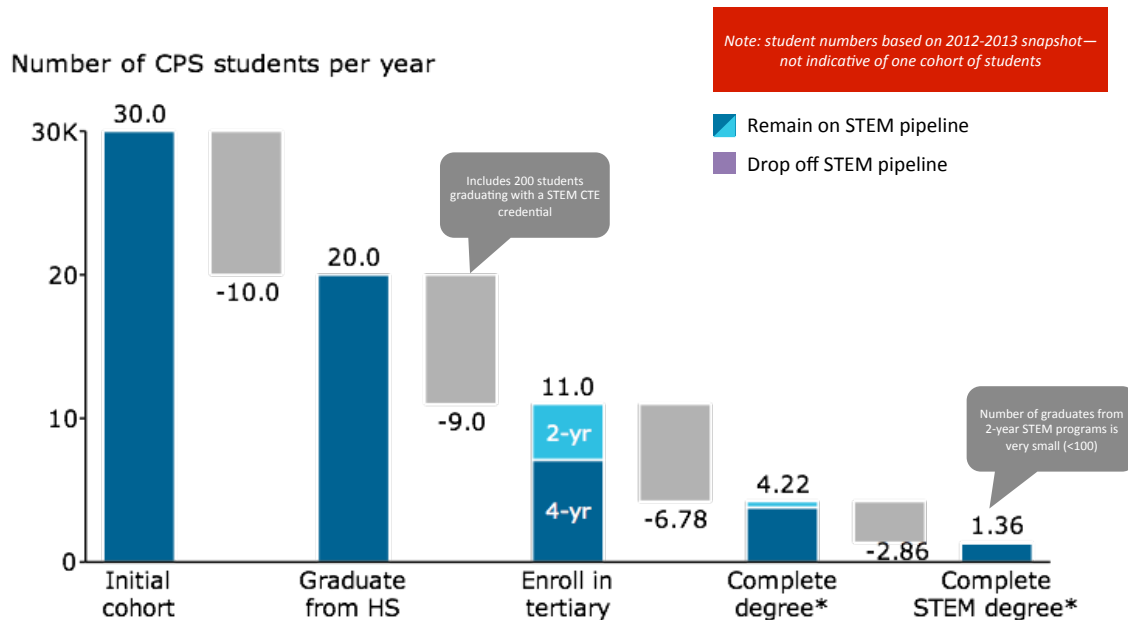
Source: The Georgetown University Center on Education and the Workforce June 2010; CCC 2013 Labor Market Data (based on EMSI industry data)

63% of the projected 447K STEM jobs in Cook County will require at least an Associate's degree



Source: The Georgetown University Center on Education and the Workforce June 2010

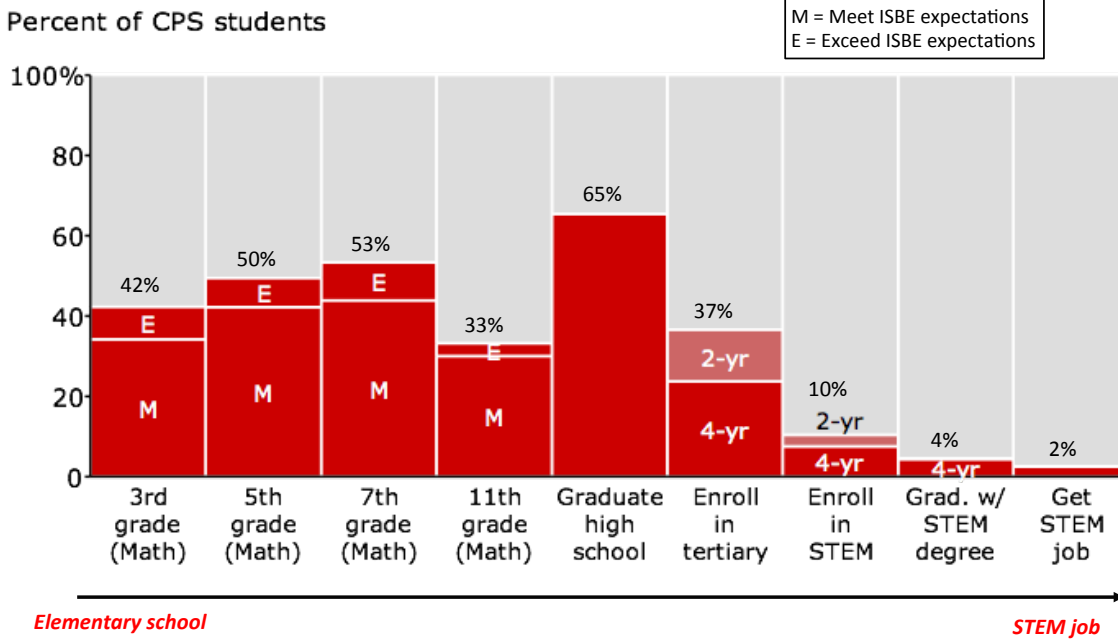
There are ultimately only ~1.4K STEM college graduates from each year's CPS cohort of ~30K students



*Numbers of CPS high school students completing degree programs were extrapolated from CCC, UIC & DePaul retention/graduation rate data; a very small proportion of adult education students go directly into 4-year degrees, less than 100 students graduate yearly from 2-yr & 4-yr colleges combined

Source: Chicago Public Schools database 2013; 5 Year Plan 2013-2018, City Colleges of Chicago; Baseline Data of UIC Student Success, prepared for Thrive; DePaul

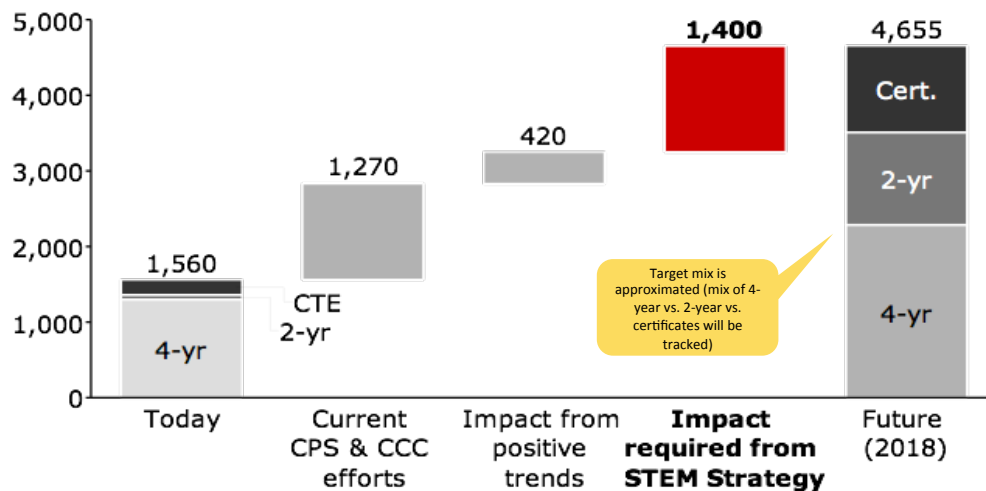
Students drop off the STEM pipeline as early as elementary school, so interventions are required throughout



Note: Percentage data based on 2013 snapshot of each grade/level; data from 3rd to 7th grade is 2013 ISAT, 11th grade data is PSAT 2013; English Language Learners are included; benchmarks based on ISBE 2013 cutoffs for 'meeting or exceeding expectations'; HS graduation data is 2013; enroll in tertiary data is 2012; tertiary-level education milestone percentages were extrapolated from UIC, DePaul & CCC data; transfers from 2-year to 4-year colleges are not included in analysis
Source: Chicago Public Schools database 2013; 5 Year Plan 2013-2018, CCC; DePaul; UIC Baseline Data of UIC Student Success, prepared for Thrive

Tripling number of STEM grads in 4 years is ambitious but achievable; current initiatives contribute >1600 graduates

Number of Chicagoans earning STEM credentials (per year)



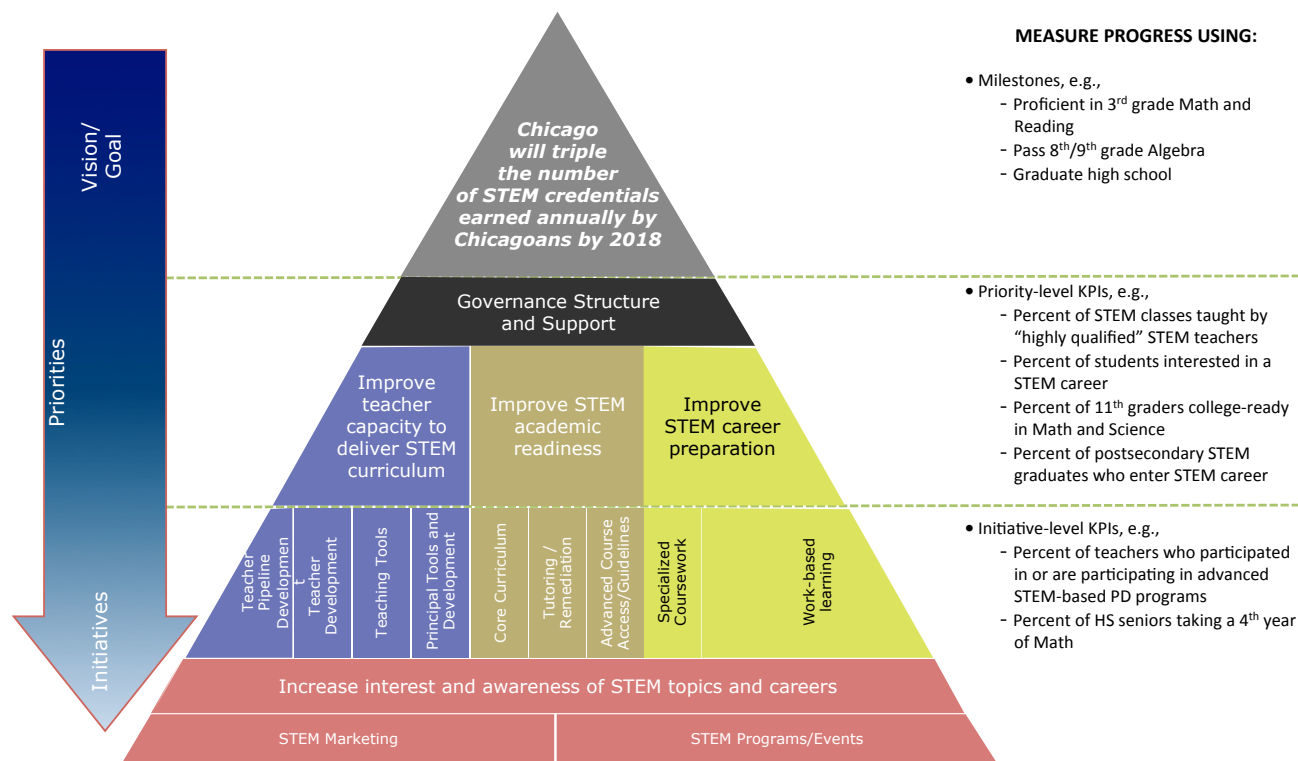
Note: "Today" includes number of STEM credentials awarded through CTE (based on data from CPS Office of College and Career Success), 2-yr degrees and 4-yr degrees; "Today" CTE STEM grads might be overestimated as "Today" includes total CTE STEM certificates awarded whereas some students could be earning multiple CTE STEM certificates; 2012 CTE certificates awarded are used in the "Today" count as the 2013 CTE numbers are still incomplete; STEM CTE certificates include only STEM certificates that qualify as advanced courses under the School Quality Rating Policy (SQRP); Current CPS and CCC efforts include an increase in STEM grads from ECSS (based on CCA Analysis of ECSS enrollment and graduation), in STEM credentials from CTE, in CCC students enrolling in STEM, and in CCC grad rates (based on an improvement from 11% currently to 20% in 2018 as outlined in CCC's 5-yr plan); Impact from positive trends includes improving high school grad rates (based on an annual improvement of 1.75 percentage points from 2003 to 2011) and tertiary enrollment rates (based on an annual improvement of 1.4 percentage points from 2003 to 2012); Mix in the "future" is estimated based on mix after accounting for lifts from current efforts and positive trends (lifts from CPS efforts are allocated between 2-yr and 4-yr based on mix of credential post CCC efforts outlined above)
Source: CPS Graduation Rate and College Enrollment data, CCC 5-yr plan, CCA Analysis; Office of College and Career Success; CCC estimates

Mr. Battle detailed the need for a city-wide STEM strategy. Approximately 450,000 STEM-related jobs are anticipated in Cook County by the year 2018, and approximately 63% of these are projected to require at least an Associate's Degree. However, data show that less than 5% of all CPS graduating seniors ultimately graduate from college with a STEM degree, which amounts to only 1,400 out of CPS' 30,000 graduating seniors. Unfortunately, achievement in STEM (illustrated by data regarding math scores for CPS students, which includes students who leave high school prior to graduating) declines relatively early, necessitating early interventions.

The city-wide STEM strategy proposes to triple the number of students who ultimately graduate with post-secondary STEM degrees. Current interventions support the successful post-secondary STEM degree completion of approximately 1,600 students. A coordinated strategy is therefore needed to enable the City of Chicago to support 1,400 additional students in successful completion of a post-secondary STEM degree in a four year interim between 2014-2018. Mr. Battle explained that this is an ambitious yet achievable goal, acknowledging that new initiatives may need to be developed or created to achieve this outcome.

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City of Chicago STEM Strategy Overview



Mr. Battle detailed the city-wide STEM strategy in its current form, which is structured as follows:

- The basis of the plan consists of STEM programs and events, as well as STEM marketing, which is a broad category of activities;
- An additional foundation includes supporting students and family awareness of STEM fields and careers;
- Three areas comprise the next portion of the strategy, including increasing teacher capacity to deliver STEM education, improving students' STEM academic readiness, and improving STEM career preparation;
- Increasing teacher capacity to deliver STEM education includes the following components:
 - * Teacher pipeline development-increase the number of eager teachers who are excited to teach throughout the educational life cycle of a student;
 - * Teacher professional development;
 - * Increasing access to and quality of teaching tools;
 - * Principal tools and development-give principals the infrastructure they need to support teacher success;
- Improving students' STEM academic readiness includes the following components:
 - * Teaching a strong core STEM curriculum, including computer science;
 - * Providing tutoring and remediation to support students learning through supplemental instruction;
 - * Advanced course access and guidelines - bringing college course material (or college courses themselves) to students who are ready for such course work to support their growth;
 - * Overseeing everything is the governance structure and support, which holds accountable people who are doing the work, and provides guidance and thought leadership
- The city-wide STEM strategy will be supported by staff who are dedicated at CPS, the City of Chicago Office of the Mayor Deputy for Education's office, and others who guide the strategy's implementation

Eleven key initiatives were identified by the development team to support the achievement of the above outcomes. These are as follows:

1. Improving teacher capacity to deliver STEM curriculum
 - a. Develop and implement a plan to reduce the percentage of STEM teacher vacancies from 9% to 2%, filling vacancies with "highly qualified" candidates;
 - b. Focus K-5 teachers' PD opportunities on those that will increase their ability and confidence in teaching math;

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- c. Train or endorse more teachers to teach high school algebra in 8th grade;
 - d. Train K-8 teachers on new STEM instructional strategies/ teaching materials;
 - e. Provide teachers with a clear, curated repository of effective STEM teaching materials and resources that they can easily access for their subjects, grades, and modules;
 - f. Coach principals in best practices for utilizing STEM teacher talent (e.g., scheduling);
 - g. Integrate STEM programs/ coursework into principals' PD roadmap;
- 2. Improving STEM academic readiness
 - a. Design a STEM curriculum framework, including Common Core Standards in Math and Next Generation Science Standards;
 - b. Develop effective remediation options across the academic spectrum and scale successful remediation programs that already exist;
 - c. Increase the range and variety of college level courses offered within each school;
- 3. Improve STEM career preparation
 - a. Building on CCC's College to Careers program and the IL Learning Exchanges, design an articulated, stackable curriculum for grades 9-14 with employer input to ensure that employers view graduates as qualified and job-ready;
 - b. Develop a plan to broaden the supply of meaningful work-based learning experiences for high school and CCC students;
- 4. Increase interest and awareness of STEM topics and careers
 - a. Create a segmented marketing plan for parents, teachers, guidance counselors and principals so that they understand the range of STEM jobs and the pathways for students to qualify for the jobs;
 - b. Design differentiated strategies to ensure all students have access to appropriate, high-quality STEM programming and events;
- 5. Governance Structure and Support
 - a. Designate point person to improve ties between CPS and other stakeholders such as universities, cultural institutions, and non-profit program operators;
 - b. Help stakeholders navigate within CPS to reduce "transaction costs" of working with district headquarters and specific schools/ teachers

Key Performance Indicators

Proposed metrics will be used to track the progress of each initiative.

Priority	Key Performance Indicator	Metrics	Baseline (2013)	Target
Improve teacher capacity to deliver STEM curriculum	% of STEM classes taught by “highly-qualified” STEM teachers	K to 5: % of CPS teachers whose students average ≥ 1 year of growth on NWEA Math (<i>note: could use surveyed % of teachers who feel comfortable teaching Math</i>);	• TBD	• TBD
		Middle and high school: % of STEM classes taught by teachers who rate as ‘Proficient’ or ‘Distinguished’ in the REACH evaluation (<i>note: could temporarily use % of STEM teachers if data by class not available</i>)	• TBD	• TBD
Increase interest and awareness of STEM topics and careers	% of students interested in a STEM career	% of CPS 6th graders indicating an interest in a STEM career;	• TBD	• TBD
		% of CPS 11th graders indicating an interest in a STEM career on ACT survey	• TBD	• TBD
Improve STEM academic readiness	% of students who don’t require tertiary Math remediation	% of former CPS students at CCC who don’t require math remediation;	• TBD	• TBD
		% of former CPS students at UIC who don’t require math remediation;	• 42% (Math or Reading)	• TBD
	% of 11th graders college-ready in math and science	% of CPS 11th graders testing as college-ready on the ACT for math;	• TBD	• TBD
		% of CPS 11th graders testing as college-ready on the ACT for science	• TBD	• TBD
Improve STEM career preparation	# of companies that recruit STEM graduates	# of companies that recruit STEM graduates at CCC;	• TBD	• TBD
		# of companies that recruit STEM graduates at key four-year institutions (UIC, DePaul)	• TBD	• TBD
	CTE KPI TBD	• CTE metric TBD	• TBD	• TBD

Partners in the Mayor's STEM Plan

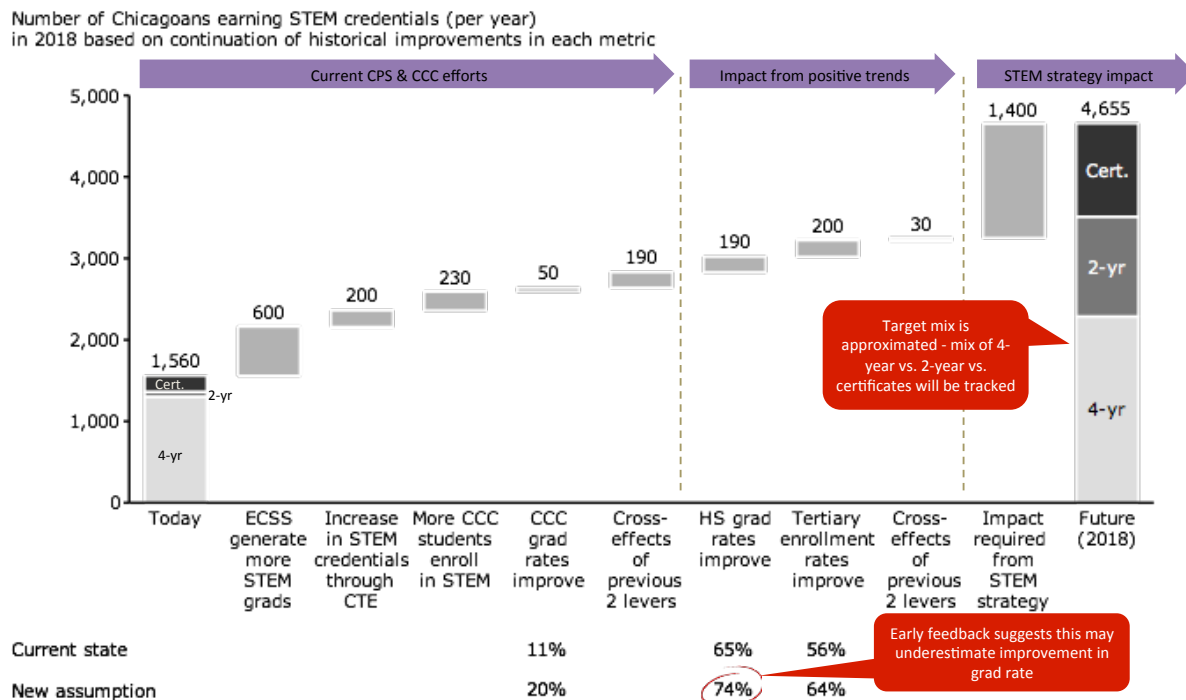
Governance Structure and Support													
Priority	Improve Teacher Capacity to Deliver STEM				Increase Interest and Awareness of STEM Topics and Careers				Improve STEM Academic Readiness			Improve STEM Career Preparation	
	Teacher Pipeline Development	Teacher Development	Teaching Tools	Principal Tools	STEM Marketing	Competitions and Projects	Mentoring Programs	Awareness Events	Core Curriculum	Tutoring and Remediation	Advanced Course Access and Guidelines	Specialized Coursework	Work-Based Learning
Corporate Sponsors			☆		★	★	★	★		★	★	★	★
Universities	★	★		☆	★	★	★	☆	☆	☆	★	☆	
City Agencies					★	★		★					
Local Organizations			★	☆	★	★	★	★				☆	
National STEM Organizations			★	☆	★	★	★					☆	

Achieving the Strategic Goal

Mr. Battle outlined how the various initiatives described in the city-wide STEM strategy would contribute to the accomplishment of the plan's goals. The figure below details these additive outcomes.

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Tripling number of STEM grads in 4 years is ambitious but achievable; current initiatives contribute >1600 graduates



Note: "Today" includes number of STEM credentials awarded through CTE (based on data from Office of College and Career Success), 2-yr degrees and 4-yr degrees; "Today" CTE STEM grads might be overestimated as "Today" includes total CTE STEM certificates awarded whereas some students could be earning multiple CTE STEM certificates; 2012 CTE certificates awarded are used in the "Today" count as the 2013 CTE numbers are still incomplete; STEM CTE certificates include only STEM certificates that qualify as advanced courses under the School Quality Rating Policy (SQRP); HS graduation rates based on an annual improvement of 1.75 percentage points from 2003 to 2011; tertiary enrollment rates based on an annual improvement of 1.4 percentage points from 2003 to 2012; CCC graduation rate based on an improvement from 11% currently to 20% in 2018 as outlined in CCC's 5-yr plan; ECSS STEM graduate numbers based on CCA Analysis of ECSS enrollment and graduation; Mix in the "future" is estimated based on mix after accounting for lifts from current efforts and positive trends (lifts from CPS efforts are allocated between 2-yr and 4-yr based on mix of credential post CCC efforts outlined above)

Source: CPS Graduation Rate and College Enrollment data, CCC 5-yr plan, CCA Analysis; Office of College and Career Success; CCC estimates

Guest Questions about the City-Wide STEM Strategy

Meeting attendees posed a variety of questions regarding the plan, which highlighted issues that arose for individuals from the OST and funder communities in attendance.

Q. Are there more thoughts about how this becomes a long term strategy?

A. This is a long term plan. There is a dire need to get this work going. Logically, these projects will start relatively small, but we believe they can go to scale effectively. It's important to note that we won't fill all available STEM jobs by merely tripling the number of STEM-ready youth, but it is a start. Our priorities are two-fold: We must ensure that we can fill available STEM jobs, and we have to change the fact that 95% of CPS students are

unprepared to be employed in STEM at all, according to our research.

Q. What's happening to build enthusiasm among program coordinators and practitioners so that, if they do not already do so, they see each other as collaborators?

A. The reality is that there is more demand than supply - youth are still coming to programs, and they want to have things to do. The HIVE network is a great example of how well collaboration can work in networks, as opposed to competition. The need exceeds available capacity, so there is only room to grow from a practitioner standpoint.



Q. Specifically, where does city see organizations like those here today fitting into this?

A. This work is so critical for a variety of reasons, but one of them is that it has facilitated this conversation here today between funders, practitioners, and ourselves. The City needs guidance around how this strategy meshes with existing organizations to ensure that we have organizational buy in and that it makes sense for them as well. We'll be relying on your guidance to achieve what we've outlined.



Q. How does the strategy outline how we as practitioners share best practices on professional development and the like?



A. We haven't yet defined firmly the governing model's identity or structure for this strategy, but once we do, it will be critical that community partners "click in" to the governing model to co-create such strategies. It will also be important that they link up with CCC and CPS to align efforts there as well. We envision that it will be a digital environment.

Q. When we are talking about interest and access, enthusiasm isn't enough. Teaching candidates can't be afraid that they won't be supported in teaching STEM in innovative ways, and right now they are. How can we change that?

A. This is a great question, and it's one that we'll be working on with our governing structure, and certainly both teacher and principal PD structures will hopefully address this concern as well.

Q. Parents at home are crucial. How does the strategy address their needs?

A. Absolutely parents are critical. The strategy incorporates parents at every level, including STEM field and career awareness, STEM marketing and events, and outlining strategies for good parent-teacher and parent-school communication and collaboration.

Q. Is the refinement process complete?

A. Civic Consulting Alliance is focused on the plans of the Office of the Mayor. We are done with our first iteration of the strategy, and need to connect stakeholders to begin the next phase of the process.

Q. It seems that local organizations could plug in in a variety of ways. Where do you see that happening?

A. Currently, the fundamental levels are where we envision local organizations plugging in to the plan, but certainly there are other ways in which they will play roles.

Funder Discussion: Reflections and Analysis

The morning concluded with a rich discussion among representatives of various foundations and other funding agencies, led by Tony Streit, Senior Project Director at Education Development Corporation, Inc. The conversation centered around three central questions:

1. Where and how do you envision the STEM plan fitting into your current funding priorities, or inspiring new ones?
2. What outcomes in STEM most matter to you?
3. What do you most need tactically as a funder to move an integrated STEM strategy forward?

Those in attendance discussed numerous questions, opportunities and challenges. A major theme throughout the discussion revolved around lack of representation of STEM in OST in the city-wide STEM plan. All agreed that it is vital to raise awareness of the ways in which OST aligns with the Mayor's plan, and that representatives from the STEM OST community be engaged in the planning, execution, and follow up of the plan.

Opportunities:

- If properly engaged, OST could make a substantial contribution to outcomes of the Mayor's city-wide STEM plan;

- Partnering across sectors can offer excellent rewards, and there are potentially many ways to engage OST STEM practitioners and partners in the plan;
- Funders might be able to identify one or two initiatives they can fund together to have collective impact;
- An ad campaign to create interest in STEM might support curiosity about science among youth and adults;
- Many funders are extremely interested in supporting STEM education;
- Progression of a STEM organizational body (a counterpart to Ingenuity in the arts) would benefit the STEM in-school and OST fields, and is likely to go much faster than it did in the arts field;
- Ingenuity was funder-initiated, but all arts organizations participated
- Created an Office of Arts and staffed that office to support and coordinate arts programming for schools and informal environments
- Not a great deal of money invested in Ingenuity, and it has been very successful;
- Ingenuity collects data and serves as a clearinghouse
- Data collection about STEM in OST was cited as a step that funders need, and the Chicago STEM Pathways Cooperative has already completed this work;
- Corporate funders could be natural funders for STEM strategy, due to their vested interest in its success



Challenges:

- The involvement Chicago's STEM OST community in the Mayor's STEM plan remains to be defined;
- Identifying the 'sweet spot' to maximize the outcomes supported by foundations and philanthropy is still needed;
- Need concrete plans to implementing a city-wide strategy that is in line with funders' priorities and foundation goals;
 - Much work has been and is being done to further teacher professional development already - emphasis on other areas of development are needed as well;
 - Selling services one teacher, principal, or funder at a time is challenging;
 - Currently only three individuals at CPS' Office of STEM support teacher professional development for 28,000 teachers city-wide;
 - Lack of capacity in STEM at CPS results in a dearth



of coordinated connection with STEM in OST;

- CPS leadership and capacity, STEM curriculum and STEM inventory are all needed for success of coordinated STEM efforts;
- Lead funders are needed to initiate the coordinated corporate funding of STEM education in- and out-of-school;
- Need more definition around who owns (and is accountable) for this work;
 - Many were reminded of their experiences being arts education funders in the past, with 350 arts programs in schools, and no entity governing and supporting them;
 - More conversation is necessary to outline how formal learning institutions, informal and OST learning institutions, schools, industry and policy makers can collaborate as a system;
 - Finding a common taxonomy for listing and indexing STEM opportunities and resources for a STEM pathways ecosystem may be challenging;
 - Many strategies fail to include early learners and college/post-secondary students;
 - It is important to ensure that OST is not lost amid discussion of school improvements for STEM advancement, since it is a unique environment that offers many complementary benefits to formal settings;
 - The Chicago STEM Pathways Cooperative landscape study identified a wealth of STEM programs - it is imperative that collaboration ensue to organize around this work and these programs

Guests discussed many ideas for furthering STEM in education, and the focus began with in-school efforts. Ingenuity's Creative School Certification provides a possible model for denoting STEM schools of excellence, which individuals in the funders' discussion felt could incentivize the integration of STEM in schools. The Ingenuity certification is awarded to schools based upon four levels of arts development. Those schools meeting the benchmarks receive additional funding. As examples, schools that have an arts coordinator meet one of the benchmarks, and schools that offer at least two arts programs meet another.

Similarly, every CPS school has a STEM liaison, although it was mentioned that few are aware of this, making it difficult to navigate STEM within the system, and contributing to the sense that STEM exists in a silo and is somewhat disjointed within the system. This highlights the potential impact of aggregating STEM within CPS, and suggests that doing so would facilitate better coordination with STEM in OST as well, in addition to implementing a rating system similar to that of Ingenuity.

Individuals in this part of the meeting discussed that building a centralized office of STEM that is well-staffed and well-resourced would greatly facilitate the ability of STEM to expand within CPS, and support improved coordination with informal and OST programs as well.

In addition, parents and the community would be better able to access and support STEM both in and out of school, which the funding group felt was important.

Next Steps

Culminating the day's proceedings, several next steps were identified by a vote from participants in the funder discussion from a list of items that arose during this closed session. Of these, five major items emerged from the day's discussion with highest priority:

Next Step 1: Strategy map what and where foundations and other funding sources in Chicago are supporting STEM programs.

Next Step	Leaders
Use existing data to map STEM programs supported by local foundations and other funding sources, in order to help the funding community begin analyzing intersections of interest and action with peers, patterns in funding, gaps in funding, and other variables, utilizing three fundamental questions to guide the process: • What are you funding? • What are your strategic priorities, what would you like to accomplish? • What are you learning from your experience, what can you teach your peers?	Tony Streit, Senior Project Director at Education Development Center, Inc., generously began an initial scan of funder data based on online availability. The Chicago STEM Pathways Cooperative is analyzing data gathered from a brief survey about funders' giving patterns collected earlier this year. In addition, mapping strategies that align with data collection strategies are being explored. This action step is likely to be the focus of the next meeting. Additional people and resources will be required to move this work forward.

Next Step 2: Develop a business model for the city-wide STEM strategy, including OST.

Next Step	Leaders
Generate a business model to outline the activities, resources, personnel and timelines needed to implement the city-wide STEM strategy, including an integrated STEM OST component that contains informal learning programs and institutions. Include costs.	TBD

Next Step 3: Follow up on the recommendations of the Chicago STEM Pathways Cooperative report, “State of STEM in Chicago in Out-of-School Time,” AND evaluate the system-wide approaches and models of other cities.

Next Step	Leaders
Host a follow-up meeting to enable attendees, particularly funders, to thoughtfully examine the recommendations of the Chicago STEM Pathways Cooperative report, and define next steps for the funding community to support these recommendations. Additionally, use existing research as a starting point for analysis of what effective city-wide STEM strategies have accomplished, and their mechanisms and structural elements for doing so.	Chicago STEM Pathways Cooperative leadership will be scheduling this meeting in the coming few months

Next Step 4: Create a clearinghouse for activities, programs and resources in STEM in OST.

Next Step	Leaders
Create an online portal of programs, activities, and resources to support a STEM OST ecosystem in Chicago. This is a longer-term item.	Chicago STEM Pathways Cooperative in collaboration with others.

Next Step 5: Perform a feasibility study of the Ingenuity model to see how it might be adapted for STEM.

Next Step	Leaders
Perform a study to analyze the mechanisms, personnel, structure, and partnerships of the Ingenuity model to understand its applications for STEM in Chicago.	Chicago STEM Pathways Cooperative in collaboration with others.

These action steps will support the momentum and planning for this important work, helping all to learn from each other with research-based practices. The Chicago STEM Pathways Cooperative will serve as a primary communicator and will keep attendees informed of the progress and next steps.

The Chicago STEM Pathways Cooperative wishes to thank the Motorola Mobility Foundation, Albert Pick Jr. Fund, The Brinson Foundation, LEAP Innovations, and the CME Group Foundation for their support of this convening. In supporting this discussion of systematic approaches to STEM in OST, they are making an important contribution to the learning and success of youth in Chicago.

Appendix A: STEM Funders Network (February 28, 2014)

The STEM Funders Network: An Overview

Matthew Blakely, Director of the Motorola Solutions Foundation and Chair of the Board for Project Exploration, was in attendance to share the details of the STEM Funders Network. The STEM Funders Network is a coalition of funders who share an interest in STEM education, including K-20, formal, OST, and informal STEM education, and operates with the purpose of deepening the knowledge base and field of STEM funders. As a result of the network, participating funders catalyze action that requires a mix of funders who collectively comprise a body of knowledge that matches the needs of the work. While not all members participate in every project, their connection via the STEM Funders Network allows funders to quickly engage when they choose to do so.

Relying on both online and offline mechanisms, the network hosts periodic meetings during which members bring ideas for the group's consideration. Currently, projects seek to activate state-wide readiness of teachers in the adoption of the Next Generation Science Standards (NGSS), broaden access and awareness of high-quality OST programs, and help align in-school, OST, and informal education worlds for learners. Of importance to the day's proceedings, the network collaborated on the development and implementation of STEM Learning Ecosystems. These ecosystems include the home, school, OST programs and informal learning environments that can shape and support youth interest in STEM.

Successful ecosystems are:

- Anchored by strong leaders and a collaborative vision and practice
- Are attentive to the enlightened self-interest of all partners
- Are opportunistic and nimble

Common best practices for successful ecosystems include:

- Building the capacity of educators in all sectors
- Equipping educators from different settings with tools and structures to enable sustained planning and collaboration
- Linking in- and out-of-school STEM learning day by day
- Creating learning progressions for young people that connect and deepen STEM experiences over time
- Focusing curricula and instruction on inquiry, project-based learning and real-world connections to increase relevance for young people
- Engaging families and communities in understanding and supporting children's STEM success

The network continues to support ecosystem cultivation by:

- Stimulating a community of practice
- Highlighting the value of informal science providers to meet goals of Common Core mathematics, NGSS and the Framework for K-12 Science Education
- Inform the STEM research agenda
- Encourage creative thinking in STEM policy

Reprinted from Levi, S. 2014. Systematic Approaches to STEM in Out of School Time in Chicago: Proceedings Report. Project Exploration, Chicago, IL.

Appendix B: Opportunities and Challenges Identified during February 28, 2014 Funder Discussion

Challenges: A variety of Challenges were identified during the funders-only discussion during the February 28, 2014 Chicago STEM Pathways Cooperative Meeting:

- City-level funding needs to be more nimble to respond to community in real time
- Creativity may not be encouraged in all school settings, so the value of cradle to career efforts may not be consistently realized
- Changing the focus from regurgitation of information to integration of practice, contextualization and concepts
- Making the connection between experience in OST and school settings can be challenging
- Appropriate tracking for outcomes and program structures can be tricky
- There isn't central knowledge or information about funders' interests and practices, so coordination can be challenging
- Awareness of which funder or entity would serve as central organizer for such an effort may be a barrier
- Assessing affective learning outcomes, including confidence, sense of community, self-efficacy, belonging, rich relationships, transformative experiences, and the like may pose a challenge
- Scaling successful programs can be challenging
- Numbers are not everything - building capacity can be a challenge for programs (and their funders) that are doing difficult work and making an important difference in the lives of youth, but may not have high enrollments
- Avoiding barriers introduced by policy and existing structures in funder community may present challenges

Opportunities: Various opportunities were identified during the course of the conversation:

- A model like the STEM Funder Network can help funders fill in knowledge gaps - for example, if research is not one funder's area of focus but another funder does focus on research practices, they can collaborate to inform each other and utilize knowledge to support better giving practices
- Coordination could support the alignment of measurement and assessment language and strategies
- Leveraging existing systems for collaboration (e.g., CPS parent portal) could simplify the effort
- Integration of STEM strategy in OST comprehensively
- Utilize mapping to inform funding collaboratives

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- Collaboration would help funders discover from peers what worked, what didn't work, and how learnings will change what funders do moving forward regarding STEM, education and college and career readiness
 - Increased collaboration and sharing can fuel quality and improvement systematically in STEM programs
 - Coordination presents the opportunity to develop common language and metrics around quality
 - Collaboration fosters increased focus on family engagement
 - The forward momentum of a systematic approach supports programs in pushing their assets into the community to view themselves and be viewed as part of the city beyond their own walls

Reprinted from Levi, S. 2014. Systematic Approaches to STEM in Out of School Time in Chicago: Proceedings Report. Project Exploration, Chicago, IL.