



January 29, 2016

James Hutchins  
Hutchins Family Foundation  
*via email: jameshutchins17@gmail.com*

Dear James,

Thank you for your interest in our work to bring computer science education to New York City public schools, teachers and students. As you know, our Foundation, CSNYC, recently announced a 10-year initiative to scale the work we have been doing for the past several years to eventually touch the lives of local students and at every point in their K-12 career. The initiative, called CS4All, is a partnership CSNYC developed with the City, the NYC Department of Education, the Fund for Public Schools and our lead private partner, the Robin Hood Foundation. Our work will scale CS education from its current reach of 5% of the school population to 100%. The initiative is about opportunity and equity, and it's something that we absolutely must do for our City's children.

This is the largest effort of its kind in the nation and will cost an estimated \$81 million—split equally between the City and private philanthropy. The City has agreed to match 100% of private dollars raised, which means we need to secure \$40 million on the private side. CSNYC is leading the private fundraising campaign, which has raised about 31% of the funding to date including \$5 million from my family foundation and \$5 million from Robin Hood.

What follows is an overview of CS4All's 10-year plan as well as CSNYC's request to the Hutchins Family Foundation for support specifically for CS4All's plan to create 80 software engineering-themed middle and high schools, placing interested students on a pathway to tech careers and providing NYC industries with a diverse and growing tech talent pipeline.

Please let me or my colleagues, Michael Preston or Sarah Holloway, know if you have any questions.

Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to be 'Fred Wilson'.

Fred Wilson  
Chairman & Founder, CSNYC

cc: M. Preston, S. Holloway



### Computer Science For All (CS4All)

NYC's Historic Expansion of Computer Science Education to 1.1 Million Students  
Partners: The City of New York & the NYC Department of Education, CSNYC & Robin Hood

#### *A Proposal to the Hutchins Family Foundation*

#### **CS4All**

Computer Science for All (CS4All) is an initiative to provide high-quality CS learning opportunities to every student in the New York City public school system. The centerpiece of the initiative is the training of 4,775 teachers who will, by Year 10, bring CS to more than 245,000 students each year, thus ensuring that all 1.1 million students receive CS instruction at least once during elementary, middle, and high school. CS2025 will be a model for the scaling of CS in a major urban area that will:

- Represent the largest effort to expand CS education in the country, providing every student with multiple opportunities to encounter CS in the curriculum;
- Unlock millions of private dollars to fund programmatic costs and engage the private sector in other high-impact ways (e.g., internship and job placements); and
- Ensure equity and quality in program delivery and promote diversity in technology education and careers.

***Only 1 in 10 high schools in the United States offers CS. In New York City, fewer than 5% of 1.1 million public school students currently have an opportunity to learn CS.***

#### **CS4All: Cumulative Reach by Year<sup>1</sup>**

PROJECT YEAR	0	1	2	3	4	5	6	7	8	9	10
FISCAL YEAR	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>SCHOOLS</b>	120	195	400	585	770	960	1,140	1,320	1,520	1,630	<b>1,700</b>
<b>TEACHERS</b>	240	435	947	1,399	1,891	2,492	3,055	3,618	4,241	4,571	<b>4,775</b>
<b>STUDENTS</b>	10k	25k	60k	100k	135k	155k	175k	200k	220k	235k	<b>245k</b>

<sup>1</sup> Note: Numbers are estimates for planning purposes only. Actual number of schools, teachers, and students trained each year will depend on school size and teacher/principal interest in different curricula, programs, and training formats. School, teacher, and student projections are based on schools receiving CS training for the first time.



## **An Economic Imperative**

The number of CS jobs is growing at two times the national average and will eventually outpace all other STEM-related industries. There is an increased need for technically-proficient workers at all levels across nearly every sector. By 2020, it is expected that there will be 1.4 million new CS jobs nationally and only 400,000 CS students to fill them—leading to a shortfall of 1 million. In NYC, there are an estimated 250,000 tech jobs. These numbers will easily double over the next decade and there is no plan for where NYC will find an additional 250,000 tech employees. By investing in local talent—NYC’s 1.1 million public school students—and exposing them to CS, we can put 5 to 10% of them on a pathway to a technical career. This will give them a career pathway never before available to them AND will solve—and diversify—our City’s talent pipeline at the same time.

## **Program Overview**

CS4All will introduce students in grades K-12 to CS at every stage in their career. In elementary school, they will learn basic computational thinking by interacting with programs like MIT’s Scratch, Code.org’s K-5 curriculum, and simple robots. In middle school, they will be introduced to computer programming, web and mobile development, robotics and electronics. In high school, students will receive one or two courses in CS, typically an introductory course and the new AP CS Principles course. These encounters will range from single units embedded in other subject areas (e.g., math, science, humanities) to standalone CS courses. There are 1,700 schools in the NYC public school system, and this is what the program will look like at an estimated 95% of schools. Students at the remaining 5% of schools—40 middle and 40 high schools—will follow an intensive, multi-year software engineering curriculum. *CSNYC is seeking a funding partner to support the development of these 80 software engineering-themed schools.*

## **Intensive CS Middle and High School Program**

*Preparing Students for Higher Education & Career Pathways at 80 Software Engineering-Themed Schools*  
For those interested in pursuing a career in CS, CS4All will create 80 software engineering-themed schools—40 middle schools and 40 high schools. These 80 schools will offer their students an intensive three or four-year CS curricular sequence. Students from the middle schools will have the opportunity to go on to the 40 software engineering high schools, high school students will be prepared to go directly into technical jobs and/or higher education pathways in CS or other STEM fields. NYC will go from having 2 schools focused on CS—the Academy for Software Engineering (AFSE) and the Bronx Academy for Software Engineering (BASE)—to 80<sup>2</sup> schools that will serve an estimated 20,000 students per year. This population will help fill the tech talent pipeline and have an impact on every industry in the City.

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<sup>2</sup> Note: There are currently 9 middle and 9 high schools in this program. 40 teachers from these schools are currently undergoing professional development, and the schools are building out their multi-year sequences. FY’16 is the third year of the program which started as a pilot funded in part by CSNYC.



**Software Engineering Curriculum Sequence, Grades 6-12**

Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Scratch	Web design	HTML/CSS/ Javascript	Web design	Processing	AP CS Principles	(Under development)
Data	Physical computing	Python	Scratch	Web design	Web Design: - Javascript - Backend Part II - MongoDB	AP CS A (Java)
Web design	Game design	3D Design & Modeling	Python	Data		CS intensives
Graphics	Graphics and audio	Processing	Physical computing	Networks	Data visualization, JavaScript	Work-based learning
Robotics	Mobile development	Physical computing		Mobile development	Game Design	
		Final Project			3D Design & Modeling	

**Execution Plan**

The centerpiece of CS4All is professional development (PD). As opposed to waiting for a pipeline of teachers to come out of education programs (which will take decades), CS4All’s model is to turn current teachers of subjects ranging from math to the arts into CS teachers. This requires significant PD—up to 100 hours per teacher per year for three years—as well as ongoing support once they return to their classrooms.

Depending on the curriculum, training will commence with intensive sessions in spring or summer and then entail regular PD throughout the school year. Training will focus on both developing teachers’ CS content knowledge and the pedagogies that underpin rich student learning. The majority of teachers are expected to have little to no prior knowledge of CS. Changes to certification policy at the state level, new programs at the schools of education, and an expanded job market for CS teachers will gradually shift CS teacher development to the universities.



Strategy	Timeline	# of Teachers Trained	# of New SE Schools	Total SE-Themed Schools
<ul style="list-style-type: none"> <li>Develop K-12 CS Education Blueprint</li> </ul>	Years 1-2			
<ul style="list-style-type: none"> <li>Continue Training of MS Teachers</li> <li>Continue Training of HS Teachers</li> </ul>	Year 1 (Current)	40		20 <sup>3</sup>
<ul style="list-style-type: none"> <li>Train New MS Teachers</li> <li>Train New HS Teachers</li> </ul>	Year 2	60	20	40
<ul style="list-style-type: none"> <li>Train New MS Teachers</li> <li>Train New HS Teachers</li> </ul>	Year 5	60	20	60
<ul style="list-style-type: none"> <li>Train New MS Teachers</li> <li>Train New HS Teachers</li> </ul>	Year 8	60	20	80
<b>Cumulative</b>		<b>220</b>	<b>60</b>	<b>80</b>

**Outcomes and Impact**

CS4All will make CS available to every elementary, middle and high school student in the City, and will significantly scale the number of schools with comprehensive, advanced CS programs. With the strong and sustained engagement of the technology industry, higher education, philanthropic and business communities, we are confident we will deliver the following outcomes by 2025:

- High quality CS curricula provided in 1,700 schools across the city, with 80 of them offering multi-year software engineering programs
- More than 1 million students receiving CS education at each school level during their time in the public school system
- 4,775 teachers trained and prepared to teach at least one meaningful unit of CS in their classrooms

CS4All will have exponential impact:

- For every teacher trained, an average of 50 students will be reached annually, reaching a total of 245,000 public school students *per year* by 2025
- Investments in professional development for the existing teacher workforce leverage public salaries for CS education, meaning more than \$200M of public funds will be spent *per year* by 2025
- An \$81 million investment in CS education will complement the city’s \$750M investment in school technology infrastructure, including \$93M for devices and \$650M for network upgrades

<sup>3</sup> These 20 schools include The Academy for Software Engineering, The Bronx Academy for Software Engineering + 9 Middle and 9 High Schools.



CS4All will include a multi-year evaluation of both program execution and teaching and learning outcomes. Outcomes will include an assessment of the effectiveness of teacher PD (for example, are the teachers prepared to teach CS?), student interest in the subject matter and a long term analysis of the higher education and career pathways of these students, and whether the program and curriculum is aligned with industry needs. An RFP will be issued in FY'16 to identify an external evaluation provider. The evaluation will be overseen by CSNYC and the Robin Hood Foundation.

### **Role of Industry**

Learning CS should not stop at the classroom walls. To increase access to career and higher education pathways, students need exposure to a wide range of possibilities and learning experiences in authentic contexts. High school students who participate successfully in CS4All will be eligible for internships, weekend hackathons, and other immersions that enhance their learning and introduce them to the world of work. We are in the process of securing industry partnerships. Partners will be asked to: (1) host internships and job shadowing opportunities for high school students; (2) host student site visits to their companies and, in turn, have employees visit program and school sites.

### **CSNYC Role & Oversight**

CSNYC, as a lead architect of CS4All and partner to the Department of Education (DOE), will devote significant time and human capital in support of the initiative and ensuring its successful roll out. CSNYC's role will include chairing the Advisory Board, working with the DOE on annual planning, identifying partner programs and curricula, building a NYC teacher community of practice (to include teacher Meetups) across all grade levels and programs, and participating in the evaluation of and research for the initiative. CSNYC's team devoted to CS4All will include Executive Director Michael Preston (PhD, Columbia), Leigh Ann DeLyser (PhD, Carnegie Mellon) and Kelsey Finkel (PhD, Oxford).

1. Chairing Advisory Board: CSNYC will Chair an advisory board of private donors which will approve annual implementation plans and budgets and ensure that private funding is overseen by representatives of the private donors.
2. Performance Management & Program Evaluation: Overseeing fiscal management, and measurement and evaluation of quality of implementation and teaching and learning outcomes.
3. Fundraising: Contributing funds and raising the private commitment.
4. Stakeholder engagement: Convening computer science educators and building partnerships with the wider tech sector.
5. Thought partner: Providing domain expertise on computer science education and its integration throughout the NYC K12 school system.

### **Budget**

The programmatic budget for CS2025 is \$81 million over 10 years. This amount does not include planned capital and other investments in infrastructure—including network design, bandwidth capacity, and wireless technologies—to increase the speed and capacity of internet services for schools, or investments in the purchase of the necessary hardware and devices required for students to learn computer science 100% of which will be paid by the City. These investments include:



**CS4All Budget: Years 1 to 5**

*Includes DOE Leadership & Team, Teacher Training & Other Direct Program Costs, Internship Stipends & Other Student Activities, Program Evaluation as well as CSNYC Support and Oversight*

<b>CS4ALL BUDGET - 80 CS Schools Program</b>	<b>TOTAL</b>	<b>FY16</b>	<b>FY 17</b>	<b>FY18</b>	<b>FY19</b>	<b>FY 20</b>
<b>Program Operations and Support</b>						
<i>NYCDOE Leadership &amp; Program Directors</i>	<b>\$2,888,089</b>	<b>\$409,117</b>	<b>\$551,781</b>	<b>\$559,506</b>	<b>\$679,088</b>	<b>\$688,595</b>
<b>Curriculum, Professional Development &amp; Materials</b>						
<i>Curriculum Development</i>	\$404,930	\$78,750	\$79,853	\$80,970	\$82,104	\$83,253
<i>Teacher Stipends, Per Session</i>	\$1,740,270	\$275,184	\$344,306	\$356,311	\$372,533	\$391,936
<i>Course Materials and Equipment</i>	\$1,719,311	\$ 225,750	\$ 532,350	\$ 212,940	\$ 215,921	\$ 532,350
<i>Teacher Training - Food &amp; Space</i>	\$151,472	\$21,000	\$31,941	\$32,388	\$32,842	\$33,301
<b>Subtotal</b>	<b>\$4,015,984</b>	<b>\$600,684</b>	<b>\$988,450</b>	<b>\$682,610</b>	<b>\$703,400</b>	<b>\$1,040,840</b>
<b>Career Exposure, Internships, Hackathons</b>						
<i>Summer Learning and Hackathon Teacher Stipends</i>	\$827,173	\$7,862	\$192,544	\$199,257	\$208,329	\$219,180
<i>Materials &amp; OTPS, Consulting</i>	\$255,935	\$15,750	\$58,800	\$59,623	\$60,458	\$61,304
<i>Placement Consultant</i>	\$184,161	\$12,600	\$42,000	\$42,588	\$43,184	\$43,789
<i>Student Internship Stipends</i>	\$264,771	\$28,875	\$57,750	\$58,559	\$59,378	\$60,210
<i>Student Activities - Food &amp; Space</i>	\$214,190	\$44,426	\$42,000	\$42,588	\$42,588	\$42,588
	<b>\$1,746,230</b>	<b>\$109,513</b>	<b>\$393,094</b>	<b>\$402,615</b>	<b>\$413,938</b>	<b>\$427,070</b>
<b>Independent Evaluation and External Support</b>	<b>\$853,812</b>	<b>\$0</b>	<b>\$233,469</b>	<b>\$233,469</b>	<b>\$233,469</b>	<b>\$153,404</b>
<b>CSNYC Program Support &amp; Personnel</b>						
<i>Leadership</i>	\$449,526	\$73,631	\$80,994	\$89,094	\$98,003	\$107,804
<i>Curriculum Development, Program Partnerships</i>	\$209,863	\$34,375	\$37,813	\$41,594	\$45,753	\$50,328
<i>Teacher Support &amp; Meetups</i>	\$95,392	\$15,625	\$17,188	\$18,906	\$20,797	\$22,877
<i>MeetUps, Site Visits and Teacher Event OTPS</i>	\$152,628	\$25,000	\$27,500	\$30,250	\$33,275	\$36,603
<i>Research and Evaluation</i>	\$267,098	\$43,750	\$48,125	\$52,938	\$58,231	\$64,054
<b>Total</b>	<b>\$1,174,507</b>	<b>\$192,381</b>	<b>\$211,619</b>	<b>\$232,781</b>	<b>\$256,059</b>	<b>\$281,665</b>
<b>Total</b>	\$9,759,565	\$1,210,045	\$2,177,864	\$1,907,624	\$2,080,347	\$2,383,685
<b>Public Funding</b>	\$2,888,089	\$409,117	\$551,781	\$559,506	\$679,088	\$688,595
<b>Private Funding</b>	\$6,871,476	\$800,928	\$1,626,083	\$1,348,118	\$1,401,259	\$1,695,089
<b>Request to Hutchins Family Foundation</b>	<b>\$2,500,000</b>	<b>\$500,000</b>	<b>\$500,000</b>	<b>\$500,000</b>	<b>\$500,000</b>	<b>\$500,000</b>