

STRATEGIC PLAN 2015-2019



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**Somewhere,
something incredible
is waiting to be known.**

-Carl Sagan

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iridescent overview

Iridescent's mission is to open up the fields of science, technology, engineering and math (STEM) to children, particularly the underserved, and especially girls, so that they are encouraged and enabled to pursue a professional education and career in these fields.

The goal of Iridescent's programs is to develop and instill a greater understanding of the engineering design process, a mindset of curiosity, creativity and persistence – essential prerequisites for success in the fields of STEM.



STEM non-profit

Active since 2006

\$3M annual budget

21 team members



iridescent's strategic basis

At the core of Iridescent's activities are 2 educational programs:



These programs have been developed, field-tested, externally evaluated and then broadly applied by Iridescent.

CURIOSITY MACHINE is an original, hands-on, engineering design curriculum for girls and boys aged 5-10 years (Grades K-5). Iridescent trains volunteer engineers and scientists from collaborating corporations and universities to develop and teach unique lesson modules based on current research. Engineers and scientists can continue mentoring students, year-round, on various projects through an online platform. Parents are engaged as learners alongside their children – a key ingredient for lasting impact not addressed by other STEM educational programs.

TECHNOVATION is a technology entrepreneurship competition for girls aged 10-18 (Grades 5-12). Participants develop unique community-centric smartphone apps and present business plans for their commercialization to a panel of tech industry experts. Teams are mentored by a global network of professional technologists.

For details regarding the two programs refer to Appendix 1:
Iridescent Programs, page 16.

WE HAVE REACHED

28,500 CHILDREN

IN

40 COUNTRIES



iridescent's strategic basis

Both the Curiosity Machine and Technovation programs were developed, tested and implemented by Iridescent with total funding of \$12 million from the National Science Foundation, the Office of Naval Research, Boeing, Google, Intel, Verizon, Adobe and many others.

We have collaborated with the White House Office of Science & Technology Policy, Clinton Global Initiative, UNESCO, UN Women, Peace Corps, US2020, 100kin10, Change the Equation, Disney, Warner Bros, Bravo, MIT, Harvard, University of Southern California, Columbia University, Los Angeles Public Library, Chicago Public Library, Boys and Girls Clubs and the American Society of Engineering Education to develop, evaluate and further optimize the programs.

In parallel, we have built a distributed organization of 25 academically trained professionals who are fundamental in implementing and further scaling our two educational programs.

The two programs, our organization and our reputation are our current strategic platform from which a substantial expansion will be possible now. Both our programs and our organization have reached a firm level of maturity and reliability that should enable a substantial scaling-up, provided we are able to secure a reliable and sustainable financial platform for this expansion.



iridescent's long-term goal

TO GLOBALIZE OUR UNIQUE MODEL OF INDUSTRY ENGAGEMENT IN STEM EDUCATION

The strategy for this long-term goal will be dealt with in a separate document covering the next 10 years.

The goals and strategies of the Strategic Plan 2015-19 as they are summarized in the following, represent, however, important steps towards reaching Iridescent's overarching, long-term strategic goal.



iridescent's strategic plan goals

I. INCREASE THE NUMBER OF CHILDREN REACHED PER YEAR

- 20X increase for Curiosity Machine program (from 4,200 currently to 78,000 in year 5, corresponding to a total of 150,000 in years 2015 - 19)
- 25X for Technovation program (5,000 > 125,000/yr)

II. MAINTAIN PROGRAM QUALITY STANDARDS WHILE ALSO REDUCING COST/STUDENT BY ~30% YEAR OVER YEAR

III. INCREASE STUDENT, TEACHER AND MENTOR RETENTION TO 50% FROM YEAR OVER YEAR.

IV. ESTABLISH SUSTAINABLE & CONSISTENT FUNDING

by securing more long term/repetitive funding from corporate donors and, in addition, generate an earned income stream corresponding to approx. 30% of annual expenses.

V. BUILD AND ESTABLISH VISIBILITY OF THE IRIDESCENT BRAND

as a leader in high quality STEM K-12 education.

VI. BUILD AN IRIDESCENT INFRASTRUCTURE ABLE TO MEET THE REQUIREMENTS OF THE STRATEGIC PLAN.



iridescent's strategic plan goals

DETAILS OF STRATEGIES TO ACHIEVE THE GOALS OF THE STRATEGIC PLAN 2015-19

- I. INCREASE THE NUMBER OF CHILDREN REACHED PER YEAR. Instead of recruiting through individual schools, we will increasingly engage school districts and global organizations such as UNESCO as “distribution” partners. We will train their staff who will use our online curriculum and mentoring platform to teach children.
- II. MAINTAIN PROGRAM QUALITY STANDARDS WHILE ALSO REDUCING COST/STUDENT BY ~30% YEAR OVER YEAR. We will increasingly use online training modules and online forums to support participants (engineers, teachers and parents), instead of training them through face-to-face programs. This use of technology will help us to dramatically reduce our personnel costs and thereby the cost per student. We will establish data tracking and analytics abilities on our online platforms to closely monitor the depth of learning in general and individually for any participant - regardless of their geographical location.
- III. INCREASE OUR RETENTION RATE OF PARTICIPANTS TO 50% FROM YEAR OVER YEAR. We will do this by using different features (grounded in Motivation Theory) such as goal setting, providing sequenced curriculum levels that increase in complexity, progress tracking as well as giving rapid, formative feedback through Digital Badges.

IV. ESTABLISH SUSTAINABLE & CONSISTENT FUNDING BY:

- Continuing the shift to larger and longer term sponsorship by industry partners and foundations. The goal is to have 10 Founding Partners (5 each for Technovation and Curiosity Machine) by the end of the 5 year period who will provide long-term funding to Iridescent.
- Charging industry partners a fee for training engineers in technical communication as well as charging ~700 schools for Curiosity Machine Club Memberships. The goal is to have 50 supporting industry partners by the end of the 5 year period.

V. Build and establish visibility of the Iridescent brand by substantially increasing our marketing activities, for example through greater representation of our model and success in the media and by engaging industry partners as champions and spokespersons for Iridescent.

VI. Build an Iridescent infrastructure able to meet the requirements of the Strategic Plan. We will expand the internal team and bring in new skill sets for fundraising and marketing. In addition we will build out a strong advisory board consisting of industry and academic partners.

appendix 1: iridescent's programs

I. GENERAL

The main aim of both programs, Technovation and Curiosity Machine, is to train self-motivated, self-driven learners for the 21st century.

Students today face a great challenge in analyzing and using information - much more than their parents or grandparents did at their age. The cumulative amount of information that exists on the planet, from the beginning of recorded history to the present, is, by realistic estimates, doubling every two years. To be successful in this information-age, students need three higher-order cognitive traits — curiosity, creativity and persistence — key ingredients of self-motivated learners.

However, training self-motivated learners is hard. It goes beyond learning vocabulary and factual content. It requires a single-minded focus on the development of higher-order cognitive traits and a very special learning environment with four specific features¹.

Iridescent has developed a differentiated approach to this problem which makes drastically different trade-offs on approach, cost and structure, compared to others in the space of STEM education. These trade-offs have been made through extensive empirical development of the programs, backed by theory and external evaluation. They emphasize:

- **ROLE MODELS**
- **MODELING PROBLEM SOLVING STRATEGIES**

¹. Based on the Cognitive Apprenticeship Model, https://www.ideals.illinois.edu/bitstream/handle/2142/17958/ctrstreadtechrepv01987i00403_opt.pdf?sequence=1

To implement at scale without sacrificing quality, we leverage online platforms and carefully produced videos to connect students with role models who model the higher-order cognitive traits of curiosity, creativity and persistence. In addition, through this framework, role models and mentors are able to provide completely personalized instruction, formative feedback and support for each student.



appendix 1: iridescent's programs

To ensure quality as we implement at scale, we focus on addressing four features through our programs:

FUNDAMENTAL VOCABULARY

Learners need to know the basic vocabulary of the field to be able to make progress. We provide this content through engaging videos featuring role models talking about the problems they are solving and the underlying fundamental concepts.

MODELING STRATEGIES

Trained mentors, aided by technology, share problem solving, analysis and learning strategies with individual children so that they can develop higher-order cognitive traits. This type of metacognitive support is hard to implement in the traditional school environment where one instructor teaches 25 students. However, our programs serve to complement and amplify what schools can provide. We bring in personalized mentoring and learning support to help each child reach her full potential.

SEQUENCED CURRICULUM

Practice is an essential component of mastery. A prerequisite for this is to have a sequenced curriculum that makes it enticing and easy for a novice to start and then gradually increases in complexity and diversity, challenging the student as she grows and changes herself. Both our programs aim to engage a child for at least two consecutive years to establish a strong foundation of curiosity, creativity and persistence.

ROLE MODELS

People learn by observing others through social interactions and media. An effective learning environment provides opportunities to learn from experts and role models as well as from peers through team work and competition. Our deep integration of role models is a key differentiator. Role models are trained to not just share career advice, but to model problem solving strategies, discuss fears and failure as well as share strategies for how they overcame them.



appendix 1: iridescent's programs

II. CURIOSITY MACHINE

Through Curiosity Machine, engineers and scientists are trained to develop hands-on projects that illustrate core concepts in their work. We then train them to teach these concepts to local underserved K-5 children and parents. The families then continue to explore, design and build via an online platform, supported by online mentoring by engineers and scientists.

In the field of STEM education, Curiosity Machine is the only program that:

- Trains engineers and scientists in technical communication whereby they develop and teach a unique curriculum based on their work.

The beneficiaries of this training are not just the students, but also the engineers and scientists themselves whose professional performance is enhanced. (This has been unequivocally seen through a NSF-funded research study and through work with participating corporate partners.)

- Provides one-on-one, long-term, technical mentoring support to each of its students.
- Engages and empowers underserved parents to become science facilitators. Engagement of parents is an essential component to the long-term support of the child and ultimate success of the program.



appendix 1: iridescent's programs

III. TECHNOVATION

Technovation is a technology-entrepreneurship competition for girls. Through Technovation, girls aged 10-18, learn to:

- Identify problems in their community that they are passionate about
- Program mobile apps to help solve, those problems
- Develop a plan to start a business based on the app

In the ecosystem of technology education programs, Technovation has the:

LARGEST REACH

To date we have engaged 4500 girls across 40 countries. The curriculum is universally appealing to girls across a wide age range (10-18), across many cultures, ethnicities, and literacy levels. For instance, we have had girls from remote Amazon rainforests create apps to grow more trees, and girls from Mumbai slums brainstorming to find ways to help girls in their community access clean water.

LOWEST COST

We have 3,500 volunteer women mentors, teachers and regional ambassadors, lending their time and skills for free.

DEEPEST IMPACT

Through our five-year look-back survey, we learned that 70% of our alumnae actually take more Computer Science courses when given access, and nearly 50% of college-age alumnae intend to major in CS.



appendix 1: iridescent's programs

NEED FOR IRIDESCENT'S PROGRAMS

There is a strong desire for high quality STEM programs as articulated by the government and corporations. The following are clear signals that Iridescent provides solutions that are needed by the world:

- The Next Generation Science Standards (NGSS) are now being adopted by various states and school districts. The NGSS are the science and engineering equivalents of the Common Core Standards. The NGSS heavily favor problem solving, critical thinking, and the engineering design process. School districts are going to begin testing their students on the NGSS, but teachers have not yet been trained on how to teach NGSS-aligned curriculum. This is where Curiosity Machine is so powerful, as our curriculum is aligned with the NGSS and teachers can access mentors for each of their students to provide the support they need.
- Recently, much attention has been given to the fact that there are not enough women in the technology industry. Technovation directly addresses this issue by providing a solution that has been proven to scale, and have persistent impact.
- There has been a growth in mentoring organizations and groups such as US2020 (an Obama Initiative) and Million Women Mentors that address corporations' need to engage their employees in skill-based volunteering to increase employee engagement and retention. Our programs directly address this need by providing opportunities for STEM professionals to mentor students on projects that align with their work.

There is a universal and large-scale need for highly curious, creative, innovative, self-motivated employees. Schools do not have the infrastructure and social capital to fill this need. Iridescent programs tightly weave into the schools' infrastructure and enable them to leverage untapped resources (parents and STEM professionals) to develop self-motivated innovators and inventors.



appendix 2: details of strategies

I. INCREASE THE NUMBER OF CHILDREN REACHED PER YEAR

2015 is the year where we fully shift from running programs ourselves to training others to do so.

During this year we will transition our training materials to online courses and support mechanisms to online community forums and re-engage our existing partners with these new comprehensive support packages.

Our implementation plan is as follows:

LARGE SCALE METHOD OF REACHING STUDENTS

To reach more students efficiently we will partner with organizations such as UNESCO, UN Women, Peace Corps, Boys and Girls Clubs, library systems and school districts (instead of individual schools as we have done in the past).

Most of these partnerships are in place because of our prior relationship building over the past nine years. We now present a robust and scalable way in which to support their local chapters.

LARGE SCALE METHOD OF REACHING MENTORS

Our model requires a very large number of mentors (~50,000/5 years for both programs). Our goal would be to partner with 50 Curiosity Machine industry partners and 50 Technovation industry partners through which we will engage employees worldwide as mentors. Our method for engaging mentors is high yield because we:

- Provide direct business-related value back to the corporation (professional development for employees as well as marketing).

- Leveraging existing partners such as US2020, Change the Equation, Million Women Mentors to publicize our unique employee engagement opportunities to corporations.
- Make it easy for corporations to get started and remain engaged with low time commitments.
- Leverage our relationship with the White House Office of Science & Technology Policy and Clinton Global Initiative for greater visibility for corporate partners.

LARGE SCALE METHOD OF TRAINING PARTNERS

We will train partner organizations' team members to use our curriculum through a combination of in-person introductory workshops and follow-up online modules.

LEVERAGING VOLUNTEER AMBASSADORS

We will engage and train our existing base of trained parents, educators, STEM mentors and librarians to support incoming cohorts — thereby expanding the Iridescent's team bandwidth.

LEVERAGING TECHNOLOGY AND VIDEOS

We will use online platforms and videos to support large numbers of students all over the world with high-quality curriculum and mentoring.

appendix 2: details of strategies

II. SECURE QUALITY STANDARDS & LOWER COSTS PER STUDENT BY APPROXIMATELY 30% YEAR AFTER YEAR

A. LEVERAGING TECHNOLOGY FOR QUALITY CONTROL

As Iridescent continues to scale, we will ensure program quality (while keeping costs low) through the following technology-based ways:

PRE AND POST SURVEYS ADMINISTERED ONLINE

We will conduct pre- and post-surveys with each of our stakeholders - students, parents, mentors and educators to assess the impact of our training and programs on their sense of self-efficacy, metacognitive skills and professional development. All surveys will use validated questions and will be based on research on parental involvement, teachers' sense of self-efficacy and efficacy regarding science and engineering teaching, engineers' work engagement and leadership development, and organization citizenship behavior. Surveys will be administered via the online Technovation and Curiosity Machine platforms at regular intervals.

DATA ANALYTICS

We will build more sophisticated analytics in both the Technovation Curiosity Machine online platforms to monitor clickstream data, quality of project/code submissions, student, mentor and teacher interactions with the curriculum and training modules.

VIDEO FACILITATED EVIDENCE BASED ASSESSMENT

Based on our prior results (and NSF-funded external evaluations) we anticipate students will make gains across four areas: persistence, creativity, curiosity and the engineering design process. Mentors will be trained to score students' videos of projects according to a rubric and award badges to students when they are fully convinced that she has mastered a particular topic and skill. Videos enable mentors to see for themselves whether the model is working and to access the student's commentary and thought processes (which do not come through in paper and pen surveys).

COMMUNITY-MODERATED QUALITY CONTROL

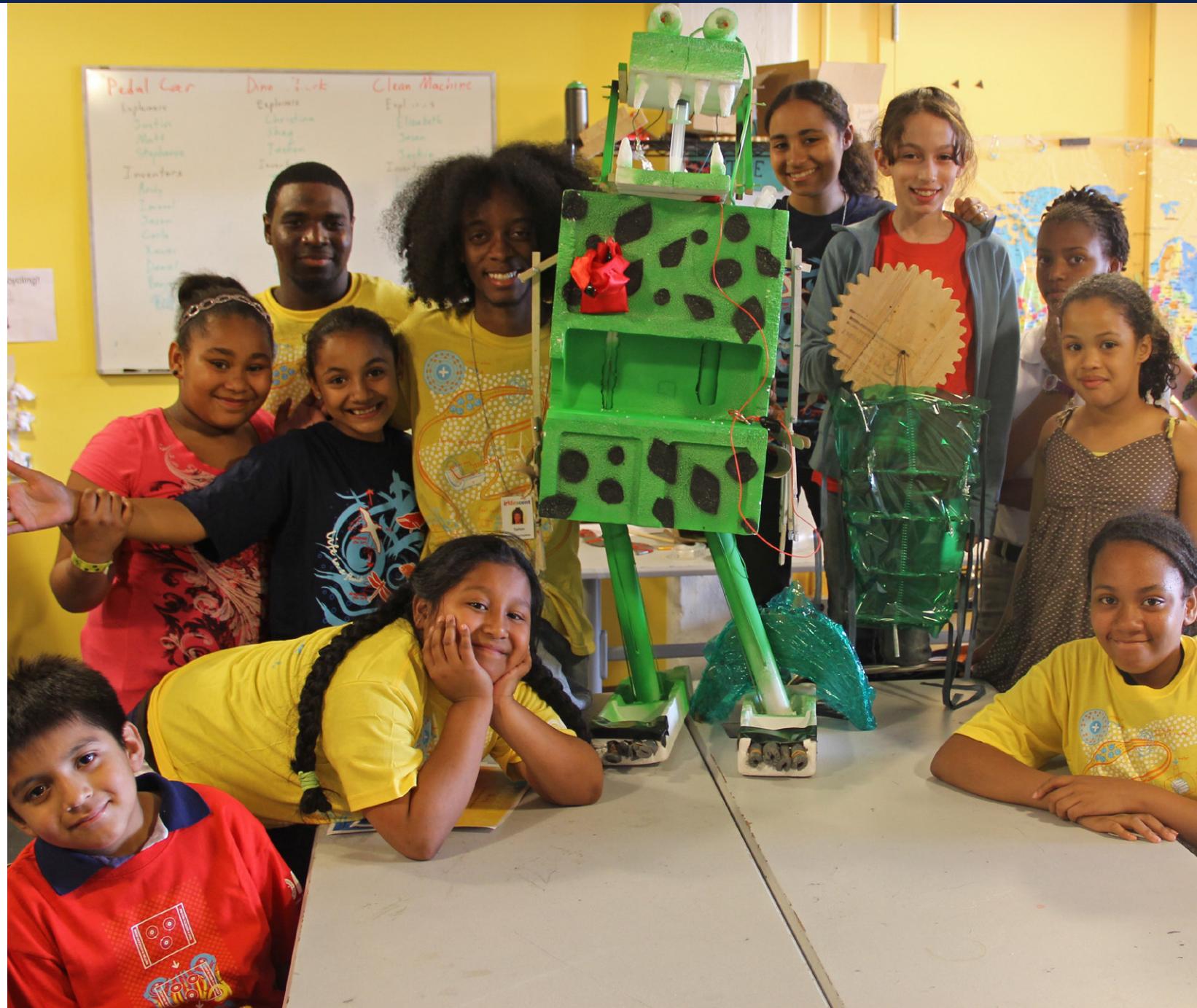
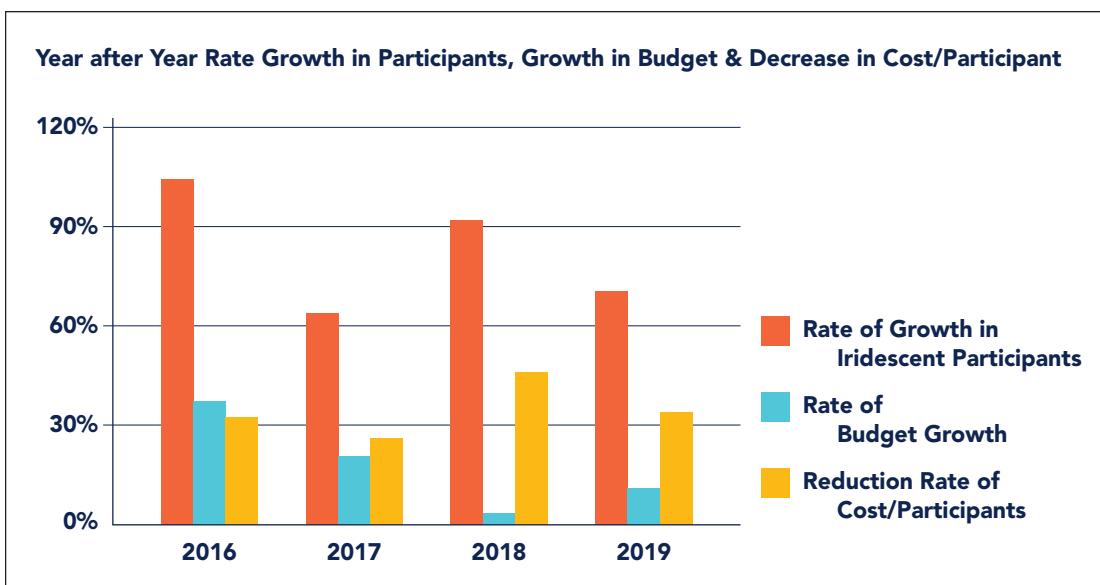
We will build out features on the two online platforms so that we can engage and leverage our large networks of trained mentors, teachers and parents to monitor quality - at scale and low cost. We will invite and train certain leaders from each group to train incoming cohorts and monitor the quality of interactions at each stage.



appendix 2: details of strategies

B. LOWERING COST WITH SCALE

We are transitioning from running programs ourselves to training other partners to run our programs. We host the training modules, curriculum and assessment features on online platforms, as well as provide year-round mentoring support via the same online platforms. This means that capital, team effort and resources are directed primarily towards recruiting and training partners, curriculum development and acquisition of new users through marketing and brand building. The graph below shows the projected increase in participants year over year compared to a significantly lower increase in budget resulting in lower cost/participants each year.



appendix 2: details of strategies

III. INCREASE THE RETENTION RATE OF STUDENTS TO 50% FROM YEAR TO YEAR

We are at the stage now where we have a proven model that can scale. For the next 5 years we are going to shift our attention towards depth and retaining participants from year to year. We are going to do that by applying key principles of Motivation Theory in our online platforms:

GOAL SETTING, CHOICE AND PROGRESS TRACKING

All curriculum and training modules will have clear goals. Learners will have a choice in what type of goals they choose to set and the user interface will highlight the progress made by each learner towards the goal. This will make the experience interesting, engaging - and addictive. Goals will be set for two years at a time.

SEQUENCED CURRICULUM

We will provide clear paths for learners to pursue, each with a long term goal and intermediate milestones. For Technovation, we will develop more advanced curricula based on Java and Swift (developer language for the iOS) that will encourage Technovation alumnae to return the following years and go deeper in their learning. For Curiosity Machine, we will create various sequences of design challenges based on different content areas that will provide enough learning to span two years.

RAPID, REGULAR, FORMATIVE FEEDBACK

Feedback is an essential part of a “sticky interface”. We will leverage digital badges and regular virtual competitions to provide various types of formative feedback to learners to keep them motivated and engaged through a long learning journey.

BUILDING A COMMUNITY

Each of our programs rely heavily on group-based learning and the formation of local support, peer groups that come together regularly to support each other. We will create online community forums as well which are virtual extensions of these physical communities. Students will be able to showcase their work through photos, videos, online portfolios, badges, peer and mentor approval. The goal would be to build a robust community of support around each child to applaud her learning gains.



appendix 2: details of strategies

IV. ESTABLISH CONSISTENT & SUSTAINABLE FUNDING

A. STRUCTURE OF SPONSORING PARTNERS

We anticipate a conservative growth in budget over the coming 5 years. The budget will stay stable in years 2015 & 2016 (\$3.5 million), and grow by 20% each year for the following years.

We want to build an alliance of Founding and Supporting Industry Partners who will be close strategic partners as we grow and scale globally. Founding Partners will provide financial support towards 60% of the budget, while Supporting Partners will provide 40% of the budget. Both types of partners will have an opportunity to serve on Iridescent's Advisory Board in appropriate functions.

B. RATIONALE FOR GENERATION OF EARNED INCOME

According to the Bridgespan group non-profits survive and get big by: 1) developing expertise with one particular type of funding rather than diversifying; 2) finding an earned income revenue model that was a natural match to their mission and beneficiaries.

We are transitioning from federal research funding to corporate funding. For financial stability, we need to establish a sustainable, earned-income stream that can cover at least 30% of our budget.

We will do so by leveraging our online platforms and our learning model as high-value products to engineers and the companies they work for, to parents, and to students.



appendix 2: details of strategies: funding

CURIOSITY MACHINE

Club memberships

We are developing a Curiosity Club model through which schools will pay \$5000 a year for year-round Club membership privileges. Club membership benefits to each school will include a sequenced training for Parent Leaders, and teachers, and mentoring training for local engineers and scientists. Club membership benefits will be extended to 40 students which will include year-round and one-on-one customized project-based learning support.

The Curiosity Club membership can be paid, donated or sponsored by corporations and foundations.

Engineer & Scientist Technical Communication

Training & Engagement

Our model also provides a lot of value to engineering companies in terms of brand value and employee engagement. We will provide four easy ways for small, mid-sized and large engineering companies to start a relationship with us. Engineers and scientists can:

- Tell their stories in a video
- Develop design challenges based on their work
- Mentor children online
- Teach children in person

We will offer to develop one video, one design challenge based on an exciting, current project, train 10 employees to become online mentors and connect them with schools for \$20,000.

Through this easy on-ramp process, we will build deeper synergistic relationships with science and engineering companies providing great shared value to all participants.

Success will be to have an Curiosity Machine Earned income strategy in place with \$650,000 earned by Dec 2015 (~30% of the program annual budget).



appendix 2: details of strategies: funding

TECHNOVATION

App Gallery & Matching Platform

In 2014, we created a simple App Gallery, which showcased every app submitted for the 2014 season. Our goal is to develop a more comprehensive and powerful Kickstarter-style gallery that will showcase each of the girls, their LinkedIn profiles, mentor and teacher recommendations, their apps, pitches and business plans and their needs, and connect them to a resource pool of investors, mentors, universities, and corporations. The goal will be to engage girls year-round and help them take their apps to market as well as connect them with additional learning and career opportunities.

Value to corporations and investors

The database of Technovation apps is the world's largest collection of tech innovations developed by girls for girls. Each year we have consistently seen that the types of apps Technovation girls develop are completely unlike those developed by white male engineers – and they are at least two years ahead of the market.

Technovation is entering its sixth year now and many of our alumnae are graduating from college. These are inspiring young women - innovative, not afraid of technology, not afraid of starting something new and hard. They are the top talent that corporations are looking for worldwide. Our platform will have the functionality to identify top talent based on expertise, competence, and innovation.

We will charge a fee from corporations and potential investors, to access this pool of technology innovations and female technology leaders from all around the world.

Success will be a Technovation Earned income strategy in place with at least \$200,000 earned by Dec 2016 (~15% of the program annual budget).



appendix 2: details of strategies

V. ESTABLISH IRIDESCENT'S BRAND

We are coming out of a long and unbroken stretch of focused research and development. During this period we kept our heads down, just trying different solutions, analyzing the data and iterating. The benefit of this laser-like focus was that we were able to develop a high-quality, large-scale, low-cost STEM education model. The downside was that we didn't talk too much to the external world (except to our participants).

Now we have a very powerful solution to bring to the world that will benefit thousands of children worldwide.

Moving forward, a primary goal will be to build the Iridescent brand and establish Iridescent as a powerful leader in STEM education and mentoring. We will do this by developing a clear brand essence for each program – Curiosity Machine and Technovation – and then reflecting that across the user's entire experience.

In addition, we will develop, deepen, and cultivate relationships, both with journalists and with our corporate partners. The cornerstone of this strategy will be sharing the lessons we have learned about bringing high-quality STEM education to underrepresented groups - at large scale. We will do this by publishing a series of white papers.

We will build strong relationships with top media outlets. This will be done by maintaining regular contact with reporters at these outlets, sending weekly emails with relevant announcements and updates, having regular conversations and establishing Iridescent as a leader with key and unique insights.

Our prior experience with PR firms has shown us that while some press coverage and attention can come from concentrated campaigns, greater return comes from establishing personal contacts with reporters – a lengthy and time-intensive process. Iridescent's CEO will ramp up these efforts to establish regular contact with national media reporters, aiming to cultivate relationships with 20-50 journalists each year.

We will also leverage our existing corporate connections to help with increasing brand awareness at multiple levels to enhance our credibility and increase visibility. For instance, we will invite senior leadership from our corporate sponsors to speak to our Curiosity Machine families, our

Technovation girls and mentors, and invite media to cover these events. We have not done this in a strategic and focused way and will do so in the coming years. We have incredibly inspiring participants and can get their support to help the sustainability of our offerings.



appendix 2: details of strategies

VI. BUILD AN IRIDESCENT INFRASTRUCTURE ABLE TO MEET THE REQUIREMENTS OF THE STRATEGIC PLAN

The team needed to execute this five-year strategic plan will consist of the following three groups:

- A General Management group consisting of the Chief Executive Officer, Chief Operating Officer, Chief Development Officer and Chief Marketing Officer.
- The Program Delivery Groups (Curiosity Machine and Technovation) consisting of Partner recruiting & training, Curriculum Development and Mentor recruiting & training.
- Program Support Group consisting of Fundraising, Video Production, Software Development, Marketing, Alumnae Engagement, Assessment and Finance.

