Georgia Governor's Office of Student Achievement

Innovation Fund SROI Analysis
Final Report

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INNOVATION FUND

The Innovation Fund invests in local education authorities, schools, institutions of higher education, and nonprofit organizations in planning, implementing, and scaling innovative education programs that advance student achievement throughout Georgia. The Innovation Fund began as a $19.4 million fund under Georgia's Race to the Top (RT3) plan. During Race to the Top, the Innovation Fund provided grants to 12 programs providing applied learning opportunities, eight programs focused on creating teacher and leader induction programs or growing the teacher and leader pipeline, and three programs focused on developing or expanding charter schools. GOSA supports Innovation Fund grantees through ongoing technical assistance, site visits, and a yearly Innovation Fund Summit. The Innovation Fund has received funding in Fiscal Years 2015 and 2016 to invest in innovative education programs beyond RT3.

SOCIAL RETURN ON INVESTMENT (SROI) METHODOLOGY

This study examines the social return on investment (SROI) of four of the RT3 Innovation Fund grantees. The **SROI approach** (see Appendix A for glossary) focuses on understanding what has changed as the result of a program, what matters to stakeholders about those changes, and the social value (value to stakeholders and society) of those changes.[1] SROI studies involve stakeholders in a transparent process in which verifiable claims about value are founded on qualitative data (such as stakeholder interviews) and quantitative data (such as graduation rates), including financial information (such as program costs). In an SROI, money is simply one widely-accepted way of conveying value. With this SROI, IMPAQ used financial proxies where appropriate to understand and estimate the social value of changes that stakeholders experienced (or may experience). For Innovation Fund grantees, we established what changed for them as a result of the funding, identified the outcomes of those changes, how the changes can be measured, and assigned a monetary value to outcomes where appropriate. We then compared the monetary value to the investment made to determine a ratio of cost:value.

Two Types of SROI

There are **two types of SROI**: 1) evaluative, which is conducted retrospectively post-program with years of data on outcomes; and 2) forecast, which predicts the social value of a program in progress based on current data and estimates of intended outcomes. Because the Innovation Fund grants are either ongoing or finishing, this is a **forecast SROI**. We estimated the forecast outcomes based on the best available data and on existing research literature. Because of the uncertainty associated with estimated outcomes in a forecast SROI, we present a range of value outcomes in the cost:value ratio, and scenarios and rationales on which we based those values. Only a retrospective SROI, conducted years from now, could describe the achieved outcomes.

[1] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

Seven Principles of SROI

The seven principles of SROI[2] include:

1. **Involve stakeholders.**
   SROI focuses on stakeholders' experiences of the changes associated with a program. Therefore, stakeholders must be identified and involved in selecting and measuring changes.

2. **Understand what changes.**
   With the SROI method, it is important to understand, describe, and gather evidence for changes—positive and negative, intended and unintended—that are important to stakeholders.

3. **Value the things that matter.**
   Use financial proxies where possible and appropriate to put a value on program outcomes that are important to stakeholders.

4. **Only include what is material.**
   SROI practitioners must give sufficient evidence and information about inputs and outcomes to enable stakeholders to understand how calculations were made and how conclusions were drawn.

5. **Do not over-claim.**
   The challenge to practitioners is to estimate as well as possible the amount of the outcome value that is due to the program under study, as opposed to that which is due to other influences or changes. Estimating value is especially challenging in forecast SROI, in which data on eventual outcomes do not yet exist. Practitioners must rely on program data, stakeholder information, and research literature to build a logical argument for the estimated value of a program, and describe how the decisions were made.

6. **Be transparent.**
   SROI practitioners must explain and document decisions about stakeholders, inputs, outcomes, and indicators to enable others to understand those decisions. Transparency about the approach and the decision making lends credibility to the work.

7. **Verify the result.**
   SROI practitioners should seek stakeholder and expert input about whether projections were appropriate and reasonable.

Evaluation Questions

The evaluation questions for the SROI analysis focus on understanding what happened in each program, the outcomes of those activities and changes, and the value of the outcomes. The

[2] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

method emphasizes the centrality of stakeholder input in understanding the program and its outcomes. The evaluation questions are:

1. What is the **theory of change** of each Innovation Fund program?
    a. Who was involved in the program?
    b. What were the investments (financial and other inputs)?
    c. What activities were funded by the grant (outputs)?
2. What **outcomes** are attributable to the programs?
    a. Which stakeholders experienced changes as a result of the program?
    b. What were the outcomes of program activities (expected and unexpected)?
    c. What evidence exists of changes connected to program activities?
    d. What activities/changes would have occurred even without grant funding?
    e. What or who else contributed to outcomes connected to Innovation Fund activities?
3. What is the **value** of those outcomes?
4. What is the **ratio** of inputs to outcome value?

Innovation Fund Grantee Selection

Because Innovation Fund grantees have many different program goals and outcomes, we assessed programs' SROI feasibility to enable the analysis to focus on a subset of programs likely to be rewarding to study in terms of the information gained. In this feasibility analysis, we followed several steps to appropriately focus the SROI analysis on four projects (total N = 14) from Rounds 1 and 2 of funding. We consulted with GOSA about each step so that our decision-making process would be guided by knowledgeable key stakeholders.

1. We **eliminated awardees of small planning grants** (n = 2) because they had not yet implemented a program that we could analyze.
2. We eliminated from consideration one grantee whose **program had changed substantially** after the initial proposal, because the new program plans were in an early stage of implementation.
3. In reviewing the grantees' programs, we found that they tended to cluster into the Applied STEM Learning priority area and the Teacher and Leader Induction and Development area. We consulted with GOSA and reached a decision to focus on the **Applied STEM Learning grantees**. This decision enabled us to focus more deeply on a related group of grantees working toward similar goals. Otherwise, evaluation resources could have been stretched too thin by trying to address two disparate priority areas within one initiative.
4. We reviewed the program components across the remaining set of seven Applied Learning grantees to find which **program components were most prevalent**. This review allowed us to ensure that the programs selected for SROI analysis would reflect program components of the Applied Learning priority as a whole. To ensure that we did not overlook any program aspects, we coded the program components in the grant proposals with NVivo qualitative software, which allows evaluators to import multiple documents and create and apply sets of codes and subcodes that label sections of text. NVivo also

counts the number of individual text segments coded. We coded each program component as an individual text segment, enabling us to assess the prevalence of each type of program component across the set of documents. We coded the proposals primarily for the student-facing components, although we also included codes for aspects of teacher professional development and education technology infrastructure. As we coded, we created new codes for program component types that were not well reflected in the current list, ensuring that all program components could be classified. Reviewing the number of text segments coded under each type of program component, we determined that the three top program components were: **1) connections with career knowledge and opportunities; 2) connections with higher education; and (3) advanced coursework**.

5. In consultation with GOSA, we decided to focus the SROI analysis on the **four high school programs** in this group. High school programs best reflect the most prevalent Innovation Fund components of career and higher education connections, because these concerns become most acute in the high school years.
6. To verify that the four high school programs were feasible to evaluate, we developed a **rubric with three dimensions** and three levels of evaluability for each dimension. We were challenged to identify, as confidently as possible, the proportion of outcomes attributable to the funded program. The three dimensions chosen and their levels of evaluability were:
    a. Degree to which activities funded by the grant were **specific and focused**. The more program funds spent on highly specific and well-bounded programs, the easier it is to isolate the funding's impact.
    b. Degree to which grant-funded activities are **new to the school(s)**. When the grant enables introduction of new programs and practices, it is easier to contrast with prior practices and outcomes.
    c. Degree to which the grant-funded activities are **not commonly found in other schools**. The more uncommon and unique the grant activities, the easier it was to contrast them with other schools in the region, if applicable.
7. We scored the four high school programs on the rubric. They obtained scores of seven to nine out of nine on the rubric, providing assurance of feasibility to study in the SROI analysis.

The four programs recommended for analysis after this process were:

1. **21st Century STEM Collaborations: Applications of the Direct to Discovery Model** ("D2D"), Barrow County School System, Round 1, $1,772,325.
2. **STEM for Life** Program ("STEM for Life"), Carroll County Schools, Round 2, $999,911.
3. **Student Applied Learning, New Teacher Induction, and Staff Leadership Program** ("Morehouse"), Morehouse College, Round 2, $1,042,095.
4. **Tift County Mechatronics Partnership** ("Mechatronics"), Tift County Board of Education, Round 2, $1,004,762.

Six Stages of SROI

The SROI Network establishes six key stages of an SROI analysis.[3]

1. **Establishing scope and identifying key stakeholders.** It is important to have clear boundaries about what your SROI analysis will cover, who will be involved in the process and how.
2. **Mapping outcomes.** Through engaging with your stakeholders you will develop an impact map, or theory of change, which shows the relationship between inputs, outputs, and outcomes.
3. **Evidencing outcomes and giving them a value.** This stage involves finding data to show whether outcomes have happened and then valuing them.
4. **Establishing impact.** Having collected evidence on outcomes and monetized them, those aspects of change that would have happened anyway or are a result of other factors are eliminated from consideration.
5. **Calculating the SROI.** This stage involves adding up all the benefits, subtracting any negatives and comparing the result to the investment. This is also where the sensitivity of the results can be tested.
6. **Reporting and using.** Easily forgotten, this vital last step involves sharing findings with stakeholders and responding to them, enabling verification of the report.

Stage 1. Identifying Key Stakeholders

For each program, we engaged stakeholders to identify the planned and enacted program inputs, activities (outputs), and outcomes to ensure that the impact map accurately reflected those items. We aimed to identify **stakeholders most likely to have experienced changes** from the program, or who were key informants about program activities. We began by reviewing the grant proposal and the external evaluation reports to identify possible stakeholder groups. In these documents, we looked for the intended and enacted inputs (such as grant funding), activities, outcomes, and the stakeholders involved. From this document review, we identified categories of possible stakeholders who funded, designed, led, and participated in the program. We selected those stakeholders because, according to the available information, they were likely to experience change in connection with program activities.

From the program documents, we could identify each program director. We emailed the program director a request for an interview and a list of initial contact information for key stakeholders in the school/district, higher education partner, student, parent, and business partner categories. We interviewed the program director first, then the initially recommended stakeholders, and then other stakeholders named in our initial interviews, as time and budget permitted.

We developed the initial protocols for the stakeholder interviews to align with the evaluation questions and sub-questions and the expected areas of knowledge for each stakeholder category. The evaluation team created a matrix of topics and stakeholders (see Exhibit 1), indicating which stakeholders would be asked about which topics. Using this matrix, we

[3] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland.

developed generic interview protocols for each stakeholder category. Later, as we prepared for stakeholder interviews, we created customized versions of the protocols that reflected what we knew about each program and what we still needed to know.

Exhibit 1. Matrix of Interview Topics and Expected Stakeholder Respondents

Topics	GOSA/GADOE	Administrators	Teachers	Students	Parents	Higher Ed	Business	Community Organizations	Evaluators
What did the grant funds pay for?	x	x	x			x	x	x	x
What were the funded activities (what was different than before)?	x	x	x	x	x	x	x	x	x
Who was involved in the program?	x	x	x	x	x	x	x	x	x
What changed for you as a result of the program?	x	x	x	x	x	x	x	x	x
What would have happened differently without funding?	x	x	x		x	x	x	x	x
What expected outcomes did you see?	x	x	x	x	x	x	x	x	x
What expected outcomes didn't happen?	x	x	x	x	x	x	x	x	x
What unexpected outcomes did you see?	x	x	x	x	x	x	x	x	x
What evidence is there of these outcomes?	x	x	x	x	x	x	x	x	x
What else contributed to the outcomes?	x	x	x	x	x	x	x	x	x
What are your sustainability plans for the program after funding is over?	x	x	x			x	x	x	x
Who else should we talk to?	x	x	x	x	x	x	x	x	x

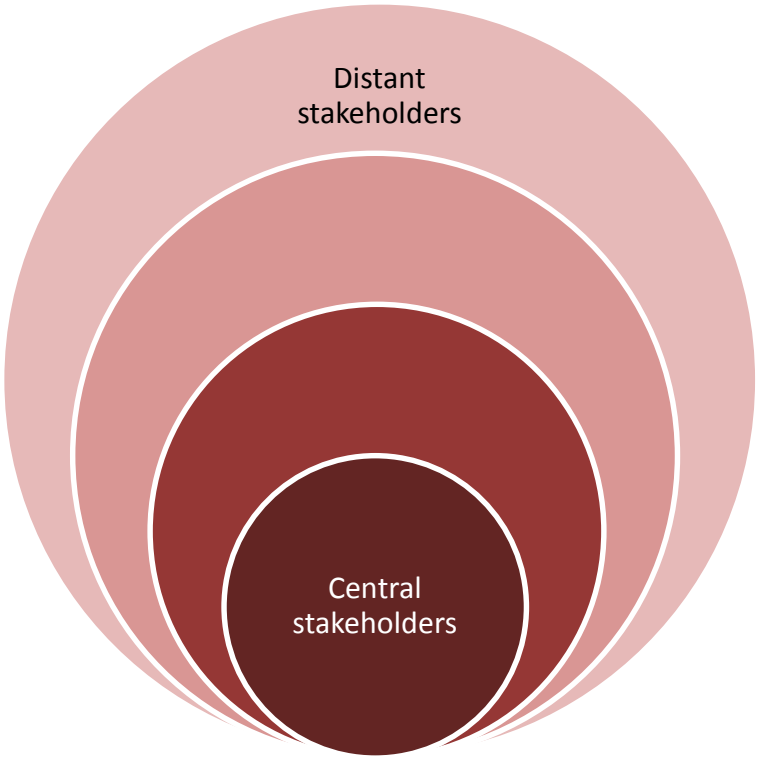
Generally, we began by interviewing the program director and the external program evaluator, followed by teachers, partnership members, and students. At the conclusion of each interview, we asked stakeholders for recommendations for additional interviewees, and followed up if possible. We conducted initial interviews using at least two evaluators; in some cases, all four members of our team participated. Team members could then assist with notes and record any suggested updates to the interview protocol.

We started collecting data on January 12, 2015 and continued through February 27, 2015. Additional stakeholder follow-up on details of outcomes mentioned in the interviews continued as needed through the end of April, but no new outcomes were added. These analyses therefore include monetized and non-monetized outcomes that were documented through the end of

February, 2015. It is possible that other outcomes emerged or will emerge after this time period; for example, one of the programs could be awarded a new grant to extend work initially begun with Innovation Fund money. These outcomes would not be included in these analyses, however, because they occurred after the close of the data collection window.

We represented stakeholders in columns A and B of the impact maps, and in a graphic (see Exhibit 2) depicting how intensely linked stakeholders were to the program activities and outcomes. Those in the innermost circle are the central stakeholders, while others are less intensely linked to the program the further they are from the innermost circle. In involving stakeholders, we intended to include and represent as fully as possible those most central to the mission of the each program—those most directly involved or most likely to be affected.

Exhibit 2. Representation of Stakeholder Categories in the Analysis



Stage 2. Mapping Outcomes

The SROI impact map demonstrates how the program's inputs and activities connect to their outputs, which in turn affected stakeholders' outcomes (see attached *Excel* spreadsheets for each program). Impacts can then be derived from the identified outcomes. To create the impact map, we:

a. **Reviewed program documents** such as the grant proposal and evaluation reports to record information about each program. Information about stakeholders (columns A and

B) initially came from lists of participants and partners. We derived Inputs (columns C and D) from the amount of funding awarded in the grant plus any other funding described in the grant proposal. We drafted outputs/activities (column E) based on the scope of work in the grant proposal and from evaluation reports, and based indicators/sources (columns G and H) on the evaluation plan in the grant proposal. We then reviewed additional documents such as the Innovation Fund report to the U.S. Department of Education and the Innovation Fund financial reports, along with documents and information received directly from stakeholders.

b. **Reviewed notes from the stakeholder interviews** as they were completed. The purpose was not to perform detailed content analysis, but to confirm, disconfirm, add to, or consolidate the information on the impact map.
c. **Asked stakeholders for additional documentation** if they mentioned activities and outcomes that were not part of the original proposal or evaluation plan. If the activities and outcomes were substantiated, we also recorded them on the impact map.

Stage 3. Evidencing Outcomes and Giving Them a Value

To substantiate outcomes and their indicators, we relied on stakeholder interviews, external evaluation reports for each program (which had information about enrollment/completion, test scores, graduation rates, survey and focus group results, and other outcomes from the evaluation plan), Applied Learning Student Questionnaire (ALSQ) results, and program-specific documentation received from stakeholders. Column G records the indicators that we discussed with stakeholders, and Column H on each spreadsheet lists the data sources that we relied on for information about the outcomes.

For **monetized outcomes**, such as estimated educational attainment, we completed the rest of the impact map, as described, to calculate the SROI. We included **non-monetized outcomes** in the impact map because they were significant to stakeholders, but these outcomes are not included in the SROI ratio. Non-monetized outcomes are generally affective, referring to feelings and attitudes. Some SROI approaches monetize affective outcomes as well. For example, one approach—stated preference—asks people how much they value a hypothetical thing or feeling in comparison to something that has a known price. Monetizing affective outcomes was beyond the scope of this evaluation.

The **quantity** column (column I) is in the units of the indicator (Column G), which could mean number of students, number of parents, number of internships, and so on.

Duration (column J) refers to the number of years the outcomes last, and continue to generate value, beyond the end of the activity period. We assumed that the end date of the Innovation Fund grant was the end date of the activity. Although we know that many programs will be sustained beyond that date (for example, new students will continue to be enrolled in Mechatronics in Tift County), to avoid overstating the case we did not include future students in the model. We estimated a duration for each monetized outcome and described it in a comment in the Duration cell. For most outcomes, we were conservative about the duration, as ongoing value is calculated for each year of the duration period. For example, learning to use state-of-the

art manufacturing equipment could benefit an intern for many years, but we estimated the duration at 3 years based on stakeholder input because an employee may need retraining in the future as equipment gets replaced or employees take on new responsibilities. For outcomes that already include future value, such as lifetime earnings for those with bachelors' degrees, we estimated the duration at 1 year, to avoid counting it multiple times. For outcomes generating financial value over multiple years, values are discounted at net present value using a discount rate of 2.5%. Discounting is necessary for comparisons between current and future values.

Because we focus on outcomes that are relatively easy to monetize, we could rely on government research or on economic and education research literature for most of our key **outcome valuations**. For example, information about costs of recruiting an employee came from the Bureau of Labor Statistics. Column N lists the source for each financial proxy and value.

Stage 4. Establishing Impact

Establishing impact involves accounting for deadweight, displacement, attribution, and drop-off.

Deadweight is the counterfactual, outcomes that would have resulted if the program had not existed. Deadweight is set up as a percentage deducted from the impact. Because this forecast SROI is not the type of study, such as an experimental evaluation, that generates an unbiased estimate of impact, we estimated deadweight based on the best available data sources. We based our estimates on data such as the ALSQ (pre- and post-program measurements of student educational aspirations) and comparisons with pre-program years or statewide averages.

Displacement refers to situations in which program outcomes displaced outcomes for non-program stakeholders. For example, a program might reduce crime in one area of a city, but neighboring areas report a proportional increase in crime, making it likely that the crime did not decline overall but rather moved to new stakeholders (those in the neighboring area). Displacement is not relevant to all SROI analyses. However, in our analyses we found evidence of some degree of displacement. For example, students in Tift County Mechatronics offered an electronics repair service that may have displaced some activity from local repair vendors.

Attribution refers to the influence of other activities, events, organizations, or people on the outcomes associated with the program under evaluation. Attribution is an estimate based on the best available information rather than an exact calculation, and reflects an awareness that the program in question may not be the only influence on the associated outcomes. In estimating attribution for our SROI analyses, we took into account the intensity of the Innovation Fund programs. For example, a 3-year intensive program likely has had more effect on students' choice of postsecondary education than a 4-week program. We also accounted for stakeholders' descriptions of other influences on outcomes, such as family members' influence on career choice or educational attainment goals.

Drop-off refers to the fading of a program's effects over time, even within the *duration* period. Because drop-off is calculated on program outcomes that last for more than a year, those outcomes with a duration of 1 in column J are not affected. We estimated drop-off based on stakeholder estimates, research, and economic literature.

Stage 5. Calculating the SROI

The **impact map *Excel* spreadsheets** have formulas that calculate SROI based on summing the benefits and subtracting deadweight, displacement, attribution, and drop-off.

Because the parameters in the forecast SROI analysis are largely estimates of future events, it is appropriate to conduct sensitivity analyses to determine the degree to which the cost:value SROI ratio is affected by more conservative versus less conservative assumptions. Therefore, we present the SROI as a range of values associated with different input scenarios. It is possible to vary many of the parameters, such as estimates of attribution, deadweight, and drop-off; financial valuations; outcome quantities; and input values. In accordance with the recommendations in the SROI Guide,[4] we focused on those parameters that had the greatest impact on the overall SROI ratio.

Stage 6. Reporting and using

During the process of specifying and valuing the outcomes of the four selected programs, we **re-contacted stakeholders** to obtain specific information for calculating outcome quantities and valuations, and estimating deadweight, displacement, attribution, and drop-off. Now that we have conducted the analyses, we will consult with GOSA on the appropriate approach to sharing the SROI results with program stakeholders.

Levels of Evidence

In the next four sections, we present the data sources, methods, and results of the forecast SROI analyses for the four selected Innovation Fund programs. For the parameters of the impact map that are used to calculate the SROI, we rely either on existing data related to outcomes, if the outcomes have already been achieved, or on estimates of future outcomes based on the best available current information. These information sources provide different levels of evidence for each parameter. **Existing data on outcomes already achieved** provide the highest level of evidence and permit the highest level of confidence. **Estimates of future data** achieve lower levels of evidence, because they describe events that have not yet happened, and must be treated with greater caution. Many outcomes in a forecast SROI are estimates of future data; the results of the SROI should be thought of as the ratio of cost:value that will be achieved *if the estimates of future data turn out to be correct*. The forecast is not what *will* happen, but our best prediction of what *could* happen based on current information.

We use **three levels of evidence** in this report to describe the confidence that we have in the data sources. Exhibit 3 describes these levels that we will indicate in the tables explaining the quantity, duration, proxy, value, deadweight, displacement, attribution, and drop-off. The lower the level of evidence, the greater caution needed when interpreting the results.

[4] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland.

Exhibit 3. Levels of Evidence for SROI Parameters

Level of Evidence	Description
High	Parameter is not an estimate, but is based on existing data from program stakeholders, such as graduation rates, number of people hired, or amount of money spent.
Medium	Parameter is an estimate based on quantitative data from program stakeholders (such as survey results) or from research literature.
Low	Parameter is an estimate based on stakeholder interviews and communications, but is not connected to a quantitative data source.

TIFT COUNTY MECHATRONICS PARTNERSHIP

The Tift County Mechatronics Partnership ("Mechatronics") aims to bring together the Tift County Board of Education, Moultrie Technical College (MTC), and local business partners in an effort to provide an **innovative STEM applied learning program for high school students**. Mechatronics is an interdisciplinary field involving control systems, electronic systems, computers, and mechanical systems. A robot is an example of a mechatronic system. People with **mechatronics** skills can work in a variety of industrial, manufacturing, and health sciences settings.

The Tift County Mechatronics Partnership established **elective mechatronics classes** in the high school, taught by MTC instructors. The classes are in the career, technical, and agricultural education (CTAE) content area. Students can join the program as sophomores and continue through senior year. Mechatronics also provides a week-long summer camp for current and prospective students. Some students also participate in the school chapter of SkillsUSA, a national organization that sponsors competitions for students in career and technical classes. Parents of Mechatronics students are involved through twice-yearly family STEM nights. Mechatronics also offers paid internships for seniors in coordination with industry partners, in which students can develop their skills in a real-world work setting. At the conclusion of the program, students receive technical certificates of credit from Moultrie Technical College, work-ready certificates, and a high school diploma.

The first cohort of students entered the program as sophomores and are now seniors. In focus groups and interviews, they said that they appreciated the **college-like atmosphere** of the Mechatronics class, and they felt respected and took on responsibility for managing their own time and workload. They knew they were working on **state-of-the-art equipment** used in industry across the region. Many students said that the course helped them take school more seriously, become more studious and confident, and make more specific and ambitious **postsecondary plans**. Students could apply their learning to skilled summer jobs. Parents of Mechatronics students said that they noticed their children had become more focused and more engaged in school, and were impressed by the students' demonstrations at family STEM nights.

School and district representatives mentioned that the success of Mechatronics attracted **more students than planned**, including students who otherwise may not have taken any CTAE classes. More class sections were added and another instructor was hired. Industry and school visitors came from across the state and region to see the program in action and get ideas about replicating it.

Students, parents, and school representatives all praised the **electronics repair service** that the Mechatronics students offered to the school and community. With the skills they learned and the equipment they had access to, students could repair smartphones with cracked screens, broken game controllers, "buggy" computers, and other devices. The students built the computers they used in the Mechatronics classes, built and repaired custom computers for family members and friends, and made other home electronics repairs. These activities demonstrated

to students, parents, and school stakeholders that the Mechatronics students were learning valuable, real-world skills that were immediately applicable.

The higher education partner, MTC, reported that Mechatronics helped **raise their profile in the community**, allowed them to have more state dual enrollment funding, and gave them future opportunities to grow the program. Industry partners said that hosting interns gave them a new appreciation of the capabilities of high school students and provided a source of **current and future employees with mechatronics knowledge**.

Mechatronics Impact Map Creation Overview

To begin the **process of creating the impact map** for Mechatronics (see attachment SROI IMPACT MAP Tift Co final.xlsx), we **reviewed program documents** such as the grant proposal and evaluation reports, and started recording information about Mechatronics on the map. Information about stakeholders (columns A and B) initially came from lists of participants and partners. We derived inputs (columns C and D) from the amount of funding awarded in the grant plus leveraged funds from MTC described in the grant proposal. We drafted outputs/activities based on the scope of work in the grant proposal and from evaluation reports. We based indicators/sources (columns G and H) on the evaluation plan in the grant proposal.

We then **reviewed notes from each of the stakeholder interviews** as they were completed, along with additional documents such as the Innovation Fund report to the U.S. Department of Education and Innovation Fund financial reports, along with documents and other information received directly from stakeholders. The purpose of this iterative review was not detailed content analysis, but to confirm, disconfirm, add to, or consolidate the information on the impact map so that it reflected the most complete possible information on Mechatronics. If stakeholders mentioned in interviews outcomes that were not part of the original proposal or evaluation plan, we recorded them on the impact map and then sought to corroborate them by communicating with other stakeholders and asking for documentation. For example, several stakeholders mentioned in interviews that Mechatronics students were offering repairs for electronic devices at the school. We contacted the program director to get estimates of the extent of this activity.

The following sections give additional detail on creating the impact map, and provide a walkthrough of its contents and rationales.

Stakeholders (Impact Map Stage 1)

Who was involved?

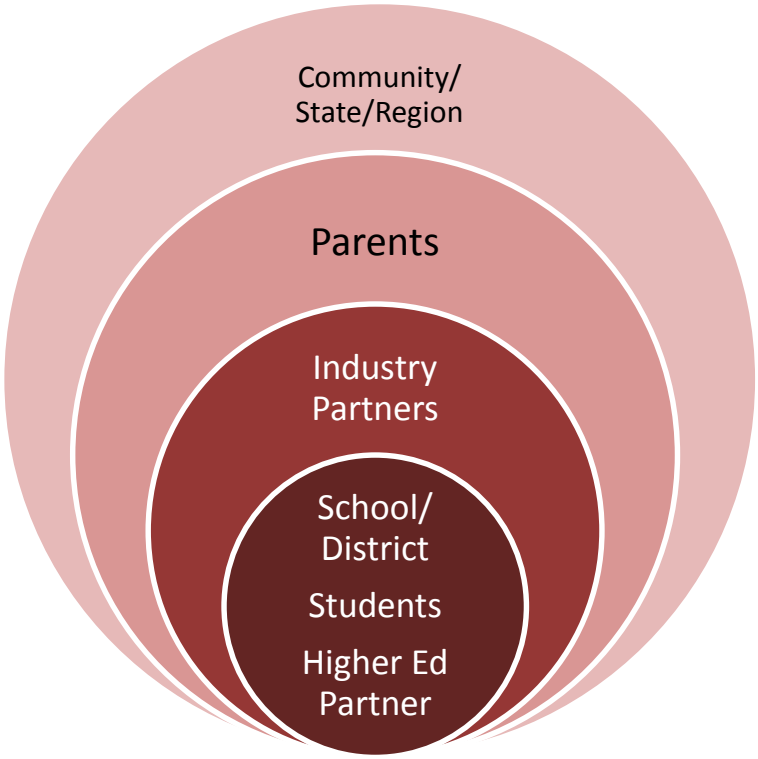
We took the following steps to contact **key stakeholders of Mechatronics**. At the end of each stakeholder interview, we asked interviewees to recommend other knowledgeable stakeholders to interview. This continued until no new categories of stakeholders were being suggested. We conducted interviews in the following sequence.

1. We began by interviewing the **Mechatronics program director, the district Career, Technical, and Agricultural Education (CTAE) director, and the external program evaluator** together. The mechatronics program director and CTAE director are key members of the school/district stakeholder category, as their focus is to implement the program and administer the grant. Although the program evaluator was not considered a stakeholder of Mechatronics, she is a knowledgeable informant because of the data collection and analysis she has been conducting.
2. Next we interviewed the **lead Mechatronics instructor**, who according to program evaluation reports and school stakeholders has been crucial to the program's success. He is a member of the higher education partner (MTC) stakeholder category.
3. Then, as a member of the business stakeholder category, we interviewed a representative of a **local industry partner** that has Mechatronics interns.
4. Next we interviewed two **parents** of senior students, as representatives of the parent stakeholder category.
5. We conducted two Skype video focus groups with a total of five **students**. Two of the students were children of parent interviewees.
6. We interviewed the **economic development director** of MTC, who is also a parent of a Mechatronics student.
7. Finally, we interviewed the high school principal, who was a teacher at the school for over 20 years before assuming the principalship two years ago, as a representative of the school stakeholder group.
8. In order to get a state-level perspective on the goals and outcomes of the Innovation Fund, we also interviewed the Fund's current and former program directors.

In involving stakeholders, we intended to include and represent as fully as possible those who are most central to the mission of Mechatronics—stakeholders most directly involved or most likely to be affected (see Exhibit 4; those in the innermost circle are the central stakeholders, while others, further out, are less intensely linked to the program). These central stakeholders were the **school/district** stakeholder category, the **student** stakeholder category, and the **higher education partner** stakeholder category. These stakeholders also form the primary focus of the external evaluation of Mechatronics. We interviewed multiple representatives of each group because of their centrality to the program.

Industry partners are important to Mechatronics because the program aims to provide knowledge of advanced manufacturing, enabling students to train on and program state-of-the-art equipment. Industry partners provide input into the Mechatronics curriculum, host Mechatronics interns, benefit by having the opportunity to hire trained program graduates, and perhaps in the future will donate equipment to the program. The future of Mechatronics students and the program itself intertwine with industry. However, industry partners are less involved in the day-to-day operations of the program than are stakeholders in the inner circle. We also had access to only one of the industry partner representatives; we acknowledge that this stakeholder group may not be as well represented as other groups.

Exhibit 4. Representation of Stakeholder Categories in the Analysis—Mechatronics



Parents are program stakeholders because they were expected to participate in family STEM night activities and gain STEM knowledge, as well as support their children in Mechatronics. Parents also have a stake in the postsecondary plans of their children—particularly in their children having specific and ambitious yet attainable goals—and Mechatronics focuses on supporting career readiness and postsecondary educational transitions. However, parents are also less involved in the day-to-day operation of Mechatronics than are the stakeholders in the inner circle, and over time as students graduate and enter college and career, parents could be less central to students than industry partners. We also acknowledge that our analysis may not fully represent this stakeholder group.

We acknowledge that the **local community**, the state of **Georgia**, and the **southeast region** could be considered stakeholders of Mechatronics. The success of Mechatronics and the publicity it has attracted have reflected the community in a positive light, and could, for example, draw new residents to the area. On the other hand, the student repair service could have displaced some local electronics repair activity. Representatives from state and regional schools and business have all toured the program to gain insight into replicating it. Of the stakeholder categories included here, however, they are the least involved in the daily operations and eventual outcomes of Mechatronics. Aside from the interviews with the Innovation Fund state program directors, interviewing these stakeholders was beyond the scope of this analysis, but in accordance with the SROI method, we acknowledge their possible role.

Inputs (Impact Map Stage 2)

What did stakeholders invest? What was its value?

We started Stage 2 of the SROI analysis by identifying the **program inputs**, which are the investments, financial and otherwise, that stakeholders make into the program. In Mechatronics, the primary financial input was the Innovation Fund grant from the state, which paid for personnel, facilities, equipment, and consumable materials. The scale-up Innovation Fund grant is also included as an input from the state (as well as an outcome for the school district). MTC contributed equipment from a previous grant, and pays for the Mechatronics instructors, COMPASS tests (needed for students to earn college credit) and other assessments, a high school coordinator, and enrollment costs with leveraged state funds. The school district also made financial investments to accommodate the growth of Mechatronics because the school had to provide more space for the program, which meant renovations and a portable classroom for displaced classes. The school principal estimated that contribution at $100,000.

In accordance with SROI methods, we also mention inputs in column C that do not have a dollar value. These investments help the program to function well but were not described in monetary form. For the Mechatronics program, we included MTC's experience with large grants and connections with school and industry, and for students, the time that they otherwise could have spent in other elective classes. For parents, the time spent at family STEM nights was an investment.

Outputs (Impact Map Stage 2)

What were the activities?

The outputs in column E summarize the **activities funded by the grant**. Stakeholders confirmed that the planned grant-funded activities were enacted, and there were few unexpected activities. The Mechatronics classes, summer camps, and family STEM nights operated as intended, and the internships began in 2015, although not with all of the originally planned partners. The primary deviation from planned activities was the additional half-time Mechatronics instructor (not paid for by the grant) needed to handle unexpectedly large demand.

Outcomes (Impact Map Stage 2)

What changed?

In column F, we list the outcomes to describe what has changed as a result of the Mechatronics program activities. We have labeled them **expected** or **unexpected,** and **monetized** and **not monetized**. As Mechatronics is the subject of a high-quality, program-level evaluation, many of the expected outcomes we heard about in the interviews have already been well documented by the evaluator in the twice-yearly reports. Therefore, we primarily drew upon sources such as evaluation reports to describe and estimate the outcomes.

Exhibit 5. Mechatronics Outcomes and Presence in SROI Ratios

Expected Outcomes	In SROI ratio?
Moultrie Technical College has more dual enrollment funding	✓
Students have higher postsecondary educational aspirations	✓
Students get college credits	✓
Mechatronics courses created, replacing outdated engineering program	
New mechatronics career pathway for state	
Moultrie Technical College has higher profile and future opportunities for growth	
Students have more specific postsecondary plans	
Students have increased confidence, better study habits	
Parents have increased STEM knowledge	
Unexpected Outcomes	**In SROI ratio?**
District gets new Innovation Fund grant to replicate program in another district	✓
Students provide service fixing electronic devices at school	✓
Students build computers and repair electronics at home	✓
Students get skilled summer jobs, such as computer support	✓
Industry partners have a new source to recruit employees	✓
Industry partners save money on technical training	✓
Mechatronics course aligned to math and English language arts standards	
Higher than expected parental involvement	
Students won national SkillsUSA titles	
Increased attention to and respect for CTAE courses at school	
Local, state, and regional publicity for quality of program	
Mechatronics attracts academically diverse student body	
Parents worry less about students' academic performance and postsecondary plans	
Community feels pride in quality of program	

Many of the expected outcomes in column F are **affective and were not monetized** in this analysis. Other expected outcomes have not yet been observed directly, such as graduation rates, as the first group of Mechatronics students had not yet graduated as of April 2015.

Part of the value proposition of SROI is that stakeholder engagement surfaces important outcomes that were not originally expected and not included in pre-planned evaluations. When this happened, we sought additional data to substantiate the **unexpected outcomes**, and added them to the impact map if they could be confirmed. Some of these unexpected outcomes were monetized and are included in the SROI analysis. Exhibit 5 summarizes outcomes included in the impact map, whether they were expected or unexpected, and whether they were monetized and included in the SROI ratio.

Indicators and Data Sources (Impact Map Stage 3)

How were changes measured? Where did the information come from?

Starting in Stage 3, we focused primarily on **outcomes included in the SROI ratio**. The indicators of the outcomes, in column G, express how the changes were measured. The indicators are the link between the outcomes and the valuations, because they support quantifying the outcomes.

Without the access to program proposals and documents, results from the ALSQ, reports to the U.S. Department of Education, and external evaluation reports provided by GOSA, this analysis would not have been possible without a much larger budget and timeframe. We were able to rely on several **extant data sources** that make the project more efficient. Column H lists the data sources that we used for information about the changes experienced by each stakeholder group. The proposal helped us understand intended inputs, activities, and outcomes, while other documents, such as survey results and evaluation reports, have provided information on what happened in the program. We supplemented these documents with **stakeholder interviews** (column A) and additional program documentation supplied by stakeholders, such as the cost of renovations at Tift County High School. Exhibit 6 depicts the monetized outcomes linked to their indicators and data sources (column H).

Exhibit 6. Monetized Outcomes, Indicators, and Sources—Mechatronics

Monetized Outcomes	Indicators	Data Sources
Students have higher postsecondary educational aspirations	Number of students intending to achieve postsecondary education	ALSQ
Students get college credits	Number of Technical College System of Georgia credits earned	Communication from program leaders, evaluation reports
Students provide service fixing electronic devices at school	Number of repairs at school	Interviews, communications from program leaders, evaluation reports
Students build computers and repair electronics at home	Number of repairs at home	Interviews, evaluation reports
Students get skilled summer jobs	Number of skilled summer jobs	Interviews, communications from program leaders
Industry partners have a new source to recruit employees	Number of students recruited/hired	Interviews
Industry partners save money on technical training	Number of students trained	Interviews
Moultrie Technical College has more dual enrollment funding	Level of dual enrollment funding increase	Communications from MTC
District gets new Innovation Fund grant to replicate program in another district	Size of award	GOSA web site

Quantity and Duration

How many people/items/units changed? How long does the change last after the activity ends?

The **quantity** (column I) refers to the number of units (items, people, etc.) associated with the selected indicator. Exhibit 7 shows the rationales for each indicator's quantity, and the level of evidence for each.

We based the quantity of students intending to achieve specific levels of education on the post-program ALSQ results for the grant-funded cohort.[5] The quantity is presented as an upper bound (assuming those who intended to achieve that level will do so) and a lower bound (applying research-based data on acceptance and graduation rates) for any education levels *whose impact is not later reduced to zero by estimates of deadweight.* The upper and lower bounds enable us to easily perform sensitivity analyses on the SROI ratio by changing this parameter.

Exhibit 7. Quantity of Indicators, Rationale, and Level of Evidence—Mechatronics

Indicator		Quantity	Rationale	Level of Evidence
Level of dual enrollment funding increase		1	One total increase amount	High
Number of students intending to achieve secondary/ postsecondary education	High school	3	Number reported on post-program ALSQ	Medium
	2-year college	4	Number reported on post-program ALSQ	Medium
	4-year college	18	Number reported on post-program ALSQ	Medium
	Graduate school	8-22	High estimate is number who intended to achieve this level, reported on the post-survey. Low estimate is number of students who intended to achieve this level (22) * .52, the STEM graduation rate[6] for students who enter a 4-year college * .66, the graduation rate for STEM Master's degrees[7] = 8	Medium

[5] An additional 32 students enrolled in Mechatronics but are not considered grant-funded and do not appear in the evaluation reports.

[6] Chen, X. (2013). *STEM attrition: College students' paths into and out of STEM fields* (NCES 2014-001). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

[7] Council of Graduate Schools. (2013). *Master's completion project.* Retrieved from http://www.cgsnet.org/masters-completion-project

Indicator		Quantity	Rationale	Level of Evidence
	Professional school[8]	3-18	High estimate is number who intended to achieve this level, reported on the post-survey. Low estimate is the number of students who intended to achieve this level (18) * .52, the STEM graduation rate for students who enter a 4-year college * .42, the acceptance rate for medical school[9] *.81, the medical school graduation rate[10] = 3	Medium
Number of Technical College System of Georgia credits earned		924	Number reported by program leaders	High
Number of repairs at school		200	Based on school stakeholders' reports	Medium
Number of repairs at home		26	Estimated from parent and student interviews, assuming that all 104 Mechatronics students have the ability to provide home repairs and computer services, and 25% have done so.	Low
Number of skilled summer jobs		18	Based on school stakeholders' reports	High
Number of students recruited/hired by industry (cost savings)		5	Estimated from industry partner interview and evaluation report; one student has already been hired. As many students indicated they were planning to stay in the area at least initially after high school graduation, they would be available for hiring. This represents half of the interns, although non-intern Mechatronics students could also be hired.	Low
Size of new Innovation Fund award		1	One award made	High

Duration (column J) refers to the length of time the outcomes of the activity last after the activity ends. For each year entered beyond 1, the value of the outcomes is counted again, minus the discount rate (see Appendix B for a sensitivity analysis of the discount rate). Although several outcomes associated with Mechatronics are expected to last more than a year, the duration is sometimes entered as 1, as explained in Exhibit 8. The level of evidence refers to the confidence about the data sources for the duration estimate.

[8] We defined "professional school" from the ALSQ as medical school across the four programs because this was the only professional school that students talked about in interviews.

[9] Association of American Medical Colleges (2014). *Applicants and matriculants data*. Retrieved from https://www.aamc.org/data/facts/applicantmatriculant/

[10] Association of American Medical Colleges. (2007). Medical school graduation and attrition rates. *Analysis in Brief*, 7(2). Retrieved from https://www.aamc.org/download/102346/data/aibvol7no2.pdf

Exhibit 8. Duration of Indicators, Rationale, and Level of Evidence—Mechatronics

Indicator	Duration (years)	Rationale	Level of Evidence
Level of dual enrollment funding increase	1	Refers to increase over life of grant; entered once to avoid overcounting.	High
Number of students intending to achieve secondary/postsecondary education	1	Although the effects of education levels last a lifetime, we entered a duration of 1 year to avoid counting a lifetime-earnings unit more than once.	High
Number of Technical College System of Georgia credits earned	2	Credits are expected to be most applicable in the first 2 post-secondary years.	Medium
Number of repairs at school	2	Most people will replace the phone or device after 2 years.	Medium
Number of repairs at home	2	Devices that were repaired or updated may need similar services in 2 years.	Medium
Number of skilled summer jobs	1	The effect of the summer job is expected to last a year, until the next summer job opportunity.	Medium
Number of students recruited/hired by industry (cost savings)	3	Interns who stay in the area post-program are likely to remain attractive candidates for at least 3 years as their skills will remain current.	Low
Size of new Innovation Fund award	1	The grant lasts for 3 years, but we entered 1 year here with the total amount to avoid overcounting.	High

Financial Proxies and Value

What proxy is used to value the outcomes? What is its value in currency?

Financial proxies for the outcomes associated with a program express the relative importance of the outcomes to the stakeholders in terms of currency. We based **financial proxies for Mechatronics** (column L) and their associated **values** (column M) on existing program-specific financial data when possible, such as the size of the Innovation Fund scale-up award and the cost of a credit hour at MTC. We based other proxies and values on research into prices, such as the typical cost of repairing a smartphone screen. Recruiting and training cost savings to Mechatronics industry partners, and the value to students of getting skilled summer jobs, were based on estimates from the Bureau of Labor Statistics because local industry data were not available.

The **highest-value outcomes from Mechatronics** were associated with the program's estimated influence on students' postsecondary choices and the associated lifetime earnings. We could have either estimated the earnings based on planned career choices or on educational attainment, which includes income from career. We chose to focus on lifetime earnings

connected to educational attainment because we had pre- and post-data on students' educational intentions from the ALSQ that were consistent across all four programs, and reliable data from research literature on income associated with educational attainment. When estimating the value of changes to educational aspirations, we assumed that each student who increased his or her aspiration did so by only one level; that is, to two-year college graduate from high school graduate, or to professional school graduate from four-year college graduate.

Exhibit 9 presents the financial proxies and values from the monetized outcomes, along with rationales and levels of evidence.

Exhibit 9. Financial Proxies and Values, Rationales, and Levels of Evidence—Mechatronics

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
Level of dual enrollment funding increase		Dual enrollment funding generated by 107 Mechatronics students	$120,161 (total)	Lower end of figure quoted by Moultrie Technical College program leaders	High
Number of students intending to achieve secondary/ postsecondary education	High school	Change in lifetime earnings for high school graduates	$331,000 (total)	Difference in median lifetime earnings between people with high school diploma vs. less than high school.[11]	Medium
	2-year college	Change in lifetime earnings for 2-year college graduates	$413,600 (total)	Difference between the lifetime earnings of students with Associate's degrees vs. high school graduates, minus the average student debt amount for 2-year degree.[12]	Medium
	4-year college	Change in lifetime earnings for 4-year college graduates	$497,800 (total)	Difference between the lifetime earnings of students with Bachelor's vs. Associate's degrees, minus the average student debt amount for a Bachelor's degree.	Medium
	Graduate school	Change in lifetime earnings of graduate school graduates	$371,800 (total)	Difference between the lifetime earnings of students with Bachelor's vs. Master's degrees, minus the average student debt amount for Master's degree.[13]	Medium

[11] All lifetime earnings for high school, 2-year college, 4-year college, graduate school, and professional school are from: Carnevale, A., Rose, S., and Cheah, B. (2011). *The college payoff: Education, occupation, lifetime earnings.* Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from https://www2.ed.gov/policy/highered/reg/hearulemaking/2011/collegepayoff.pdf

[12] Debt from 2- and 4-year degrees from Radwin, D., Wine, J., Siegel, P., and Bryan, M. (2013). *2011–12 National Postsecondary Student Aid Study (NPSAS:12): Student Financial Aid Estimates for 2011–12* (NCES 2013-165). Washington, DC: National Center for Education Statistics.

[13] Debt from Master's degree and professional school from Institute of Education Sciences. (2010). *Student financing of graduate and first-professional education 2007–08* (NCES 2011-172). Washington, DC: National Center for Education Statistics.

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
	Professional school	Change in lifetime earnings of professional school graduates	$1,254,400 (total)	Difference between the lifetime earnings of students with Bachelor's vs. professional degrees, minus the average student debt amount for professional degree.	Medium
Number of Technical College System of Georgia credits earned		Cost of a credit at MTC	$127 (per credit)	The amount that students would be charged to take the course outside of high school[14].	High
Number of repairs at school		Typical cost of smartphone screen repair	$99 (per repair)	Smartphone screen repair was the job most frequently mentioned. Estimate from Apple, Inc. and Tift County local repair service.	Medium
Number of repairs at home		Cost of in-home computer repair or support	$150 (per repair)	Prices for in-home repair from Geek Squad (www.geeksquad.com).	Medium
Number of skilled summer jobs		Earnings for IT support jobs	$4,050 (total)	Working 30 hours a week for 9 weeks at $15/hr (Bureau of Labor Statistics estimate for IT support worker)	Medium
Number of students recruited/hired by industry (cost savings)		Cost to recruit employee	$1,091 (total)	Bureau of Labor Statistics estimate (40 hours at HR Specialist wage)[15].	Medium
		Cost of basic training in advanced manufacturing	$2,164 (total)	Bureau of Labor Statistics estimate (80 hours at Production Supervisor wage).	Medium
Size of new Innovation Fund award		Size of award	$199,940 (total)	Size of award as reported by GOSA.	High

Deadweight

What would have happened anyway, without Mechatronics?

Deadweight estimates (column O) describe the **counterfactual**, what is likely to have happened without the program. Deadweight is expressed as a percentage of the value of each outcome, subtracted from the impact estimate. For some outcomes, we estimate 0 percent deadweight because we did not find evidence that they would have happened without the grant program. For others, we estimate 100 percent deadweight, and thus no impact, if evidence suggests that the outcome would have occurred even if Mechatronics had not been funded.

The most accurate and unbiased estimates of deadweight come from experimental evaluations, in which some participants are assigned to the program of interest and others are assigned to a control condition. Because this is not such a study, the level of evidence for the deadweight

[14] Moultrie Technical College. (2015). *Tuition & fees.* Retrieved from http://www.moultrietech.edu/admissions/tuition.php

[15] United States Department of Labor, Bureau of Labor Statistics. *May 2014 State Occupational Employment and Wage Estimates, Georgia: HR Specialist and Production Supervisor wages.* Retrieved from http://www.bls.gov/oes/current/oes_ga.htm

estimates is necessarily lower for many indicators. Exhibit 10 shows the deadweight estimates, rationales, and levels of evidence for the Mechatronics outcome indicators.

Exhibit 10. Deadweight Estimates, Rationales, and Levels of Evidence—Mechatronics

Indicator		Dead-weight	Rationale	Level of Evidence
Level of dual enrollment funding increase		0%	The funding increase from Mechatronics would not have happened without Mechatronics.	High
Number of students intending to achieve secondary/ postsecondary education	High school	100%	Before the program, no students said they intended to get less than a high school diploma, so it is unlikely that the program made these students more likely to graduate.	Medium
	2-year college	100%	Before the program, 10 students said they were going to get a 2-year degree. We assume that the 4 who still plan to are those who originally had this intention.	Medium
	4-year college	100%	Before the program, 27 students said they would get a 4-year degree. We assume the 18 who still intend to are those who originally did.	Medium
	Graduate school	59%	The number of students intending to get a graduate degree rose from 13 to 22, suggesting 59% deadweight (13/22).	Medium
	Professional school	28%	The number of students intending to get a professional degree rose from 5 to 18, indicating 28% deadweight (5/18).	Medium
Number of Technical College System of Georgia credits earned		25%	Mechatronics attracted students who were already college-bound, but some, estimated at 25% based on interviews, would have taken other classes with TCSG credits if Mechatronics hadn't existed.	Low
Number of repairs at school		0%	Without Mechatronics, the devices may have been fixed, but not by Mechatronics students. Mechatronics made it possible for this activity to provide outcome benefits to the school.	High
Number of repairs at home		30%	Parents may otherwise have brought devices to a repair facility, which costs 30% less than in-home repair.	Medium
Number of skilled summer jobs		48%	Students who now have skilled jobs may otherwise have worked the same hours but at minimum wage, which is 48% of the estimated skilled wage.	Low

Indicator	Dead-weight	Rationale	Level of Evidence
Number of students recruited/hired by industry (cost savings)	0%	Industry partners indicated they would not have hired high school interns without Mechatronics.	High
Size of new Innovation Fund award	0%	Without the initial grant, there would be no scale-up grant.	High

Displacement

What activity was displaced to or from others by the program?

Displacement (column P) refers to **outcomes that shift from one stakeholder group to another**, rather than truly increasing or decreasing. For most of the indicators in the Mechatronics evaluation, we had no evidence of displacement. Therefore, we present displacement estimates for selected indicators in Exhibit 11.

We considered displacement for outcomes related to employment in local industry. We did not have evidence that Mechatronics interns displaced any regular workers in local industry. The internship program has just begun in the 2014-15 school year, and employs only 10 interns for limited numbers of hours per week, funded by the grant. The program is also time-limited in that the interns are graduating in May 2015 and their internships will end. In this context, it is improbable that they take the place of regular workers. Former Mechatronics students may be recruited for jobs in the local industry, in part, on the basis of what they have learned in the Mechatronics program. However, as these students are still members of the local community from which the industry workforce is traditionally drawn, we did not consider their possible employment to be displacement.

Exhibit 11. Displacement Estimates, Rationales, and Levels of Evidence—Mechatronics

Indicator	Displacement	Rationale	Level of Evidence
Level of dual enrollment funding increase	25%	An estimated 25% of Mechatronics students may have completed a different CTAE program, so the outcomes are displaced to Mechatronics students from other possible replacement course options.	Low
Number of repairs at school and home	25%	Up to 25% of device users seek some kind of repair during the life of the device (CNet). Therefore, we estimated that 25% of the repairs by Mechatronics students are displaced from other local repair services.	Low

Attribution

What else contributed to the outcomes associated with Mechatronics?

Attribution (column Q) focuses on estimates of contributions to program-related outcomes made by other people, organizations, or activities. Conceptually, it is related to deadweight, in that it also involves alternative explanations for, or influences on, outcomes. In our study we make the distinction by treating deadweight as the scenarios likely to have happened without Mechatronics (e.g., students would likely still have graduated from high school, but may have had to take lower-wage summer jobs because of a lack of specialized skills), and treating as attribution **other likely contributors to outcomes**, such as family members' and teachers' encouragement of ambitious postsecondary education plans for Mechatronics students.

According to the SROI Guide (p. 59),[16] "It will never be possible to get a completely accurate assessment of attribution. This stage is more about being aware that your activity may not be the only one contributing to the change observed than getting an exact calculation." To identify outcomes for which other attributions should be considered, we asked stakeholders to identify, if possible, other influences on the outcomes that they were describing. We based our estimates on this stakeholder feedback. Exhibit 12 has attribution estimates for indicators for which we had some relevant stakeholder evidence.

Exhibit 12. Attribution Estimate, Rationale, and Level of Evidence—Mechatronics

Indicator	Attribution	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	25%	Mechatronics is a relatively intensive program designed to influence students' postsecondary choices. However, we do not want to over-claim its influence. We include 25% attribution to account for other influences on postsecondary plans that students mentioned, such as other summer STEM camps or family members' career recommendations. (Only affects students who aspire to have Master's or professional degrees, because other levels have 100% deadweight.)	Low

Drop-Off

Does the outcome drop off in future years?

Drop-off (column R) only affects outcomes that extend beyond 1 year, which applies to few indicators in the Mechatronics program analysis (see column J). Drop-off refers to a diminution of the effect of the program on the indicator over time, within the *duration* period. The most

[16] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

accurate estimates of drop-off are calculated retrospectively by tracking indicators over time. In a forecast SROI, this is not possible. Based on stakeholder information, we estimated drop-off for one indicator with a duration of 3 years, as shown in Exhibit 13.

Exhibit 13. Drop-Off Estimate, Rationale, and Level of Evidence—Mechatronics

Indicator	Drop-Off	Rationale	Level of Evidence
Cost savings in employee training	10%	Each year Mechatronics students hired by local industry may require some new training as equipment and software change; we estimated that 10% of their skills would need updating.	Low

Sensitivity Analysis

What is most affected by changes in the assumptions of SROI?

We can change many of the estimates in the SROI impact map for Mechatronics. In accordance with the recommendations in the SROI guide,[17] however, we focused on the **changes that would have the greatest impact** on the overall SROI ratio. For Mechatronics, these outcomes relate to students' plans for educational attainment. These outcomes are also those for which we have a specific basis in the ALSQ data and in the research literature to have low and high estimates. The two changes that have impact after deadweight is factored in are 1) students choosing to complete Master's degrees, as opposed to stopping with Bachelor's degrees and 2) students choosing to complete professional degrees rather than stop with Bachelor's degrees.

Scenario for upper bound of educational outcomes:
We based the high estimate on the assumption that students who reported on the ALSQ that they were going to either graduate school or professional school actually will accomplish this goal and graduate (still accounting for deadweight and attribution). In this scenario, Mechatronics gave them experiences, confidence, and knowledge of postsecondary possibilities, enabling the students to choose their postsecondary programs wisely, and the study habits and work ethic to complete those programs.

Scenario for lower bound of educational outcomes:
We based the low estimate on the assumption that students who reported on the ALSQ that they were going to either graduate school or professional school actually will attempt this goal, and experience typical research-supported rates of acceptance and graduation in these programs (still accounting for deadweight and attribution). In this scenario, Mechatronics gave the students the confidence to choose this educational path (either graduate school or professional school), after which they will experience higher education in the same way other typical students have. Fewer students therefore will graduate from these programs in this scenario as compared to the high-estimate scenario.

[17] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

These two scenarios, and the variations in the quantity (column I) of graduating students associated with the low estimate and high estimate, are the basis of the low and high estimate of the SROI ratio.

SROI Ratios

By summing the benefits of Mechatronics and subtracting deadweight, displacement, attribution, and drop-off, the impact map spreadsheet calculates the SROI **cost:value ratio** (cell Z34).

Lower bound of SROI ratio: $1 : $1.97

Upper bound of SROI ratio: $1 : $8.54

This means that for every dollar invested by Mechatronics stakeholders, the program is likely to return $1.97 to $8.54 in monetized social value. For this program, the estimates of lifetimes earnings associated with increased postsecondary education were the most influential single monetized factor in the ratio. Mechatronics also produced other outcomes that were important to stakeholders, such as higher student academic confidence and positive attention to the local community, that are not reflected in the SROI ratio.

BARROW COUNTY DIRECT TO DISCOVERY PARTNERSHIP

The Barrow County 21st Century STEM Collaborations program **leverages the previously developed Direct to Discovery (D2D) model** by building on and expanding the partnership between the Georgia Institute of Technology (Georgia Tech), the Georgia Board of Regents, and Barrow County Schools in an effort to provide an innovative STEM applied learning program for middle and high school students. This analysis focuses on the high school aspect of the program.

D2D works through close partnerships between **high school teachers** and **Georgia Tech scientists**. In each partnership, a scientist worked closely with two partnering teachers from Barrow County high schools during the summer to prepare for the program. They created a series of 3- to 5-hour-long lesson plans. During the school year, the teachers hosted interactive videoconferencing classes in which students were actively engaged and applied math and science concepts to real-life STEM projects. To enable these sessions, the district equipped the schools with mobile video technology and provided students with tablets to perform their projects.

During the first year of the grant, 2011-2012, two partner teachers at Apalachee High School established a partnership in chemistry and implemented D2D. This partnership continued during the second year and a second partnership was added to D2D. In 2012-2013, two human anatomy and physiology teachers from Apalachee and Winder-Barrow High Schools partnered with a Georgia Tech research scientist. In the final year, the D2D partnerships were expanded to a total of three by including two calculus teachers from Apalachee and Winder-Barrow High Schools and a third Georgia Tech research scientist.

Furthermore, each live session between a scientist and a classroom was recorded and made available together with other digital media materials on an online portal, to **expand the program across the district** and serve all students. Through these sessions, D2D aimed to increase students' problem solving, communication, and self-management skills, their perceptions that science is useful and relevant, and their engagement and interest in persisting in STEM fields.

School district staff said that the grant helped them expand partnerships with institutions of higher education and businesses. They also built their **capacity to continue the program in-house**; for example, they grew the information technology (IT) department and added new positions (including student interns) and set up the Teaching and Learning Department.

Georgia Tech stakeholders said that the program gave them K-12 outreach experience and helped them build partnerships with teachers. Their work gained **greater visibility and exposure**, and thus a **greater pool of potential college and graduate students** to work with. The graduate students gained teaching experience, and some of them decided to become teachers.

Participating high school teachers collaborated with scientists and partner teachers, increasing their knowledge of science and its real-world applications. They also reported increased ability to incorporate project-based learning and research into their teaching, and **increased the mathematical, scientific, and statistical rigor** of their classes. Teachers were also able to

incorporate more technology in the classroom. Their work with D2D also brought them more **visibility in the school community** and with parents.

Students who engaged with the program (some did not) reported an increase in their **problem-solving and higher-order thinking skills**, along with their academic motivation. They had the opportunity to spend time with college students and got more perspective on pursuing higher education and STEM careers.

Parents took pride in the quality of D2D and were excited about children's **interest in STEM and postsecondary education**. Some reported that they began thinking more specifically about college for their children and how to support younger siblings earlier.

Direct to Discovery Impact Map Creation Overview

To begin the **process of creating the impact map** for D2D (see attachment SROI IMPACT MAP Barrow Co final.xlsx), we **reviewed program documents** such as the grant proposal and evaluation reports and started recording information about D2D on the map. Information about stakeholders (columns A and B) initially came from lists of participants and partners. We derived inputs (columns C and D) from the amount of funding awarded as described in the grant proposal. We drafted outputs/activities based on the scope of work in the grant proposal and from evaluation reports, and based indicators/sources (columns G and H) on the evaluation plan in the grant proposal.

We then **reviewed notes from each of the stakeholder interviews** as they were completed along with additional documents such as the Innovation Fund report to the U.S. Department of Education and Innovation Fund financial reports, along with documents and other information received directly from stakeholders. This iterative review was not to do detailed content analysis but to confirm, disconfirm, add to, or consolidate the information on the impact map so that it reflected the most complete possible information on D2D. In cases in which stakeholders mentioned in interviews outcomes that were not part of the original proposal or evaluation plan, we recorded them on the impact map and then sought to corroborate them by communicating with other stakeholders and asking for documentation. For example, when several stakeholders mentioned in interviews that D2D generated new employment positions in the IT department, we contacted the program director to get estimates of the extent of this activity.

The following sections give additional detail on creating the impact map, and provide a walkthrough of its contents and the rationales behind them.

Stakeholders (Impact Map Stage 1)

Who was involved?

Interviews of D2D stakeholders were conducted in the following sequence.

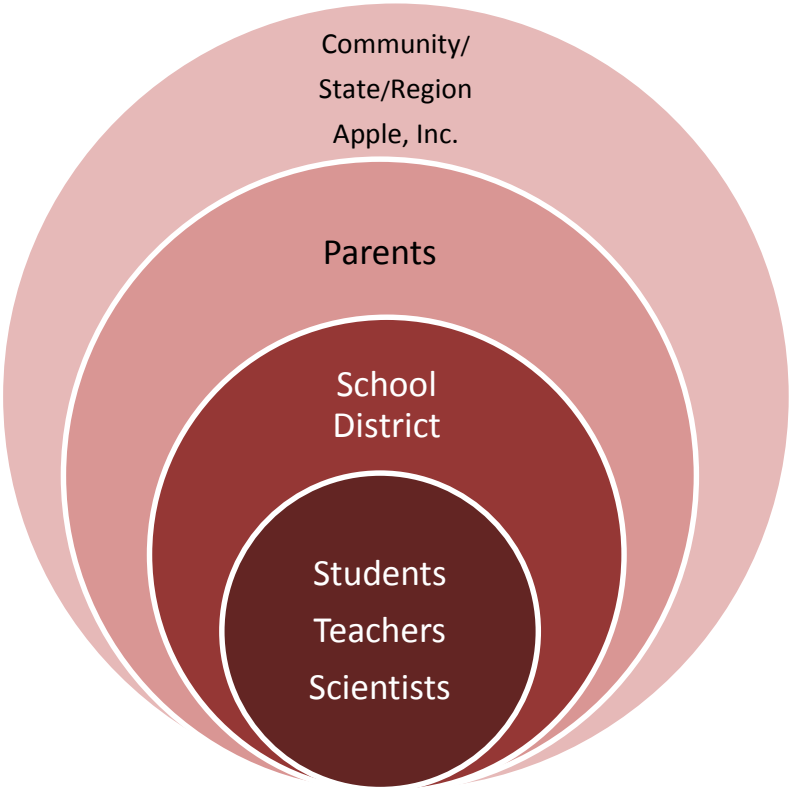
1. We began by interviewing the **two program leaders, the grant director and the STEAM integration specialist**, who were key members of the school district stakeholder category, as their focus was to implement the program and administer the grant. Although the program external evaluator was not considered a stakeholder of the D2D program, we interviewed him in order because of his knowledge of the program activities, as well as to learn about the data collection and analyses he performed.
2. Next we interviewed **additional district staff, the instructional technology specialist and the media producer**, who were instrumental in implementing the program as members of the school district stakeholder category.
3. Then we interviewed **three research scientists from Georgia Tech** who have worked with the D2D high school students either directly or through their graduate students. They are part of the scientist/researcher category of stakeholders.
4. Next we interviewed a **high school teacher** who participated in the partnership activities. We learned that teachers outside of the partnership did not appear to be involved in program activities, so focused on those who did participate at the high school level.
5. Finally, we interviewed **representatives of the student and parent groups**. We talked to one high school student who participated in the program and one parent of a middle school D2D student with an older sibling enrolled in high school.

In involving stakeholders, we intended to include and represent as fully as possible those who are most central to the mission of D2D—those who are most directly involved or most likely to be affected (see Exhibit 14; those in the inner circle are the central stakeholders, while others, further from the center, are less intensely linked to the program). These stakeholders include the **student** stakeholder category, the **teacher** stakeholder category, and the **scientist** stakeholder category. The first two stakeholders are also the primary focus of the external evaluation of D2D while the scientists were not considered in the external evaluation. In the SROI, we included scientists as central stakeholders because of their key involvement in the program. Because of their centrality, we interviewed multiple representatives of each of these groups.

The school district was very important, as many of the program activities taking place over the three years focused on the school and district level. Furthermore, some of the school district staff themselves directly benefited from the program in areas such as employment development and capacity building. However, we placed them just outside the innermost circle, as the main purpose of this category of D2D stakeholders was to be program implementers and providers of support to the stakeholders at the center.

Parents, although not direct participants**,** were stakeholders in the program who experienced changes via their children. Parents have a stake in the postsecondary plans of their children—particularly in their children having specific and ambitious yet attainable goals. However, parents had little involvement in the day-to-day operation of D2D, and as students graduate and enter college and careers, parents may become less involved in their children's plans. We also acknowledge that this stakeholder group may not be fully represented in the analysis because of the limited number of respondents.

Exhibit 14. Representation of Stakeholder Categories in the Analysis—D2D



We acknowledge that the local **community**, the state of **Georgia**, and the **southeast region** could be considered stakeholders of the D2D program. The program's success and the publicity attracted have portrayed the community in a positive light, and could, for example, draw new residents to the area. Representatives from state and regional schools and businesses have all visited the program to gain insight into replicating it. Of the stakeholder groups included here, however, they were the least involved in the daily operations and eventual outcomes of the D2D program. We also included **Apple** at this level as Apple was initially planned to be a fully invested partner with an active role in supporting the use of technology in D2D. However, in practice, Apple's role has been limited to providing a discount on the purchased iPads. Because these stakeholders were not closely connected to D2D activities, interviewing them was beyond the scope of this analysis, but in accordance with the SROI method, we acknowledge their possible role.

Inputs (Impact Map Stage 2)

What did stakeholders invest? What was its value?

We started Stage 2 of the SROI analysis by identifying the **program inputs**, which are the investments, financial and otherwise, that stakeholders make into the program. In the case of D2D, the primary financial input was the Innovation Grant funding from the state, which paid for (among other things) personnel, facilities, equipment, and consumable materials. The total financial value of all the inputs used in the D2D program is the grant value of $1,772,325 funded by the state. However, as the emphasis of this SROI analysis is on the high school component of the program, we computed the high school share of this value. Rather than isolating the share of each category of inputs and attempting to ascertain their cost values, we used the high school share of students to determine the corresponding high school share of costs. Estimating the high school share of costs in this way is justifiable given that many of the program activities were performed centrally and thus we assumed were distributed across students equally.

Exhibit 15 presents the calculation that guided us in determining the share of the high school component in the overall cost. To determine the share of high school students among all participating students, we divided the total number of high school participants by the total number of D2D participants. In Year 2, there were 177 high school students among a total of 476 participants, representing 37 percent. In Year 3, there were 137 high school students out of 532 participants, representing 26 percent. We then added the totals over the 2 years, which resulted in 314 high school students out of 1,008, representing 31 percent.

Therefore, we computed the cost of the high school component of the program as a 31 percent share of the overall value, or $552,093. We entered this value in the column C of the impact map.

Exhibit 15. Calculation for high school share of total cost—D2D

Calculation	Year 2: 2012-13	Year 3: 2013-14	Total: 2012-14
Total number of D2D participants	476	532	1,008
Total number of high school participants	177	137	314
High school proportion of students	**37%**	**26%**	**31%**

Source: Communication with program leaders from Barrow County, author's calculations

Outputs (Impact Map Stage 2)

What were the activities?

The outputs in column E summarize the **activities funded by the grant**. Stakeholders confirmed that the planned grant-funded activities were enacted, and there were few unexpected activities. The partnerships between Georgia Tech scientists and the Barrow County high school teachers were established, the lesson plans for the live video classroom session were prepared, and the selected students participated in them as intended. The school district formed and grew new partnerships with researchers and businesses outside the original grant during the last year of

the grant and continued to do so afterwards. The primary deviation from planned activities was the creation of an online portal for scientists, teachers, and students to share their project materials. The portal, though functional, was not adopted because stakeholders were already using Google Apps.

Outcomes (Impact Map Stage 2)

What changed?

In column F, we list the outcomes to describe what changed as a result of the D2D program activities. We have labeled them **expected** or **unexpected** and **monetized** and **not monetized**. As D2D is the subject of a high-quality, program-level evaluation, many of the expected outcomes we heard about in the interviews have already been well documented by the evaluator in the twice-yearly reports. Therefore, we primarily drew upon sources such as evaluation reports to describe and estimate outcomes. Many of the expected outcomes in column F are **affective and not monetized** in this analysis.

Part of the value proposition of SROI is that stakeholder engagement surfaces important outcomes not originally expected and not included in pre-planned evaluations. When this happened, we sought additional data to substantiate the **unexpected outcomes**, and added them to the impact map if we could confirm them. Some of these unexpected outcomes were monetized and are included in the SROI analysis. Exhibit 16 summarizes outcomes included in the impact map, whether they were expected or unexpected, and whether they were monetized and included in the SROI ratio.

Exhibit 16. D2D Outcomes and Presence in SROI Ratios

Expected Outcomes	In SROI ratio?
Graduate students gained teaching experience and changed their career aspirations	✓
Students have higher postsecondary educational aspirations	✓
District created teacher-scientist partnerships	
Scientists gained K-12 outreach experience to apply for more funding	
Scientists grew their partnerships with teachers	
Teachers collaborated with scientists and partner teachers from other high school	
Teachers increased their content knowledge and gained practical examples	
Teachers increased their pedagogical skills, incorporated project-based and research	
Teachers increased the mathematical, scientific, and statistical rigor of their classes	
Teachers incorporated technology in the classroom	
Students learned to create digital media	
Students saw useful applications of calculus and science in real world outside school	
Students enhanced their problem-solving and higher-order thinking skills	
Students increased their engagement, excitement, and ownership of learning	
Students showed positive gains on tests	
Students became more interested in pursuing postsecondary education	

Unexpected Outcomes	In SROI ratio?
District created a new Teaching and Learning department and a new building	✓
District started a new student IT internship program	✓
District created new permanent employment positions	✓
District created new IT job positions	✓
District expanded new partnerships with researchers and businesses	
District built their capacity to continue the program with in house resources	
IT department expanded	
District was included in new National Science Foundation grant applications	
District set up new connections with researchers for science fair	
Scientists gained greater visibility and exposure of their research work	
Scientists gained greater pool of potential college and graduate students to work with	
Scientists hosted career day	
Teachers experienced discontinuity in the partnerships as graduate students changed	
Teachers gained more visibility among students and parents	
Students faced difficulty doing both regular classroom work and D2D projects	
Some less interested students slowly disengaged from the program over time	
Students engaged with college students and got perspectives on pursuing college	
Parents were excited about children's interest in STEM and in college education	
Parents began thinking about college and how to support younger siblings earlier	
Parents grew more interested in advocating for other children and parents	
Community felt pride in quality of program	

Indicators and Data Sources (Impact Map Stage 3)

How to measure the changes? Where did the information come from?

Starting in Stage 3, we focused primarily on **outcomes included in the SROI ratio**. The indicators of the outcomes, in column G, express how the changes were measured.

Without the access to program proposals and documents, results from the ALSQ, reports to the U.S. Department of Education, and external evaluation reports provided by GOSA, this analysis would not have been possible without a much larger budget and timeframe. We were able to rely on several **extant data sources** that made the study more efficient. Column H lists the data sources that we relied on for information about the changes experienced by each stakeholder group. The proposal helped us understand intended inputs, activities, and outcomes, while other documents such as survey results and evaluation reports have provided information on what happened in the program. These other documents were supplemented by **stakeholder interviews** and additional program documentation supplied by stakeholders, such as the size of the IT department budget. Exhibit 17 depicts the monetized outcomes linked to their indicators and data sources (column H).

Exhibit 17. Monetized Outcomes, Indicators, and Sources—D2D

Monetized Outcomes	Indicators	Data Sources
Students have higher postsecondary educational aspirations	Number of students intending to achieve postsecondary education	ALSQ
Graduate students gained teaching experience and changed their career aspirations	Number of graduate students intending to become teachers	Interviews with Georgia Tech scientists
District got a new Teaching and Learning department and a new building	Size of new department budget	Interviews, communications from program leaders, evaluation reports
District started a new student IT internship program	Number of student interns at the IT department	Interviews
District created new permanent employment positions	Number of new positions created within the school district	Interviews, communications from program leaders
District created new IT job positions	Number of new IT positions created within the school district	Interviews, communications from program leaders

Quantity and Duration

How many people/items/units changed? How long does the change last after the activity ends?

The **quantity** (column I) refers to the number of units (items, people, etc.) associated with the selected indicator. Exhibit 18 shows the rationales for each indicator's quantity, and the level of evidence for each one.

Regarding students' intentions to achieve specific levels of education, we based the quantity on the post-program ALSQ results. It is presented as a upper bound (assuming those who intended to achieve that level will do so) and a lower bound (applying research-based data on acceptance and graduation rates) for any education levels *whose impact is not later reduced to zero by estimates of deadweight*. The upper and lower bounds enable us to perform sensitivity analyses on the SROI ratio by changing this parameter.

Exhibit 18. Quantities, Rationale, and Level of Evidence—D2D

Indicator		Quantity	Rationale	Level of Evidence
	High school	12	Number reported on post-program ALSQ	Medium

Indicator		Quantity	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	2-year college	5-16	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is number who intended to achieve this level (16) * .31, the NCES graduation rate for students who enter a 2-year college[18] = 5	Medium
	4-year college	49	Number reported on post-program ALSQ	Medium
	Graduate school	22-57	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is number who intended to achieve this level (57) * .52, the STEM graduation rate for students who enter a 4-year college * .66, the graduation rate for STEM Master's degrees[19] = 22	Medium
	Professional school	7-38	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is the number who intended to achieve this level (38) * .52, the STEM graduation rate for students who enter a 4-year college * .42, the acceptance rate for med school[20] *.81, the med school graduation rate[21] = 7	Medium
Number of graduate students intending to become teachers		2	Number reported by Georgia Tech scientists	Medium
Size of new department budget		1	Based on program leaders' reports	High
Number of student interns at the IT department		2	Based on program leaders' and school district staff reports. The total number of interns is 4 hired over 2 years	High
Number of new positions created within the school district		2	Based on program leaders' and school district staff reports	High
Number of new IT positions created within the school district		3	Based on program leaders' and school district staff reports	High

[18] Chen, X. (2013). STEM attrition: *College students' paths into and out of STEM fields* (NCES 2014-001). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.
[19] Council of Graduate Schools. (2013). *Master's completion project.* Retrieved from http://www.cgsnet.org/masters-completion-project
[20] Association of American Medical Colleges (2014). *Applicants and matriculants data.* Retrieved from https://www.aamc.org/data/facts/applicantmatriculant/
[21] Association of American Medical Colleges. (2007). Medical School Graduation and Attrition Rates. *Analysis in Brief*, 7(2). https://www.aamc.org/download/102346/data/aibvol7no2.pdf

Duration (column J) refers to the length of time the outcomes of the activity last after the activity ends. For each year entered beyond 1, the value of the outcomes is counted again, minus the discount rate. Although several outcomes associated with D2D are expected to last more than a year, the duration is sometimes entered as 1, as explained in Exhibit 19. The level of evidence refers to the confidence about the data sources for the duration estimate.

Exhibit 19. Durations of Indicators, Rationale, and Level of Evidence—D2D

Indicator	Duration (years)	Rationale	Level of Evidence
Number of students intending to achieve secondary/postsecondary education	1	Although the effects of education levels last a lifetime, we entered a duration of 1 year to avoid counting a lifetime-earnings unit more than once.	High
Number of graduate students intending to become teachers	1	Although the effects of education levels last a lifetime, we entered a duration of 1 year to avoid counting a lifetime-earnings unit more than once.	High
Size of new department budget	1	One budget total	High
Number of student interns at the IT department	2	Four students were hired, 2 in the first year and 2 in the second year of the internship program.	High
Number of new positions created within the school district	2	After the 3 years specified in the grant, the positions were extended for 2 subsequent years.	High
Number of new IT positions created within the school district	3	The IT positions were created during the life to the grant and are maintained for a total of 3 years.	High

Financial Proxies and Value

What proxy is used to value the outcomes? What is its value in currency?

Financial proxies for the outcomes associated with a program express the relative importance of the outcomes to the stakeholders in terms of currency. We based **financial proxies for D2D** (column L) and their associated **values** (column M) on existing program-specific financial data when possible, such as the size of the new department budget and the annual salaries of the newly created job positions at Barrow County. We obtained the budget amount and the annual salaries from communication with program leaders. We based other proxies and values on research into wages, such as the Georgia minimum wage and estimates from the Bureau of Labor Statistics, to estimate the value of the IT internship gains.

The **highest-value outcomes from D2D** were associated with the program's estimated influence on students' postsecondary choices and the associated lifetime earnings. We could have estimated these outcomes based either on planned career choices or on educational attainment,

which includes income from career. We chose to focus on lifetime earnings connected to educational attainment because we had pre- and post-data on students' educational intentions from the ALSQ that were consistent across all four programs, and reliable data from research literature on income associated with educational attainment.

To remain consistent, we applied the same method to estimate the value of the change in lifetime earnings for the graduate students who chose to become teachers instead of pursuing the career path of scientists.

Exhibit 20 presents the financial proxies and values from the monetized outcomes, along with rationales and levels of evidence.

Exhibit 20. Financial Proxies and Values, Rationales, and Levels of Evidence—D2D

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	High school	Change in lifetime earnings for high school graduates	$331,000 (total)	Difference in median lifetime earnings between people with high school diploma vs. less than high school[22]	Medium
	2-year college	Change in lifetime earnings for 2-year college graduates	$413,600 (total)	Difference between the lifetime earnings of students with 2-year degrees vs. high school graduates, minus the average student debt amount for a 2-year degree[23]	Medium
	4-year college	Change in lifetime earnings for 4-year college graduates	$497,800 (total)	Difference between the lifetime earnings of students with 4-year vs. 2-year degrees, minus the average student debt amount for a 4-year degree	Medium
	Graduate school	Change in lifetime earnings of graduate school graduates	$371,800 (total)	Difference between the lifetime earnings of students with Bachelor's vs. Master's degrees, minus the average student debt amount for Master's degree[24]	Medium

[22] All lifetime earnings for high school, 2-year college, 4-year college, graduate school, and professional school are from: Carnevale, A., Rose, S., and Cheah, B. (2011). *The college payoff: Education, occupation, lifetime earnings.* Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from https://www2.ed.gov/policy/highered/reg/hearulemaking/2011/collegepayoff.pdf

[23] Debt from 2- and 4-year degrees from Radwin, D., Wine, J., Siegel, P., and Bryan, M. (2013). *2011–12 National Postsecondary Student Aid Study (NPSAS:12): Student Financial Aid Estimates for 2011–12* (NCES 2013-165). Washington, DC: National Center for Education Statistics.

[24] Debt from Master's degree and professional school from Institute of Education Sciences. (2010). *Student financing of graduate and first-professional education 2007–08* (NCES 2011-172). Washington, DC: National Center for Education Statistics.

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
	Professional school	Change in lifetime earnings of professional school graduates	$1,254,400 (total)	Difference between the lifetime earnings of students with Bachelor's vs. professional degrees, minus the average student debt amount for professional degree	Medium
Number of graduate students intending to become teachers		Change in lifetime earnings of teachers	-$1,283,000 (total)	Difference between the lifetime earnings of scientists vs. teachers[25]	Medium
Size of new department budget		Size of budget	$600,000 (total)	Size of budget as reported by program leaders	High
Number of student interns at the IT department		Average earned wages in IT	$4,640 (per student)	Working 20 hours a week for 8 months during the school year at $7.25/hr	Medium
Number of new positions created within the school district		Annual salaries from district operational budget	$85,150 (per position)	Annual salaries including fringe benefits as reported by program leaders	High
Number of new IT positions created within the school district		Annual salaries from district operational budget	$58,950 (per position)	Annual salaries including fringe benefits as reported by program leaders	High

Deadweight

What would have happened anyway, without D2D?

Deadweight estimates (column O) describe the **counterfactual**, what is likely to have happened without the program. Deadweight is expressed as a percentage of the value of each outcome, subtracted from the impact estimate. For some outcomes, we estimate 0 percent deadweight because we did not find evidence that the outcomes would have happened without the grant program. For others, we estimate 100 percent deadweight, and thus no impact, if evidence suggests that the outcome would have been achieved even if D2D had not been funded.

The most accurate and unbiased estimates of deadweight come from experimental evaluations, in which some participants are assigned to the program of interest and others are assigned to a

[25] The value is computed as the difference between the lifetime earnings of secondary school teachers with Master's degrees ($2,217,000) and the lifetime earnings of scientists with a similar level of education ($3,500,000). Based on Carnevale et al. (2011), we averaged the lifetime earnings of the following types of scientists: aerospace, biomedical, agricultural, chemical, computer hardware, environmental, marine, materials, petroleum, mining, and geological scientists ($4.0m), civil engineers ($3.7m), electrical and electronics engineers ($4.1m), industrial engineers ($3.4m), mechanical engineers ($3.6m), miscellaneous engineers ($3.8m), agricultural and food scientists, biological scientists, conservation scientists and foresters, environmental scientists and geoscientists ($2.8m), medical scientists ($3.1m), astronomers and physicists, atmospheric and space scientists, physical scientists ($3.4m), and chemists and materials scientists ($3.4m). While this number reflects an expected financial loss, there are benefits to society from teachers entering the profession with an engineering background, which are not monetized here.

control condition. Because this is not such a study, the level of evidence for the deadweight estimates is necessarily lower for many indicators. Exhibit 21 shows the deadweight estimates, rationales, and levels of evidence for the D2D outcome indicators.

Exhibit 21. Deadweight Estimates, Rationales, and Levels of Evidence—D2D

Indicator		Dead-weight	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	High school	100%	Before the program, no students said they intended to get less than a high school diploma, so it is unlikely that the program made these students more likely to graduate.	Medium
	2-year college	88%	The number of students intending to get a 2-year degree rose from 14 to 16, suggesting 88% deadweight (14/16).	Medium
	4-year college	100%	Before the program, 67 students said they would get a 4-year degree. We assume the 49 who still intend to are those who originally did.	Medium
	Graduate school	72%	The number of students intending to get a graduate degree rose from 41 to 57, suggesting 72% deadweight (41/57).	Medium
	Professional sch.	82%	The number of students intending to get a professional degree rose from 31 to 38, indicating 82% deadweight (31/38).	Medium
Number of graduate students intending to become teachers		0%	Because of D2D, 2 Georgia Tech graduate students who instructed the high school students changed their career aspirations in favor of becoming teachers rather than pursuing career as scientists	High
Size of new department budget		0%	Without the initial grant, there wouldn't be a new Teaching and Learning department, as many of the staff members were hired for D2D specifically.	High
Number of student interns at the IT department		0%	The IT internship was a new initiative in Barrow that resulted from D2D and the expanded IT department.	High
Number of new positions created within the school district		0%	Without the initial grant, these positions would have not been created.	High
Number of new IT positions created within the school district		0%	Without the initial grant, these positions would have not been created.	High

Displacement

What activity was displaced to or from others by the program?

Displacement (column P) refers to **outcomes that shift from one stakeholder group to another**, rather than truly increasing or decreasing. For the indicators in the D2D evaluation, we had no evidence of displacement. Therefore, we used 0 percent displacement rate for all indicators specified above.

We considered displacement for outcomes related to employment in local industry. We did not have evidence that D2D interns displaced any regular workers in local industry. The internship program began in the 2013-14 school year, and employs only two interns per school year for a limited numbers of hours per week. The internship is also time-limited in that the some interns are graduating from high schools and their internships end. In this context, it is improbable that they took the place of regular workers. Former D2D students may be recruited for jobs in the local industry, in part, on the basis of what they have learned in the D2D program. However, as these students are still members of the local community from which the industry workforce is traditionally drawn, we did not consider their possible employment to be displacement.

Attribution

What else contributed to the outcomes associated with D2D?

Attribution (column Q) focuses on estimates of contributions to program-related outcomes made by other people, organizations, or activities. Conceptually, attribution relates to deadweight, in that it also involves alternative explanations for, or influences on, outcomes. In our study, we make the distinction by treating deadweight as the scenarios likely to have happened without D2D (e.g., students would likely still have graduated from high school, but may have had to take lower-wage summer jobs because of a lack of specialized skills), and attribution as **other likely concurrent contributors to outcomes**, such as family members' and teachers' encouragement of ambitious postsecondary education plans for D2D students.

To identify outcomes for which other attributions should be considered, we asked stakeholders to identify, if possible, other influences on the outcomes that they were describing. We based our estimates on this stakeholder feedback. Exhibit 22 has attribution estimates for indicators for which we had some relevant stakeholder evidence.

Exhibit 22. Attribution Estimates, Rationales, and Levels of Evidence—D2D

Indicator	Attribution	Rationale	Level of Evidence
Number of students intending to achieve secondary/postsecondary education	75%	D2D is not a very intensive program as it was designed to engage students in about five 1-hour sessions during the school year. Furthermore, we received evidence from program leaders that D2D was not as influential for high schools students as it was for middle school students. In an effort not to over-claim its influence, we include 75% attribution to account for other influences on postsecondary plans that students mentioned, such as prior education and career plans or family members' career recommendations. (Only affects students who aspire to have 2-year college, Master's or professional degrees, because other levels have 100% deadweight.)	Low
Number of graduate students intending to become teachers	25%	Career decisions are influenced by several factors. To be conservative, we estimate 25% attribution to account for other possible influences during this time.	Low
Number of new IT positions created within the school district	50%	We assume that district may have grown the IT department even in the absence of the grant, given that Barrow County previously invested in the super-high speed Internet. Therefore, we attribute 50% to this outcome.	Low

Drop-Off

Does the outcome drop off in future years?

Drop-off (column R) only affects outcomes that extend beyond 1 year, which applies to few indicators in the D2D program analysis (see column J). Drop-off refers to a diminution of the effect of the program on the indicator over time, within the *duration* period. The most accurate estimates of drop-off are calculated retrospectively by tracking indicators over time. In a forecast SROI, this is not possible. Based on stakeholder information, we estimated a 0 percent drop-off rate for the D2D indicators.

Sensitivity Analysis

What is most affected by changes in the assumptions of SROI?

We can change many of the estimates in the SROI impact map for D2D. In accordance with the recommendations in the SROI Guide,[26] however, we focused on the **changes that would have the greatest impact** on the overall SROI ratio. For D2D, these changes are the outcomes related to students' plans for educational attainment. These changes are also the outcomes for which we have a specific basis in the ALSQ data and the research literature to develop low and high estimates. The three changes that have impact after deadweight is factored in are 1) students choosing to complete 2-year college, as opposed to stopping with high school diploma, 2) students choosing to complete Master's degrees, as opposed to stopping with Bachelor's degrees and 3) students choosing to complete professional degrees rather than stop with Bachelor's degrees.

Scenario for upper bound of educational outcomes:
We based the high estimate on the assumption that students reporting on the ALSQ that they were going to either 2-year college, graduate school, or professional school actually will accomplish this goal and graduate (still accounting for deadweight and attribution). In this scenario, D2D gave them experiences, confidence, and knowledge of postsecondary possibilities, enabling them to choose their postsecondary programs wisely, and the study habits and work ethic to complete those programs.

Scenario for lower bound of educational outcomes:
We based the low estimate on the assumption that students reporting on the ALSQ that they were going to either 2-year college, graduate school, or professional school actually will attempt this goal, and experience typical research-supported rates of acceptance and graduation in these programs (still accounting for deadweight and attribution). In this scenario, D2D gave them the confidence to choose this educational path (either 2-year college, graduate school, or professional school), after which they will experience higher education in the same way as other typical students. Fewer students therefore will graduate from these programs in this scenario as compared to the high-estimate scenario.

These two scenarios, and the variations in the quantity (column I) of graduating students associated with the low estimate and high estimate, are the basis of the low and high estimate of the SROI ratio.

SROI Ratios

By summing the benefits of D2D and subtracting deadweight, displacement, attribution, and drop-off, the impact map spreadsheet calculates the SROI **cost:value ratio** (cell Z34).

[26] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

Lower bound of SROI ratio: $1 : $0.56

Upper bound of SROI ratio: $1 : $5.51

This means that for every dollar invested by D2D stakeholders, the program is likely to return $0.56 to $5.51 in monetized social value. For this program, the estimates of lifetime earnings associated with increased postsecondary education were the most influential monetized factor in the ratios. D2D also produced other outcomes that were important to stakeholders, such as expanded partnerships with higher education institutions and local businesses, and increased in-district capacity to continue the program. These non-monetized outcomes are not reflected in the SROI ratio.

CARROLL COUNTY STEM FOR LIFE

STEM for Life brings together the Carroll County School System (CCSS) and the Southwire Company to **help students stay in school, gain work and life skills, and earn a paycheck**. Founded in Carroll County in 1950, Southwire is a leading wire and cable manufacturer. One of Southwire's community goals is to "participate with academic institutions to promote sustainability initiatives within communities in which [it operates]."

In 2007, Southwire and Carroll County Schools created 12 for Life, a program to **increase the local graduation and retention rates** while employing students as part-time Southwire employees at a student-only facility. STEM for Life expands on the original 12 for Life program by adding a STEM academic component through classroom instruction, increasing opportunities to apply STEM knowledge and skills in a real-world setting, and targeting the program to students traditionally not represented in STEM. In addition, the Innovation Fund monies allow more students to participate in the program.

STEM for Life provides at least 20 hours of work per week for students at Southwire (starting at $9 per hour with the opportunities for raises and overtime), while also establishing onsite STEM classes, credit-recovery options, tutoring, mentoring, summer school, and enrichment activities. Students can choose to attend class onsite at the Southwire facility, and can also choose between three work-shift options. The program is designed for those CCSS students most **at-risk of dropping out of school** and who have been selected by their high schools based on a rubric ranking student applicants on need. Students considered the most at-risk based on academic, attendance, and financial needs are selected to participate. The goals of the program are for students to graduate from high school with the necessary skills for career and college success and be prepared for careers and postsecondary study.

Teachers, Southwire employees, and program leaders noted that the most striking effect of STEM for Life is the **confidence** instilled in the students. In the interviews, they said that most of the students entered the program with academic deficits, but soon caught up because of the small classes, mentoring, and individual attention they received in the program. Losing that fear of math, and being able to apply their new-found academic skills in the workplace, gave the students confidence in their current work and in their potential future abilities. Students that we interviewed said that before STEM for Life, they did not have aspirations beyond high school, but by participating in the program, realized that there were greater college and career opportunities available to them. Students also commented on the **non-academic skills** gained, particularly the responsibility/strong work ethic required to remain in the program. STEM for Life has a strict attendance policy, as well as other workplace rules around appropriate conduct, which students said made them think twice about skipping school, fighting, or other bad behavior. Other non-academic skills that students commented on were leadership skills (veteran students have the opportunity to lead teams and mentor peers) and communication skills (students practice mock interviews, and have regular interaction with adult mentors). Students also appreciated the **earned income**, particularly in a job that paid higher than the minimum wage. Many students in

STEM for Life are independent, or have children of their own to support, so having a steady source of income was something that many participants appreciated.

While Southwire originally started 12 for Life with Carroll County, they wanted to **give back to the community**. However, representatives from Southwire said that they would not have sought to expand the program under the Innovation Fund if it did not make "business sense." Southwire reported that, from the beginning, student workers proved profitable for the company. With the STEM for Life expansion, however, they reported higher than expected profit. In addition, Southwire representatives said that while current employees were initially nervous about hiring students (as they could potentially take jobs from higher-paid adults), no adult employees were displaced by students. In fact, adult employees were able to advance to more satisfying, less repetitive positions, as the students began doing to most basic, entry-level work. Southwire also benefited by having a **larger current and future pool of skilled applicants** – every year they hire some students immediately after they graduate, and expect to hire students in higher positions after they complete a 2- or 4-year degree.

Instructors said the **small class sizes** and **personalized attention** they could give to the students contributed to the success of the program. Instructors really appreciated the **flexible work environment** and liked getting to know the students on a personal level (in addition to teaching "traditional" classes, they have tutoring sessions where they work one-on-one with students). They also reported that this helped Carroll County schools, as they had **smaller class sizes** as a result of kids transferring to the Southwire student facility. **Removing at-risk students** also helps the schools, as these students are now receiving targeted intervention through STEM for Life. An unexpected outcome of the program was having to add a language arts instructor to the Southwire student facility (reallocating funds). Even though STEM for Life targeted students academically behind in math and science, most of these students also had **significant literacy deficiencies**.

We did not interview members of the larger community. However, STEM for Life is contributing to long term social and economic savings to the community by decreasing the dropout rate.

STEM for Life Impact Map Creation Overview

To begin the **process of creating the impact map** for STEM for Life (see attachment SROI IMPACT MAP Carroll Co final.xlsx), we **reviewed program documents** such as the grant proposal and evaluation reports and started recording information about STEM for Life on the map. Information about stakeholders (columns A and B) initially came from lists of participants and partners. We derived inputs (columns C and D) from the amount of funding awarded in the grant plus leveraged funds from Southwire, described in the grant proposal. We drafted outputs/activities based on the scope of work in the grant proposal and from evaluation reports, and based indicators/sources (columns G and H) on the evaluation plan in the grant proposal.

We then **reviewed notes from each of the stakeholder interviews** as they were completed, along with additional documents such as the Innovation Fund report to the U.S. Department of

Education and Innovation Fund financial reports, along with documents and other information received directly from stakeholders. This iterative review was not to do detailed content analysis but to confirm, disconfirm, add to, or consolidate the information on the impact map so that it reflected the most complete possible information on the STEM for Life program. In cases in which stakeholders mentioned in interviews outcomes that were not part of the original proposal or evaluation plan, we recorded them on the impact map and then sought to corroborate them by communicating with other stakeholders and asking for documentation. For example, when the program director mentioned during his interview that STEM for Life students were gaining self-confidence, this was confirmed by instructor and student interviews.

The following sections give additional detail on creating the impact map, and provide a walkthrough of its contents and rationales.

Stakeholders (Impact Map Stage 1)

Who was involved?

We took the following steps to interview key stakeholders of STEM for Life.

1. We began by interviewing the **project director**, as his focus is to administer the grant and ensure fidelity of program implementation.
2. Next we interviewed **Southwire business partners**. We included in this group the Southwire STEM for Life operations manager, who could provide the larger business perspective. We also included a STEM for Life supervisor, who is one of six Southwire employees responsible for managing student workers.
3. We next interviewed **the external evaluator**. Although the program evaluator was not considered a stakeholder of STEM for Life, she is a knowledgeable informant because of the data collection and analysis she has been conducting.
4. Next we interviewed two of the six **STEM for Life instructors**, one who teaches chemistry and one who teaches math.
5. Finally we interviewed two **students**, both who are in their second year participating in STEM for Life.

Our initial engagement plan also included parents and higher education partners as key stakeholders. However, after talking with the program director, students, instructors, and Southwire employees, it became apparent that parents are not targeted beneficiaries of STEM for Life. Many of the student participants in STEM for Life are 18 or 19 years old and independent. In fact, independence is a determining factor in students' eligibility for the program. Even students who still live with their parents may not have good relationships with them; in fact, one student commented that he was attracted to STEM for Life because of the time commitment involved, as it kept him away from home and family issues. The instructors noted that it was extremely rare to come in contact with a parent, and they treated their students as adults. That being said, the program director did try to connect us with a parent who was happy that her daughter was involved with STEM for Life. However, due to her work schedule and limited access to a computer, we were unable to contact her during the interview time period.

As for representatives from West Georgia Technical College (a higher education partner), while the proposal indicated that they are part of the STEM for Life Advisory Board, the program director, Southwire employees, the instructors, and a GOSA representative confirmed that they were not a key stakeholder.

In involving stakeholders, we intended to include and represent as fully as possible those who are most central to the mission of STEM for Life—those who are most directly involved or most likely to be affected (see Exhibit 23; those in the inner circle are the central stakeholders, while others, farther from the center, are less intensely linked to the program). The most central to STEM for Life is the **student stakeholder category**, which is also the primary focus of the external evaluation of STEM for Life. In addition, we included the **business partner stakeholder category**, Southwire, in the inner circle due to their role as founder, employer, and funder of STEM for Life. Southwire is also involved in contributing to applied learning opportunities and integrated coursework, mentoring, and providing life and career skills. Southwire intends to benefit by having a stronger local workforce. Because of their centrality, we interviewed multiple representatives from both the student and business groups.

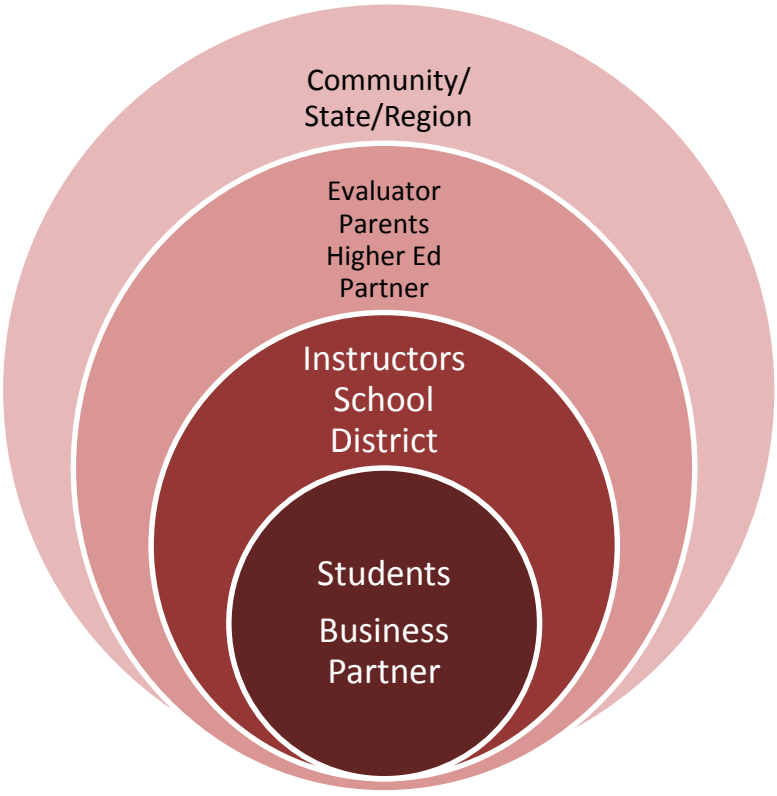


Exhibit 23. Representation of Stakeholder Categories in the Analysis—STEM for Life

Instructors and the **school district** are important to STEM for Life because, with support from CCSS, instructors receive flexibility to use applied learning techniques in a brand-new facility. All teachers have previous experience working with at-risk/economically disadvantaged students,

and have had specialized training in STEM instruction. Teachers are involved in developing the core curriculum and the "rotation" class (the required 30-minute enrichment class), and have dedicated office hours for personalized student tutoring. CCSS provides in-kind support, including graduation coaches. We had access to two of the six instructors at the Southwire facility.

We acknowledge that the **external evaluator**, **West Georgia Technical College**, and **parents** could be stakeholders as members of the local **community**, and the **State of Georgia** and **other states** could also be considered stakeholders of the STEM for Life program. For example, the local community benefits socially and economically from a higher graduation rate. Of the stakeholder groups included here, however, the larger community is the least involved in the daily operations and eventual outcomes of STEM for Life. Aside from the interviews with the Innovation Fund state program directors and the external evaluator, interviewing these stakeholders was beyond the scope of this analysis. In accordance with the SROI method, we acknowledge their possible role.

Inputs (Impact Map Stage 2)

What did stakeholders invest? What was its value?

We started Stage 2 of the SROI analysis by identifying the **program inputs**, which are the investments, financial and otherwise, that stakeholders make into the program. In the case of STEM for Life, the primary financial inputs were the Innovation Grant funding and matching funds through Southwire.

The Innovation Grant funding paid for (among other things) personnel (instructors, an applied learning specialist, and instructional facilitators), 20 percent of the STEM Lab equipment, and consumable materials.

Southwire contributed the student-only manufacturing facility, including the cost of adding a state-of-the-art Quality Assurance Lab and Raw Materials Warehouse. This contribution was estimated at $673,842 in the original proposal. Southwire also contributed funds toward the cost of summer school, tutoring, and mentoring. Southwire also pays for employees (plant manager, student supervisors), as well as the students' hourly wages. In addition, they contribute other "perks" such as food and a small bonus and gift upon graduation. The financial costs of these additional contributions are not included as inputs, but are captured in the Southwire profit from the student facility (see Stage 3).

CCSS made other in-kind financial investments including the full salary and benefits for the STEM for Life project director, partial teacher funding, and time for graduation coaches.

In accordance with SROI methods, we also mention inputs in column C that do not have a dollar value. These investments help the program to function well, but were not described in monetary form. For the STEM for Life program, we included the time that students and instructors contribute (student time in the summer, for example, is often 13 hours per day, and teachers

mentioned activities and events above and beyond their scheduled hours). For some community partners, in-kind donations or enrichment activities are an investment.

Outputs (Impact Map Stage 2)

What were the activities?

The outputs in column E summarize the **activities funded by the grant**. Stakeholders confirmed that the planned grant-funded activities were enacted with very few unexpected activities. The STEM for Life program operated as intended. The primary deviation from planned activities was the addition of a language arts instructor to the Southwire student facility (reallocating funds), because students had greater literacy deficiencies than expected.

Outcomes (Impact Map Stage 2)

What changed?

In column F, we list the outcomes to describe what has changed as a result of the STEM for Life program activities. We have labeled them **expected or unexpected and monetized and not monetized**. As STEM for Life is the subject of a high-quality, program-level evaluation, many of the expected outcomes we heard about in the interviews have already been well documented by the evaluator in the twice-yearly reports. Therefore, we primarily drew upon sources such as evaluation reports to describe and estimate the outcomes.

Many of the expected outcomes in column F are **affective and not monetized** in this analysis. Other expected outcomes have not yet been observed directly, such the total student graduation rate, as there are still students in the STEM for Life program who have not graduated.

Exhibit 24. STEM for Life Outcomes and Presence in SROI Ratios

Expected Outcomes	In SROI ratio?
Students get immediate earned income	✓
Southwire has a less expensive labor source	✓
Southwire retains strong student employees, saving money on recruiting and training	✓
Carroll County has increased opportunities for future grant funding	✓
Community has social and economic savings from lower dropout rate	✓
Improved student self-confidence and self-management skills	
Improved student attendance and grades	
Improved student workforce skills	
Increase in number of students choosing STEM careers/enrolling in STEM postsecondary education	
Students participate in a greater diversity of jobs at the Southwire facility	
Southwire employees participate in civic engagement and feel good about their community	
Southwire can keep jobs in Georgia rather than outsourcing overseas	
Southwire employees have greater job satisfaction	

Expected Outcomes	In SROI ratio?
Teachers have a flexible work environment	
Unexpected Outcomes	**In SROI ratio?**
Students have higher postsecondary educational aspirations	✓
Higher than expected Southwire profit	✓
Teachers get to know students better, and can work one-on-one with them	
Carroll County schools have smaller class sizes, with at-risk kids removed	
Higher graduation rate for Carroll County	

Part of the value proposition of SROI is that stakeholder engagement uncovers important outcomes not originally expected and not included in pre-planned evaluations. When this happened, we sought additional data to substantiate them, and added them to the impact map if they could be confirmed. Some of these **unexpected outcomes** were monetized and are included in the SROI analysis. Exhibit 24 summarizes outcomes included in the impact map, whether expected or unexpected, and whether they were monetized and included in the SROI ratio.

Indicators and Data Sources (Impact Map Stage 3)

How to measure the changes? Where did the information come from?

Starting in Stage 3, we focused primarily on **outcomes included in the SROI ratio**. The indicators of the outcomes, in column G, express how the changes were measured. The changes form the link between the outcomes and the valuations, because they support quantifying the outcomes.

Without the access to program proposals and documents, results from the ALSQ, reports to the U.S. Department of Education, and external evaluation reports provided by GOSA, this analysis would not have been possible without a much larger budget and timeframe. We were able to rely on several **extant data sources** that make the project more efficient. Column H lists the data sources that we relied on for information about the changes experienced by each stakeholder group. The proposal helped us understand intended inputs, activities, and outcomes, while other documents like survey results and evaluation reports have provided information on what happened in the program. These documents were supplemented by **stakeholder interviews** (column A) and by additional program documentation supplied by stakeholders, such as the student salary and profits of the Southwire student facility. Exhibit 25 depicts the monetized outcomes linked to their indicators and data sources (column H).

Exhibit 25. Monetized Outcomes, Indicators, and Sources—STEM for Life

Monetized Outcomes	Indicators	Data Sources
Students get immediate earned income	Amount of money students earn from working at Southwire	Interviews, communication with Southwire managers
Southwire has a less expensive labor source	Money saved by student labor vs. adult labor	Interviews, communication with Southwire managers
Southwire retains strong student employees, saving money on recruiting and training	Number of students recruited/hired	Interviews, communication with Southwire managers
Carroll County has increased opportunities for future grant funding	Funding from Investing in Innovation grant	Interviews, US Department of Education website
Students have higher postsecondary educational aspirations	Number of students graduating high school and intending to continue postsecondary and post-baccalaureate education	ALSQ, End-of-Year reports
Higher than expected Southwire profit	Southwire profit from student facility	Interviews, communication with Southwire managers
Social and economic savings for the community because of the lower dropout rate	Graduation rate	End-of-Year reports

Quantity and Duration

How many people/items/units changed? How long does the change last after the activity ends?

The **quantity** (column I) refers to the number of units (items, people, etc.) associated with the selected indicator. Exhibit 26 shows the rationales for each indicator's quantity, and the level of evidence for each one.

We based the quantity of students intending to achieve specific levels of education on the post-program ALSQ results for the grant-funded cohort. The quantity is presented as an upper bound (assuming those who intended to achieve that level will do so) and a lower bound (applying research-based data on acceptance and graduation rates) for any education levels *whose impact is not later reduced to zero by estimates of deadweight.* The high and low options enable us to perform sensitivity analyses on the SROI ratio by changing this parameter.

Exhibit 26. Quantities, Rationales, and Levels of Evidence—STEM for Life

Indicator	Quantity	Rationale	Level of Evidence
Student salaries	3.5	The student salaries reported by Southwire for the three and a half years of the grant period	High

Indicator		Quantity	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	High school	194	Number of students who graduated high school as documented in the End-of-Year report	High
	2-year college	18-55	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is number who intended to achieve this level (55) * .33, the percent of STEM 2-year college students who graduate[27] = 18	Medium
	4-year college	27-52	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is number who intended to achieve this level (52) * .52, the STEM graduation rate for students who enter a four-year college = 27	Medium
	Graduate school	7-21	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is number who intended to achieve this level (21) * .52, the STEM graduation rate for students who enter a four-year college * .66, the graduation rate for STEM Master's degrees[28] = 7	Medium
	Professional school	3-16	High estimate is number of students who intended to achieve this level, reported on the post-survey. Low estimate is the number who intended to achieve this level (16) * .52, the STEM graduation rate for students who enter a 4-year college * .42, the acceptance rate for med school[29] *.81, the med school graduation rate[30] = 3	Medium
Southwire profit		3.5	The profit from the student facility reported by Southwire for the 3.5 years of the grant period	High

[27] Chen, X. (2013). *STEM attrition: College students' paths into and out of STEM fields* (NCES 2014-001). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.
[28] Council of Graduate Schools. (2013). *Master's completion project.* Retrieved from http://www.cgsnet.org/masters-completion-project
[29] Association of American Medical Colleges (2014). *Applicants and matriculants data.* Retrieved from https://www.aamc.org/data/facts/applicantmatriculant/
[30] Association of American Medical Colleges. (2007). Medical school graduation and attrition rates. *Analysis in Brief, 7*(2). Retrieved from https://www.aamc.org/download/102346/data/aibvol7no2.pdf

Indicator	Quantity	Rationale	Level of Evidence
Money saved by student labor vs. adult labor	3.5	Based on an estimate from a Southwire manager for the 3.5 years of the grant period	Medium
Number of students recruited/hired by Southwire (cost savings)	3	Estimated from Southwire interviews and follow up correspondence; Southwire retains approximately 40 students per year after they graduate	Low
Funding from i3 grant	1	One award made	High
Social and economic savings from lower dropout rate	23	Estimate is calculated by known number of students who graduated (194) * 32.5% (county dropout rate) * 36.6%[31] (percentage of dropouts who receive Temporary Assistance to Needy Families (TANF)) = 23	Medium
	4	Estimate is calculated by known number of students who graduated (194) * 32.5% (county dropout rate) * 6.3% (percentage of dropouts who are incarcerated[32]) = 4	Medium

Duration (column J) refers to the length of time the outcomes of the activity last after the activity ends. For each year entered beyond 1, the value of the outcomes is counted again, minus the discount rate. Although several outcomes associated with STEM for Life are expected to last more than a year, the duration is sometimes entered as 1, as explained in Exhibit 27. The level of evidence refers to the confidence about the data sources for the duration estimate.

[31] Office of Family Assistance, Administration for Children & Families. (2012). *Characteristics and financial circumstances of TANF recipients, fiscal year 2010.* Retrieved from http://www.acf.hhs.gov/programs/ofa/resource/character/fy2010/fy2010-chap10-ys-final

[32] Sum, A., Khatiwada, I., McLaughlin, J., and Palma, S. (2009.) *The consequences of dropping out of high school: Joblessness and jailing for high school dropouts and the high cost for taxpayers.* Boston: Center for Labor Studies, Northeastern University. Retrieved from http://www.northeastern.edu/clms/wp-content/uploads/The_Consequences_of_Dropping_Out_of_High_School.pdf

Exhibit 27. Durations, Rationales, and Levels of Evidence—STEM for Life

Indicator	Duration (years)	Rationale	Level of Evidence
Student salaries	1	Refers to immediate student earnings during the grant period; entered once to avoid overcounting.	High
Number of students intending to achieve secondary/postsecondary education	1	Although the effects of education levels last a lifetime, we entered a duration of 1 year to avoid counting a lifetime-earnings unit more than once.	High
Southwire profit	1	Refers to Southwire profit from student facility during the grant period; entered once to avoid overcounting.	High
Money saved by student labor vs. adult labor	1	Refers to the amount saved over the grant period by using student labor instead of adult labor; entered once to avoid overcounting.	High
Number of students recruited/hired by Southwire (cost savings)	1	Refers to the amount spent over the grant period to recruit and train new workers; entered once to avoid overcounting.	High
Funding from i3 grant	1	The grant is distributed over 4 years; total amount is entered once to avoid overcounting.	High
Social and economic savings from lower dropout rate (TANF assistance)	2	The maximum amount of TANF assistance in a lifetime is 4 years in Georgia. Most recipients will use 24 months at time.[33]	Medium
Social and economic savings from lower dropout rate (incarceration)	3.2	In Georgia, the average time served in prison for all crimes is 3.2 years.[34]	Medium

Financial Proxies and Value

What proxy is used to value the outcomes? What is its value in currency?

Financial proxies for the outcomes associated with a program express the relative importance of the outcomes to the stakeholders in terms of currency. We based **financial proxies for STEM for Life** (column L) and their associated **values** (column M) on existing program-specific financial data when possible, such as the student salaries and profits from Southwire, and the amount of the i3 grant. We based other proxies and values on research, such as the average annual cost of

[33] U.S. Social Security Administration, Office of Policy. Annual Statistical Supplement, 2005. *TANF/AFDC and Emergency Assistance.* Retrieved from http://www.ssa.gov/policy/docs/statcomps/supplement/2005/9g.html

[34] Pew Center on the States. (2012.) *Time served: The high cost, low return of longer prison terms.* Washington, DC: Author. Retrieved from http://www.pewtrusts.org/~/media/legacy/uploadedfiles/wwwpewtrustsorg/reports/sentencing_and_corrections/PrisonTimeServedpdf.pdf

incarcerating an inmate. We based recruiting and training cost savings at Southwire on estimates from the Bureau of Labor Statistics because local industry data were not available.

The **highest-value outcomes from STEM for Life** were associated with the program's estimated influence on students' postsecondary choices and the lifetime earnings connected to them. These outcomes could either have been estimated based on planned career choices or on educational attainment, which includes income from career. We chose to focus on lifetime earnings connected to educational attainment because we had pre- and post-data on students' educational intentions from the ALSQ that were consistent across all four programs, and reliable data from research literature on income associated with educational attainment.

Exhibit 28 presents the financial proxies and values from the monetized outcomes, along with rationales and levels of evidence.

Exhibit 28. Financial Proxies and Values, Rationales, and Levels of Evidence—STEM for Life

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
Student salaries		The amount students earned while working at Southwire	$1,847,900 (total per year)	Average annual amount of student salaries, as given by Southwire plant managers	High
Number of students intending to achieve secondary/ postsecondary education	High school	Change in lifetime earnings for high school graduates	$331,000 (total)	Difference in median lifetime earnings between people with high school diploma vs. less than high school[35]	Medium
	2-year college	Change in lifetime earnings for 2-year college graduates	$413,600 (total)	Difference between the lifetime earnings of students with Associates degrees vs. high school graduates, minus the average student debt amount for 2-year degree[36]	Medium
	4-year college	Change in lifetime earnings for 4-year college graduates	$497,800 (total)	Difference between the lifetime earnings of students with Bachelors vs. Associates degrees, minus the average student debt amount for 4-year degree	Medium

[35] All lifetime earnings for high school, 2-year college, 4-year college, graduate school, and professional school are from: Carnevale, A., Rose, S., and Cheah, B. (2011). *The college payoff: Education, occupation, lifetime earnings.* Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from https://www2.ed.gov/policy/highered/reg/hearulemaking/2011/collegepayoff.pdf

[36] Debt from 2- and 4-year degrees from Radwin, D., Wine, J., Siegel, P., and Bryan, M. (2013). *2011–12 National Postsecondary Student Aid Study (NPSAS:12): Student Financial Aid Estimates for 2011–12* (NCES 2013-165). Washington, DC: National Center for Education Statistics.

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
	Graduate school	Change in lifetime earnings of graduate school graduates	$371,800 (total)	Difference between the lifetime earnings of students with Bachelor's vs. Master's degrees, minus the average student debt amount for Master's degree[37]	Medium
	Professional school	Change in lifetime earnings of professional school graduates	$1,254,400 (total)	Difference between the lifetime earnings of students with Bachelor's vs. professional degrees, minus the average student debt amount for professional degree	Medium
Southwire profit		Southwire's profit from the student facility	$1,738,839 (total per year)	This is the average annual profit for the student Southwire facility during the grant period of performance (note that this is a conservative estimate, as profit has been steadily increasing each year, and the program is still in the no cost extension period)	High
Money saved by student labor vs. adult labor		The difference in average student pay and adult pay	$1,847,900 (total per year)	Southwire employees estimated that for similar work, adults would get paid $18/hour, as compared to students current pay of $9/hour	Medium
Number of students recruited/hired by Southwire (cost savings)		Cost to recruit employee	$1,091 (total)	Bureau of Labor Statistics estimate[38] (40 hours at Human Resources Specialist wage)	Medium
		Cost of basic training in advanced manufacturing	$2,164 (total)	Bureau of Labor Statistics estimate (80 hours at Production Supervisor wage)	Medium
Funding from i3 grant		Amount of award	$2,999,793 (total)	Size of award as reported by the US Department of Education	High
Social and economic savings from lower dropout rate		Average annual TANF assistance per family	$2,647 (per person)	Average amount of TANF assistance as reported by the US Social Security Administration Office of Policy[39]	Medium
		Average annual cost of incarceration per inmate	$21,036 (per person)	Pew Center on the States[40] report on Georgia incarceration costs	Medium

[37] Debt from Master's degree and professional school from Institute of Education Sciences. (2010). *Student financing of graduate and first-professional education 2007–08* (NCES 2011-172). Washington, DC: National Center for Education Statistics.

[38] United States Department of Labor, Bureau of Labor Statistics. *May 2014 State Occupational Employment and Wage Estimates, Georgia: Human Resources Specialist and Production Supervisor wages.* Retrieved from http://www.bls.gov/oes/current/oes_ga.htm

[39] U.S. Social Security Administration, Office of Policy. *Annual statistical supplement, 2009.* Retrieved from http://www.ssa.gov/policy/docs/statcomps/supplement/2005/9g.html

[40] Pew Center on the States. (2012.) *State fact sheet: Time served in Georgia.* Washington, DC: Author. Retrieved from http://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2012/06/06/time-served-in-georgia

Deadweight

What would have happened anyway, without STEM for Life?

Deadweight estimates (column O) describe the **counterfactual**, what is likely to have happened without the program. Deadweight is expressed as a percentage of the value of each outcome, subtracted from the impact estimate. For some outcomes, we estimate 0 percent deadweight because we did not find evidence that those outcomes would have happened without the grant program. For others, we estimate more than 50 percent deadweight, and thus lower impact, if evidence suggests that the outcome would have been achieved even if STEM for Life had not been funded.

The most accurate and unbiased estimates of deadweight come from experimental evaluations, in which some participants are assigned to the program of interest and others are assigned to a control condition. Because this is not such a study, the level of evidence for the deadweight estimates is necessarily lower for many indicators. Exhibit 29 shows the deadweight estimates, rationales, and levels of evidence for the STEM for Life outcome indicators.

Exhibit 29. Deadweight Estimates, Rationales, and Levels of Evidence—STEM for Life

Indicator		Dead-weight	Rationale	Level of Evidence
Student salaries		50%	Students may otherwise have part-time jobs, earning income even without the program.	Low
Number of students intending to achieve secondary/ postsecondary education	High school	68%	The Carroll County graduation rate is 68%, making it likely that this percentage of students would have graduated without the program.	Medium
	2-year college	89%	The number of students intending to get a 2-year degree rose from 49 to 55, suggesting 89% deadweight (49/55).	Medium
	4-year college	67%	The number of students intending to get a 4-year degree rose from 35 to 52, suggesting 67% deadweight (35/52).	Medium
	Graduate school	38%	The number of students intending to get a graduate degree rose from 8 to 21, suggesting 38% deadweight (8/21).	Medium
	Professional sch.	71%	The number of students intending to get a professional degree rose from 10 to 14, indicating 71% deadweight (10/14)	Medium

Indicator	Dead-weight	Rationale	Level of Evidence
Southwire profit	39%	101 students worked at Southwire as part of 12 for Life the year before the Innovation Funding began, indicating 39% deadweight (101/257; 101 students divided by 257 students in the program in 2014).	Medium
Money saved by student labor vs. adult labor	39%	101 students worked at Southwire as part of 12 for Life the year before the Innovation Funding began, indicating 39% deadweight (101/257; 101 students divided by 257 students in the program in 2014).	Medium
Number of students recruited/hired by Southwire (cost savings)	50%	Students may have ended up working at Southwire post-high school graduation, even without having participated in STEM for Life.	Low
Funding from i3 grant	25%	The i3 grant reviewers noted that the continued growth and success of 12 for Life was a strength of the application[41], suggesting that while the i3 grant may have been awarded regardless, there is less evidence that it would have happened without the Innovation Fund.	Low
Social and economic savings from lower dropout rate	0%	While there may be students who participate in STEM for Life and later receive TANF assistance or are incarcerated, the estimated number is so small (<1%) that we are assuming 0% deadweight.	Medium

Displacement

What activity was displaced to or from others by the program?

Displacement (column P) refers to **outcomes that shift from one stakeholder group to another**, rather than truly increasing or decreasing. For all of the indicators in the STEM for Life evaluation, we had no evidence of displacement.

We considered displacement for outcomes related to student employment at Southwire, as the student employees could have displaced adult employees. However, according to Southwire STEM for Life did not displace any adult workers at Southwire, but rather grew the workforce to include the students. In fact, we heard from current Southwire employees that the student employees are doing the repetitive quality-control work that adult employees do not enjoy;

[41] http://www2.ed.gov/programs/innovation/2013/carroltrf.pdf

therefore, many adult employees experienced greater job satisfaction because they were able to do more complex work.

Attribution

What else contributed to the outcomes associated with STEM for Life?

Attribution (column Q) focuses on estimates of contributions to program-related outcomes made by other people, organizations, or activities. Conceptually, attribution is related to deadweight, in that it also involves alternative explanations for, or influences on, outcomes. In our study, we make the distinction by treating deadweight as the scenarios likely to have happened without STEM for Life (e.g., many students would have still graduated from high school). We define attribution as **other likely contributors to outcomes**, such as Southwire's commitment to 12 for Life, and the number of students who would have participated in this even without the Innovation Fund monies that enabled the STEM for Life program expansion.

To identify outcomes for which other attributions should be considered, we asked stakeholders to identify, if possible, other influences on the outcomes that they described. We based our estimates on this stakeholder feedback. Exhibit 30 presents attribution estimates for indicators for which we had some relevant stakeholder evidence.

Exhibit 30. Attribution Estimates, Rationales, and Levels of Evidence—STEM for Life

Indicator	Attribution	Rationale	Level of Evidence
Student salaries	50%	The STEM for Life program approximately doubled the number of students working at Southwire as compared to the baseline year before funding began. Therefore, we can assume that about half of these students would still have worked at Southwire even without the Innovation Fund.	Low
Number of students intending to achieve secondary/postsecondary education	75%	STEM for Life is an intensive program designed to prevent students from dropping out of school. However, we do not want to overclaim its influence. We include 25% attribution to account for other influences (e.g. family or teacher) on secondary and postsecondary plans that students mentioned. We also include 50% attribution to account for the number of students who would have participated in 12 for Life had the Innovation Fund not been awarded.	Low

Indicator	Attribution	Rationale	Level of Evidence
Money saved by student labor vs. adult labor	75%	According to Southwire manager, student production grew in a way that probably would not have occurred if adults were working instead. It more than likely would not have been profitable for Southwire to produce the same volume of products while paying an adult wage.	Low
Number of students recruited/hired by Southwire (cost savings)	50%	Accounts for the number of students who would have participated in 12 for Life had the Innovation Fund not been awarded.	Low
Social and economic savings from lower dropout rate	50%	Accounts for the number of students who would have participated in 12 for Life had the Innovation Fund not been awarded.	Low

Drop-Off

Does the outcome drop off in future years?

Drop-off (column R) only affects outcomes that extend beyond 1 year and applies to only one indicator in the STEM for Life program analysis (see column J). Drop-off refers to a diminution of the effect of the program on the indicator over time, within the *duration* period. The most accurate estimates of drop-off are calculated retrospectively by tracking indicators over time. In a forecast SROI, this is not possible. Based on stakeholder information, we estimated drop-off for one indicator with a duration of 3 years, as shown in Exhibit 31.

Exhibit 31. Drop-Off Estimate, Rationale, and Level of Evidence—STEM for Life

Indicator	Drop-Off	Rationale	Level of Evidence
Number of students recruited/hired by Southwire (cost savings)	40%	According to a Southwire manager, many students who stay with Southwire after graduating high school leave after a year or two to enroll in college or other postsecondary training.	Low

Sensitivity Analysis

What is most affected by changes in the assumptions of SROI?

We can change many of the estimates in the SROI impact map for STEM for Life. In accordance with the recommendations in the SROI Guide,[42] however, we focused on the **changes that would have the greatest impact** on the overall SROI ratio. For STEM for Life, these outcomes are related

[42] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

to students' plans for educational attainment, and the outcomes related to community savings from a population with fewer dropouts.

Scenario for upper bound of educational outcomes:
We based the high estimate on the assumption that students who reported on the ALSQ that they were going to postsecondary education (either 2-year or 4-year college) and post baccalaureate education (either graduate school or professional school) actually will accomplish this goal and graduate (still accounting for deadweight and attribution). In this scenario, STEM for Life gave students at risk of not even completing high school the confidence in their abilities, opportunities to complete missing credits, and knowledge of postsecondary possibilities, as well as the work ethic to complete such programs.

Scenario for lower bound of educational outcomes:
We based the low estimate on the assumption that students who reported on the ALSQ that they were going to college, graduate school, or professional school actually will attempt this goal, and experience typical research-supported rates of acceptance and graduation in these programs (still accounting for deadweight and attribution). In this scenario, STEM for Life gave them the confidence to choose this educational path, after which they will experience higher education in the same way other typical students have. Fewer students therefore will graduate from these programs in this scenario as compared to the high-estimate scenario.

These two scenarios, and the variations in the quantity (column I) of graduating students associated with the low estimate and high estimate, are the basis of the lower and upper bounds of the SROI ratio.

SROI Ratios

By summing the benefits of Stem for Life and subtracting deadweight, displacement, attribution, and drop-off, the impact map spreadsheet calculates the SROI **cost:value** ratio (cell Z34).

Lower bound of SROI ratio: $1 : $9.36

Upper bound of SROI ratio: $1 : $11.27

This means that for every dollar invested by STEM for Life stakeholders, the program is likely to return $9.36 to $11.27 in monetized social value. For this program, the estimates of lifetime earnings associated with increased education were the most influential monetized factor in the ratio. However, there were other influential monetized factors, including Southwire profits, student salaries, and community economic savings, which heavily contributed to the SROI. These moderated the effect on the SROI of altering the quantity of students in the sensitivity analyses. Therefore, the range of the SROI estimate is narrower than that of the other three programs, whose ratios were more heavily influenced by the student outcomes factor. STEM for Life also produced other outcomes that were important to stakeholders, such as increased student confidence, self-management skills, and workforce skills, that are not reflected in the SROI ratios.

MOREHOUSE STUDENT APPLIED LEARNING, NEW TEACHER INDUCTION, AND STAFF LEADERSHIP PARTNERSHIP

The Student Applied Learning, New Teacher Induction and Staff Leadership program at Morehouse ("Morehouse") aims to bring together Morehouse College and Clayton County Public Schools to provide an **innovative STEM applied learning program for high school students and professional development for teachers and leaders**. The program has three separate components for students and teachers. The Student Applied Learning component was a four-week summer program at Morehouse College's campus from 2012-2014, where students experienced STEM enrichment. Students applied for the program based on their interest in STEM, teacher recommendations, and academic record. In addition to web-based learning and teacher-run seminars, participating students had access to research laboratories and were given the resources to develop an original research project. At the conclusion of the program, students presented these projects at Morehouse's annual Innovation Expo. In addition, about four high-achieving students were selected every summer to live on campus and participate in extra activities, including more intensive research.

The other two components of the Morehouse program concentrate on **teacher professional development**, aiming to increase teacher retention, improve instructional quality, and train teacher leaders to ultimately improve student learning. Teachers attended a weeklong professional development session before the summer camp, where they practiced teaching, visited professors' laboratories, and created a professional development plan and collaborative goals. During the summer camp, teachers participated in the summer learning program along with the students, assisted the professors, and prepared to deliver more complex and effective science instruction using case- and problem-based lessons. During the following school year, they provided mentoring to colleagues and received ongoing coaching from Morehouse. All of the participating teachers and students were from Clayton County Public Schools, although students did not necessarily attend the program with their teachers, and vice versa.

Students said that the summer program helped them to **better understand what college life would be like**, and that they started taking their studies more seriously so that they would be ready for college. They also learned more about **specific STEM career pathways**, and met new friends with common interests from other schools in the district. Some students said they improved their teamwork, self-management, and communications skills. Parents expressed appreciation that they had a **high-quality summer STEM option for their children**, and said that they had noticed their students working harder in school afterward.

Participating teachers said that they **successfully incorporated case- and problem-based lessons into their classrooms**, improved their curriculum and teaching skills, and had better connections with parents. They shared the teaching strategies they had learned with colleagues. Some returned in later summers to become mentors to newly participating teachers.

Morehouse Impact Map Creation Overview

To begin the **process of creating the impact map** for Morehouse (see attachment SROI IMPACT MAP Morehouse final.xlsx), we r**eviewed program documents** such as the grant proposal and evaluation reports and started recording information about Morehouse on the map. Information about stakeholders (columns A and B) initially came from lists of participants and partners. We derived inputs (columns C and D) from the amount of funding awarded in the grant plus leveraged funds from Morehouse described in the grant proposal. We drafted outputs/activities based on the scope of work in the grant proposal and from evaluation reports, and based indicators/sources (columns G and H) on the evaluation plan in the grant proposal.

We then **reviewed notes from each of the stakeholder interviews** as they were completed along with additional documents such as the Innovation Fund report to the U.S. Department of Education and Innovation Fund financial reports, along with documents and other information received directly from stakeholders. This iterative review was not to do detailed content analysis but to confirm, disconfirm, add to, or consolidate the information on the impact map so that it reflected the most complete possible information on the Morehouse program. In cases in which stakeholders mentioned in interviews outcomes that were not part of the original proposal or evaluation plan, we recorded those outcomes on the impact map and then sought to corroborate them by communicating with other stakeholders and asking for documentation. For example, when students mentioned that the program helped them to become more academically focused, we asked parents for their perspectives on their students' study habits after the program.

The following sections give additional detail on creating the impact map, and provide a walkthrough of its contents and the rationales behind them.

Stakeholders (Impact Map Stage 1)

Who was involved?

We took the following steps to contact key stakeholders of the Morehouse College program. At the end of each stakeholder interview, we asked interviewees to recommend other knowledgeable stakeholders to interview. This continued until no new categories of stakeholders were suggested. Interviews took place from January 15 to February 13, 2015. We conducted interviews in the following sequence.

1. We began by interviewing the **program assistant director**, as her focus is to implement the program and administer the grant.
2. Next, we interviewed the **external program evaluator**. Although the program evaluator was not considered a stakeholder of the program, he was a knowledgeable informant because of the data collection and analysis he has conducted.
3. We then interviewed two **teachers** involved as part of the 2014 teacher cohort.
4. We interviewed four **parents** of program students, as representatives of the parent stakeholder group.

5. We interviewed four **students** who participated in the 2013 and 2014 summer experiences.
6. Finally, we interviewed the **project lead and principal investigator** on the Innovation Fund proposal, and the program manager who is the liaison between Morehouse College and the teachers in Clayton County Public Schools.

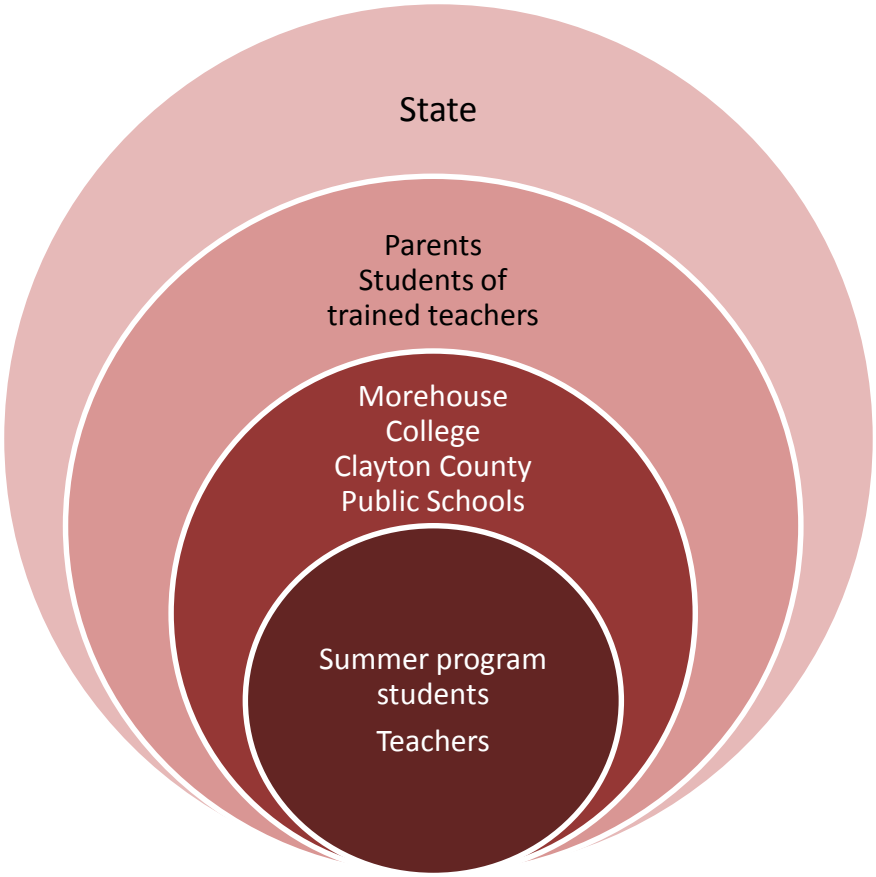
In involving stakeholders, we intended to include and represent as fully as possible those most central to the mission of the Morehouse program—those most directly involved or most likely to be affected (see Exhibit 32; those in the inner circle are the central stakeholders, while others farther from the center are less intensely linked to the program). These stakeholders were the **student** stakeholder category and the **teacher** stakeholder category. For the student stakeholder group, we only included participants in the summer experience, as they were more directly involved than students of teachers who participated in professional development. These summer program students (as well as the instructors) are also the primary focus of the external evaluation of the Morehouse partnership.

The **higher education partner** stakeholder category is important to the Morehouse program because the partners provided oversight and management of the partnership, as well as provided the teacher training and the student summer experience. **The school/district partner** category is important because they assisted in selecting teacher and student participants and benefit from their participation in the program.

Parents are stakeholders in the program because they have a stake in the postsecondary plans of their children—particularly in their children having a specific interest in STEM, as the program's applied learning experience on a college campus aims to support postsecondary STEM matriculation. Parents also benefited from having a free summer enrichment option for their children. Parents were less involved in the day-to-day operation of the program than were the stakeholders in the inner circle, and over time as students graduate and enter college and career, they will be less central stakeholders. **Students of trained teachers** are also an affected stakeholder category. While less involved than the students who attend the summer experience, these students are affected through their classroom experience under teachers who participated in the professional development. As we did not interview any students who had a class with a trained teacher but did not participate in the summer experience, this stakeholder group is not represented except through the reports of the teachers, Morehouse staff, and evaluator.

We acknowledge that the **State of Georgia** can be considered a stakeholder of the Morehouse program. Of the stakeholder groups included here, however, they are the least involved in the daily operations and eventual outcomes of the program. Aside from the interviews with the Innovation Fund state program directors, interviewing these stakeholders was beyond the scope of this analysis, but in accordance with the SROI method, we acknowledge their possible role.

Exhibit 32. Representation of Stakeholder Categories in the Analysis—Morehouse



Inputs (Impact Map Stage 2)

What did stakeholders invest? What was its value?

We started Stage 2 of the SROI analysis by identifying the **program inputs**, which are the investments, financial and otherwise, that stakeholders make into the program. In the Morehouse program, the primary financial input was the Innovation Grant funding, which paid for (among other things) personnel, supplies, and stipends. State inputs also include a new $10,000 Innovation Fund planning grant. Morehouse paid for approximately half of the program assistant position and some other personnel time, estimated at $52,650.

In accordance with SROI methods, we also mention inputs in column C for which we did not assign a dollar value. These investments help the program to function well, but cannot easily be captured in monetary form. For this program, we included Morehouse's contribution of space and previously existing curriculum; and for students, the time that they otherwise could have spent in other summer programs or plans. For teachers, the time spent during the summer training program was an investment. The time spent by school districts to select teachers for the program and attend meetings is also an investment.

Outputs (Impact Map Stage 2)

What were the activities?

The outputs in column E summarize the **activities funded by the grant**. Stakeholders confirmed that the planned grant-funded activities happened, such as the summer program experience for students and teachers, resident program for high-achieving youth, school-year coaching, teacher mentoring, and student and teacher stipends. Program leaders changed the last 2 weeks of the summer camp to be more structured, based on the response to the first year. The participating summer program teachers were intended to be in their first 3 years of teaching. However, the program attracted a more veteran group because the district's new teachers tended to be from Teach for America and were not available in the summer due to commitments to that program.

Outcomes (Impact Map Stage 2)

What changed?

In column F, we list the outcomes to describe what has changed as a result of the Morehouse program activities. We have labeled them **expected** or **unexpected** and **monetized** or **not monetized**. The Morehouse program is the subject of a program-level evaluation, and some expected outcomes we heard about in the interviews have already been documented by the evaluator in the twice-yearly reports. We drew upon sources such as evaluation reports and the ALSQ to describe and estimate those outcomes, as well as further communications with the program director.

Many of the expected outcomes in column F are **affective and were not given a monetary value**. Part of the value proposition of SROI is that stakeholder engagement surfaces important outcomes not originally expected and not included in pre-planned evaluations. When this happened, we sought additional data to substantiate them, and added them to the impact map if they could be confirmed. Some of these unexpected outcomes were monetized and are included in the SROI analysis. Exhibit 33 summarizes outcomes included in the impact map, whether they were expected or unexpected, and whether they were monetized and included in the SROI ratio.

Exhibit 33. Morehouse Outcomes and Presence in SROI Ratios

Expected Outcomes	In SROI ratio?
Students had increased aspirations for postsecondary education	✓
Participating teachers returned to the summer program to mentor new participants	✓
Participating teachers provided mentoring and support to teachers at their schools	✓
Morehouse increased exposure and involvement in community	
Launched scientific literacy center	
Teachers incorporated new instructional strategies such as problem-based learning and case studies	
Teachers had improved connections with parents	
Students were more academically motivated and studious, and more confident in STEM and other classes	

Expected Outcomes	In SROI ratio?
Students understood the college environment better	
Students had more knowledge of STEM career options	
Students had better self- and team-management skills	
Unexpected Outcomes	**In SROI ratio?**
Morehouse received new planning IF grant for online scientific literacy program[43]	✓
Parents had a free, engaging summer option for their children	✓
Morehouse staff gained satisfaction from contributing to students' perspectives on STEM education and careers	
Students made new friends with others in the district who were also STEM-focused	
Parents had greater appreciation for the school district and awareness of Morehouse	

Indicators and Data Sources (Impact Map Stage 3)

How to measure the changes? Where did the information come from?

Starting in Stage 3, we focused primarily on **outcomes included in the SROI ratio**. The indicators of the outcomes, in column G, express how the changes were measured. Changes are the link between the outcomes and the valuations, because they support quantifying the outcomes.

Without the access to program proposals and documents, results from the ALSQ, reports to the U.S. Department of Education, and external evaluation reports provided by GOSA, this analysis would not have been possible without a much larger budget and timeframe. We were able to rely on several **extant data sources** that make the project more efficient. Column H lists the data sources we relied on for information about the changes experienced by each stakeholder group. The proposal helped us understand intended inputs, activities, and outcomes, while other documents such as survey results and evaluation reports have provided information on what happened in the program. These documents were supplemented by **stakeholder interviews** (column A) and by additional program documentation supplied by stakeholders, such as the cost of Morehouse employee staff time contributed to the program. Exhibit 34 depicts the monetized outcomes linked to their indicators and data sources (column H).

Exhibit 34. Monetized Outcomes, Indicators, and Sources—Morehouse

Monetized Outcomes	Indicators	Data Sources
Students have higher postsecondary educational aspirations	Number of students intending to achieve postsecondary education	ALSQ
Participating teachers returned to the summer program to mentor new participants	Value of teacher mentoring activity	Interviews
Participating teachers provided mentoring and support to teachers at their schools	Value of teacher mentoring activity	Interviews
Morehouse received new planning grant for online scientific literacy program	Amount of new funding received	GOSA Website

[43] This outcome was also included as an input for the state stakeholder, as the state provided the grant funding.

Monetized Outcomes	Indicators	Data Sources
Parents had a free, engaging summer option for their children	Savings compared to alternate arrangements for students	Interviews

Quantity and Duration

How many people/items/units changed? How long does the change last after the activity ends?

The **quantity** (column I) refers to the number of units (items, people, etc.) associated with the selected indicator. Exhibit 35 shows the rationales for each indicator's quantity, and the level of evidence for each.

We based the quantity of students intending to achieve specific levels of education on the post-program ALSQ results for the 2013 and 2014 cohorts (n = 81).[44] The quantity is presented as an upper bound (assuming those who intended to achieve that level will do so) and a lower bound (applying research-based data on acceptance and graduation rates) for any education levels *whose impact is not later reduced to zero by estimates of deadweight* in Stage 4 of impact map development. The upper and lower bounds enable us to perform sensitivity analyses on the SROI ratio by changing this parameter.

Exhibit 35. Quantities, Rationales, and Levels of Evidence--Morehouse

Indicator		Quantity	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	High school	3	Number reported on post-program ALSQ	Medium
	2-year college	0-1	High estimate is number of students who intended to achieve this level, reported on the post-survey = 1. Low estimate is number who intended to achieve this level (1) * .33, the STEM graduation rate for 2-year degrees[45] = 0	Medium
	4-year college	6	Number reported on post-program ALSQ	Medium

[44] There was a 2012 cohort (n = 35) but no ALSQ data were found for this group.

[45] Chen, X. (2013). *STEM attrition: College students' paths into and out of STEM fields* (NCES 2014-001). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Indicator		Quantity	Rationale	Level of Evidence
	Graduate school	12-30	High estimate is number of students who intended to achieve this level, reported on the post-survey = 30. Low estimate is number who intended to achieve this level (30) * .52, the STEM graduation rate for students who enter a 4-year college * .66, the graduation rate for STEM Master's degrees[46] = 12	Medium
	Professional school	7-41	High estimate is number of students who intended to achieve this level, reported on the post-survey = 41. Low estimate is the number who intended to achieve this level (41) * .52, the STEM graduation rate for students who enter a 4-year college * .42, the acceptance rate for med school[47] *.81, the med school graduation rate[48] = 7.	Medium
Participating teachers returned to the summer program to mentor new participants		6	Estimate that 25% of the 22 participating teachers spent an average of 40 hours of their time mentoring other teachers during summer program.	Low
Participating teachers provided mentoring and support to teachers at their schools		6	Estimate that 25% of the 22 participating teachers spent an average of 40 hours of their time mentoring other teachers during school year.	Low
Morehouse received new planning grant for online scientific literacy program		1	One grant received	High
Parents had a free, engaging summer option for their children		8	Total number of participant students in both summers is 81, but it is unlikely that all parents can afford a summer camp or have knowledge about existing ones, so we estimate 10%.	Low

Duration (column J) refers to the length of time the outcomes of the activity last after the activity ends. For each year entered beyond 1, the value of the outcomes is counted again, minus the

[46] Council of Graduate Schools. (2013). *Master's completion project.* Retrieved from http://www.cgsnet.org/masters-completion-project

[47] Association of American Medical Colleges (2014). *Applicants and matriculants data*. Retrieved from https://www.aamc.org/data/facts/applicantmatriculant/

[48] Association of American Medical Colleges. (2007). Medical school graduation and attrition rates. *Analysis in Brief, 7*(2). Retrieved from https://www.aamc.org/download/102346/data/aibvol7no2.pdf

discount rate. Although the effects of education levels last a lifetime, we entered a duration of 1 year in the educational attainment outcomes to avoid counting a lifetime-earnings unit more than once. All other monetized outcomes have a duration of 1 year because we did not have evidence from stakeholders that they would expect to have a longer duration.

Financial Proxies and Value

What proxy is used to value the outcomes? What is its value in currency?

Financial proxies for the outcomes associated with a program express the relative importance of the outcomes to the stakeholders in terms of currency. We based **financial proxies for Morehouse** (column L) and their associated **values** (column M) on existing program-specific financial data when possible, such as the size of the Innovation Fund award. We based other proxies and values on research into prices, such as the cost of an alternate summer program. We based the value of teacher mentoring time on estimates from the Bureau of Labor Statistics because specific program data were not available.

The **highest-value outcomes from Morehouse** were associated with the program's estimated influence on students' postsecondary choices and the lifetime earnings connected to those choices. These outcomes could either have been estimated based on planned career choices or on educational attainment, which includes income from career. We chose to focus on lifetime earnings connected to educational attainment because we had pre- and post-data on students' educational intentions from the ALSQ that were consistent across all four programs, and reliable data from research literature on income associated with educational attainment.

Exhibit 36 presents the financial proxies and values from the monetized outcomes, along with rationales and levels of evidence.

Exhibit 36. Financial Proxies and Values, Rationales, and Levels of Evidence—Morehouse

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
Number of students intending to achieve secondary/	High school	Change in lifetime earnings for high school graduates	$331,000 (total)	Difference in median lifetime earnings between people with high school diploma vs. less than high school[49]	Medium

[49] All lifetime earnings for high school, 2-year college, 4-year college, graduate school, and professional school are from: Carnevale, A., Rose, S., and Cheah, B. (2011). *The college payoff: Education, occupation, lifetime earnings.* Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from https://www2.ed.gov/policy/highered/reg/hearulemaking/2011/collegepayoff.pdf

Indicator		Financial Proxy	Value	Rationale	Level of Evidence
postsecondary education	2-year college	Change in lifetime earnings for 2-year college graduates	$413,600 (total)	Difference between the lifetime earnings of students with Associates degrees vs. high school graduates, minus the average student debt amount for 2-year degree[50]	Medium
	4-year college	Change in lifetime earnings for 4-year college graduates	$497,800 (total)	Difference between the lifetime earnings of students with Bachelors vs. Associates degrees, minus the average student debt amount for 4-year degree	Medium
	Graduate school	Change in lifetime earnings of graduate school graduates	$371,800 (total)	Difference between the lifetime earnings of students with Bachelor's vs. Master's degrees, minus the average student debt amount for Master's degree[51]	Medium
	Professional school	Change in lifetime earnings of professional school graduates	$1,254,400 (total)	Difference between the lifetime earnings of students with Bachelor's vs. professional degrees, minus the average student debt amount for professional degree	Medium
Participating teachers returned to the summer program to mentor new participants		Time value of teachers taking leadership roles and mentoring fellow teachers	$879 (per teacher)	40 hours of average teacher salary in Georgia	Medium
Participating teachers provided mentoring and support to teachers at their schools		Time value of teachers taking leadership roles and mentoring fellow teachers	$879 (per teacher)	40 hours of average teacher salary in Georgia[52]	Medium
Morehouse received new planning grant for online scientific literacy program		Value of grant	$10,000 (total)	Amount of funding provided	High
Parents had a free, engaging summer option for their children		GA Tech science summer camp cost	$395 (per program)	Alternate program that students could have attended[53]	Medium

[50] Debt from 2- and 4-year degrees from Radwin, D., Wine, J., Siegel, P., and Bryan, M. (2013). *2011–12 National Postsecondary Student Aid Study (NPSAS:12): Student Financial Aid Estimates for 2011–12* (NCES 2013-165). Washington, DC: National Center for Education Statistics.

[51] Debt from Master's degree and professional school from Institute of Education Sciences. (2010). *Student financing of graduate and first-professional education 2007–08* (NCES 2011-172). Washington, DC: National Center for Education Statistics.

[52] Bureau of Labor Statistics, Occupational Employment Statistics. *May 2014 state occupational employment and wage estimates, Georgia.* Retrieved from http://www.bls.gov/oes/current/oes_ga.htm

[53] Georgia Tech. (2015). *Camps on campus : 2015 summer camps at Georgia Tech.* Retrieved from http://www.gotech.gatech.edu/content/158/camps-on-campus#CEISMC

Deadweight

What would have happened anyway, without the Morehouse program?

Deadweight estimates (column O) describe the counterfactual, what is likely to have happened without the program. Deadweight is expressed as a percentage of the value of each outcome, subtracted from the impact estimate. For some outcomes, we estimate 0 percent deadweight because we did not find evidence that the outcomes would have happened without the grant program. For other outcomes, we estimate 100 percent deadweight, and thus no impact, if evidence suggests that the outcome would have been achieved even if the Morehouse program had not been funded.

The most accurate and unbiased estimates of deadweight come from experimental evaluations, in which some participants are assigned to the program of interest and others are assigned to a control condition. Because this is not such a study, the level of evidence for the deadweight estimates is necessarily lower for many indicators. Exhibit 37 shows the deadweight estimates, rationales, and levels of evidence for the Morehouse College outcome indicators.

Exhibit 37. Deadweight Estimates for Indicators, Rationales, and Levels of Evidence

Indicator		Dead-weight	Rationale	Level of Evidence
Number of students intending to achieve secondary/ postsecondary education	High school	100%	Before the program, no students said they intended to get less than a high school diploma; it is unlikely that the program made these students more likely to graduate.	Medium
	2-year college	0%	No students said they wanted to complete 2-year degree before the program started; we assume no deadweight.	Medium
	4-year college	100%	Before the program, 24 students said they would get a 4-year degree. We assume the 6 who still intend to are among those who originally did.	Medium
	Graduate school	80%	24 out of the 30 students who said they wanted to complete graduate school had said so before the program; we assume that they would have done so without it (24/30 = 80%)	Medium
	Professional school	68%	28 out of the 41 students who said they wanted to complete professional school had said so before the program; we assume that they would have done so without the program (28/41 = 68%)	Medium
Participating teachers returned to the summer program to mentor new participants		0%	No evidence that the teachers would have provided mentoring otherwise.	Medium
Participating teachers provided mentoring and support to teachers at their schools		0%	No evidence that the teachers would have provided mentoring otherwise.	Medium

Indicator	Dead-weight	Rationale	Level of Evidence
Morehouse received new planning grant for online scientific literacy program	0%	The planning grant was a follow-up to the original grant.	High
Parents had a free, engaging summer option for their children	0%	Adjusted the number of possible participants in the Quantity column to facilitate sensitivity analysis	High

Displacement

What activity was displaced to or from others by the program?

Displacement (column P) refers to **outcomes that shift from one stakeholder group to another**, rather than truly increasing or decreasing. For most of the indicators in the Morehouse evaluation, we had no evidence of displacement. However, we considered that some of the students in the summer program would otherwise have entered a similar STEM camp instead (other students told us they would have been employed or would have done church activities during the summer). In figuring the quantity of parents who would have paid for a summer STEM camp if the Morehouse program had not been available, we estimated 10 percent. Therefore, we applied the 10 percent as a displacement rate for the student stakeholders, with a low level of evidence.

Attribution

What else contributed to the outcomes associated with the Morehouse program?

Attribution (column Q) focuses on estimates of contributions to program-related outcomes made by other people, organizations, or activities. Conceptually, attribution is related to deadweight, in that it also involves alternative explanations for, or influences on, outcomes. We make the distinction by treating deadweight as the scenarios likely to have happened without the Morehouse program (e.g., students would likely still have graduated from high school), and treating as attribution **other likely contributors to outcomes**, such as family members' and teachers' encouragement of ambitious postsecondary education plans for students, and prior funding that established in part the summer program curriculum.

To identify outcomes for which we should consider other attributions, we asked stakeholders to identify, if possible, other influences on the outcomes that they described. We based our estimates on this stakeholder feedback. Exhibit 38 has attribution estimates for indicators for which we had some relevant stakeholder evidence.

Drop-Off

Does the outcome drop off in future years?

Drop-off (column R) only affects outcomes that extend beyond 1 year, which applies to none of the indicators in the Morehouse program (see column J).

Exhibit 38. Attribution Estimates, Rationales, and Levels of Evidence—Morehouse

Indicator	Attribution	Rationale	Level of Evidence
Number of students intending to achieve secondary/postsecondary education	50%	While we agree that the ALSQ results suggest that students have increased their educational aspirations, the Morehouse program was targeted at self-selected students who were primarily already college-bound and are likely to have had other influential pre-college experiences. Therefore, in an effort not to over-claim its influence we estimated 50% attribution (motivated by the relative intensity of the program during the summer months) to account for other possible influences on postsecondary plans during this time. (Only affects students who aspire to have 2-year, Master's, or professional degrees, because other levels have 100% deadweight.)	Low
Morehouse received new planning grant for online scientific literacy program	50%	Built on previous development from Department of Education and National Science Foundation Funding	Low

Sensitivity Analysis

What is most affected by changes in the assumptions of SROI?

We can change many of the estimates in the SROI impact map for the Morehouse program, or usually any program. In accordance with the recommendations in the SROI Guide,[54] however, we focused on the **changes that would have the greatest impact** on the overall SROI ratio. For all four of the programs we studied, these are the outcomes related to students' plans for educational attainment. These outcomes are also the outcomes for which we have a specific basis in the ALSQ data and in the research literature, to have low and high estimates. The three changes that have impact after factoring in deadweight are 1) students choosing to complete 2-year degrees, as opposed to stopping after high school, 2) students choosing to complete Master's degrees, as opposed to stopping with Bachelor's degrees, and 3) students choosing to complete professional degrees rather than stop with Bachelor's degrees.

[54] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

Scenario for upper bound of educational outcomes:
We based the upper bound estimate on the assumption that students who reported on the ALSQ that they were going to a 2-year college, graduate school, or professional school actually will accomplish this goal and graduate (still accounting for deadweight and attribution). In this scenario, the Morehouse program gave them experiences, confidence, and knowledge of postsecondary possibilities such that they could choose their postsecondary programs wisely, and the study habits and motivation to complete those programs.

Scenario for lower bound of educational outcomes:
We based the lower bound estimate on the assumption that students who reported on the ALSQ that they were going to either a 2-year college, graduate school, or professional school actually will attempt this goal, and experience typical research-supported rates of acceptance and graduation in these programs (still accounting for deadweight and attribution). In this scenario, Morehouse gave them the confidence to choose this educational path, after which they will experience higher education in the same way and to the same degree of success that other typical students have. Fewer students therefore will graduate from these programs in this scenario as compared to the upper-bound scenario.

These two scenarios, and the variations in the quantity (column I) of graduating students associated with the low estimate and high estimate, are the basis of the lower and upper bound estimates of the SROI ratio.

SROI Ratios

By summing the benefits of Morehouse College's program and subtracting deadweight, displacement, attribution, and drop-off, the impact map spreadsheet calculates the SROI **cost:value ratio** (cell Z34).

Lower bound of SROI ratio: $1 : $1.49

Upper bound of SROI ratio: $1 : $7.63

This means that for every dollar invested by Morehouse program stakeholders, the program is likely to return $1.49 to $7.63 in monetized social value. For this program, the estimates of lifetime earnings associated with increased postsecondary education were the most influential single monetized factor in the ratios. The Morehouse program also produced other outcomes that were important to stakeholders, such as increased community exposure and involvement for Morehouse, and new instructional strategies for teachers, that are not reflected in the SROI ratios.

CROSS-PROGRAM SROI CONSIDERATIONS AND CONCLUSION

While we applied the same SROI methodology across the four studied programs and followed the same steps in building the impact maps and in proceeding with the final analysis, we caution readers against comparing between programs the four SROI ranges we established. This is because they each had their own specific goals and unfolded in their own specific contexts. All four programs intended to produce meaningful changes for their students within that context, which we systematically and consistently captured in their expected and monetized outcomes.

The four Innovation Grantees we studied were different in important ways. For example, STEM for Life focused on students who were at risk of not graduating from high school, while Mechatronics involved students across the academic spectrum in a challenging CTAE program. Morehouse College sought to bolster the academic aspirations of students who were interested in STEM, and D2D focused on connecting high school students and teachers with university scientists. The programs were relatively diverse in their components (e.g., building IT and videoconferencing capabilities in D2D vs. hands-on STEM work-related employment in STEM for Life) and intensity of activities (e.g., 3-5 sessions per year in D2D vs. daily classes over years in STEM for Life). They also differed in their affected stakeholders (e.g. industry partners in Mechatronics and STEM for Life vs. teachers in Clayton County with the Morehouse program).

These contextual factors led to differences in the components of the SROI ratio. The four programs varied in the mathematical multipliers in the SROI calculations based on their monetized outcomes. The SROI value is expressed by:

$$SROI(program\ X) = \frac{\sum_{Inputs\ j=1}^{Total\ N\ of\ inputs\ (X)} input(j)}{\sum_{Outcome\ i=1}^{Total\ N\ of\ outcomes\ (X)} quantity(i) * value(i) * assumptions\ (i)}$$

The four programs differed:

- In the total number of invested inputs,
- In the values of each input *j,*
- In the total number of monetized outcomes,
- In quantities used for each outcome *i,*
- In the financial proxy values for each outcome *i, and*
- In the corresponding assumptions for the related duration, deadweight, displacement, attribution, and drop-off.

Considering the multitude of varying factors, we therefore recommend against using the lower and upper bounds of our SROI calculations to compare across the four programs. Creating a "better-worse" scale with the calculations would not be an appropriate interpretation of SROI.

However, for future planning, it may be useful to point out that the one aspect that was most valuable to the SROI ratio across the programs was the estimated effect on students'

postsecondary plans. Any program focusing on high school students, regardless of its other features and goals, should therefore consider making a specific, concerted effort to help students make postsecondary plans that are specific and ambitious yet achievable. This will return more social value than any other single program component.

APPENDIX A: GLOSSARY

Attribution: the influence of other activities, events, organizations, or people on the outcomes associated with the program under evaluation.

Deadweight: the counterfactual, outcomes that would have resulted if the program had not existed.

Discount rate: the interest rate used to compute net present value of future cash flows.

Displacement: situations in which program outcomes displaced outcomes for non-program stakeholders.

Drop-off: the fading of a program's effects over time, even within the duration period.

Duration: the number of years the outcomes last, and continue to generate value, beyond the end of the activity period.

Evaluative SROI: conducted retrospectively post-program with years of data on outcomes.

Forecast SROI: predicts the social value of a program in progress based on current data and estimates of intended outcomes.

Inputs: the resources that were invested in the program, such as time, funding, materials, and equipment.

Lifetime earnings: the estimate of work-life earnings by using the working population's one-year annual earnings and summing their age-specific median earnings for people ages 25 to 64 years.

Outcomes: the changes that resulted from the program activities.

Outputs: the summary of program activities.

Quantity: the units of the indicator, which could mean number of students, number of parents, number of internships, and so on.

SROI approach: the methodology used to understand what has changed as the result of a program, what matters to stakeholders about those changes, and the social value (value to stakeholders and society) of those changes.

APPENDIX B: SENSITIVITY NOTE ON THE DISCOUNT RATE

We chose a discount rate of 2.5% for our SROI calculations. The SROI Network recommends a rate of 3.5% for public sector projects in the United Kingdom,[55] but 2.5% is more appropriate to the U.S. context. This 2.5% rate is derived from the real interest rate of long-term U. S. government bonds. Furthermore, Carnevale et al. (2011) applied a 2.5% discount rate to the calculations of lifetime earnings by education level, which is the valuation for our most influential student outcomes. In this Appendix, we describe the **sensitivity checks** we performed on the discount rate and explain why we find that this rate to be appropriate for our SROI analysis.

The most appropriate discount rate for SROI calculations is related to the funder's objectives for the returns from the Innovation Fund grants.[56] For example, GOSA can be thought of as an investor choosing from various investment options (the IF grantees). Some IF grantees may implement programs that lead to outcomes in the short term, concentrated in the first couple of years after funding, while other programs may lead to periodic outcomes over extended periods of time well beyond the life of the grants. Depending on GOSA's time preferences and risk tolerance levels, we can apply **three types of discount rates**: low, medium or high (see Exhibit A1).

In the case of our four programs, we have established that there are flows of valuations over a period of up to five years, which suggests that our SROI analysis could be sensitive to the choice of discount rate. The higher the rate, the lower the SROI. To test this, we applied discount rates ranging from 1.5% to 5%, and indeed the SROI varied—but by very little. This is because the most important outcomes in our impact maps are the student educational aspirations as valued by the corresponding financial proxy of lifetime earnings, which are already calculated in present value.

Exhibit A1. Possible values of appropriate discount rates

Preference about future valuations	Rate	Source
High	1.50%	5-year treasury yield rate (US Treasury Department)
Medium	2.50%	Real interest rate of long term government bonds (Carnevale et al.)
Medium	2.75%	30-year treasury yield rate (US Treasury Department)
Medium	3.50%	SROI Network recommended UK rate (HM Treasury's Green Book)
Low	5.00%	Coupon rate for Carroll County School District bonds

[55] The SROI Network. (2012). *A guide to Social Return on Investment.* East Lothian, Scotland: Author.

[56] The main purpose of the discount rate is to allow comparisons of monetary valuations across different time periods based on the fact that people generally prefer to receive money today rather than tomorrow because there is a risk.