



COLUMBUS STATE COMMUNITY COLLEGE

# **Data Analytics Technician Advancement (DATA) Project Year 1 Evaluation Report**

**Prepared for:**  
**Gloria Rogiers**  
**Computer Science Chair**  
**Principal Investigator**

**Prepared by:**  
**Raeal Moore, Ph.D.**  
**Evaluation Data Solutions, LLC.**

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## EXECUTIVE SUMMARY

A need for a workforce with data analytics and information technology skills is increasing exponentially, both nationally and locally in the Columbus, Ohio area. Yet there are a limited number of institutions training the workforce with these skills. To address this gap, Columbus State Community College (CSC) in partnership with Education Development Center (EDC) and with support from the National Science Foundation Advanced Technology Education (NSF ATE) grant is in the first year of developing a 2+2+2 Data Analytics Technician Advancement (DATA) pathway.

The DATA team is on track to complete the three deliverables proposed for the first year of the project. The DATA project team had created a Data Analytics and Information Systems plan of study and two of the four data analytics courses. The plan of study is expected to be made available to students in Autumn of 2019, with specific data analytics courses available as early as Autumn of 2018. A one-page, high-level summary of the internship guide has been crafted. Industry partners have also identified activities they would like interns to know and be able to do. Finally, progress has been made in identifying industry leader interest with the project, including how local businesses can provide support to the project, overall, and to students in the data analytics program, more specifically.

The DATA team has engaged in three central outreach initiatives that have made key stakeholders and future students' aware of the project. These outreach initiatives include: participation at the Ohio Educational Technology Conference (OETC), the integration of data analytics at this year's Smart Columbus Smart Careers event, and communication of the program to collaborators also involved with data analytics programs.

It is recommended that the DATA team consider: collecting user data to inform curricular, internship, and leadership development; document and share pertinent files so that the justification for program decisions are made accessible to key team members.

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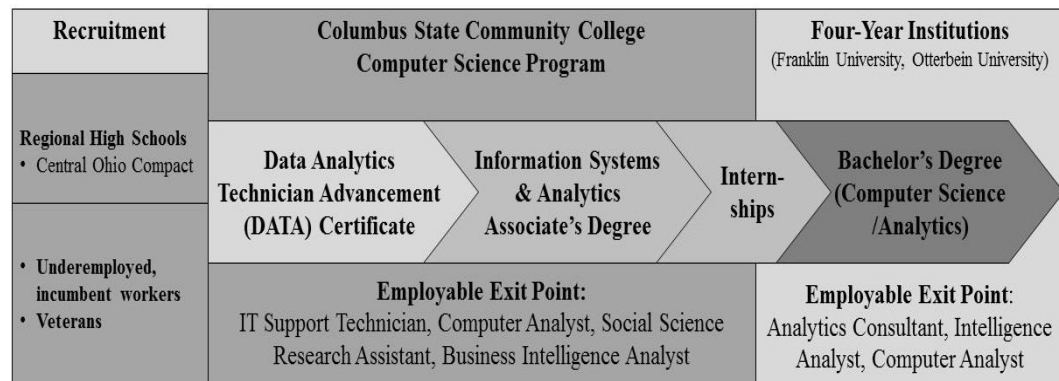
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## INTRODUCTION

The need for a workforce with data analytics and information technology skills is increasing exponentially, both nationally (Deloitte, 2016; Ransbotham, et al., 2015) and locally in the Columbus, Ohio area (Columbus2020, 2014). Yet there are a limited number of institutions training the workforce with these skills. To address this gap, Columbus State Community College (CSCC) in partnership with Education Development Center (EDC) and with support from the National Science Foundation Advanced Technology Education (NSF ATE) grant is in the first year of developing a 2+2+2 Data Analytics Technician Advancement (DATA) pathway (see Figure 1). This pathway has two potential tracks for (1): incoming students from regional high schools; and (2) veterans and underemployed incumbent workers. Students can leave with either a certificate, an Associate's degree, or transfer to a four-year institution to complete a Bachelor's degree in data analytics.



**Figure 1.** 2+2+2 Data Analytics Technician Advancement (DATA) pathway design

The primary goal of this project is to establish a Data Analytics Technician Advancement Pathway in the central Ohio region to increase the supply of qualified technicians. To reach this goal, the project has five objectives:

1. Revitalize the existing curriculum content and create new courses within the Associate of Applied Science degree in Computer Science, Data Analytics and Information Systems track at CSCC.
2. Solidify an Industry Leadership Team so that regional businesses are co-leading the work to provide maximum benefit and employability to students.
3. Develop an internship guide for data analytics students and employers.
4. Develop a learning module used to expand the knowledge base in data analytics for non-computer science majors.

5. Establish a model articulation agreement in which regional four-year universities can serve as the final link in a high school to two-year college to four-year college training pipeline.

This report summarizes the progress made in accomplishing the first three objectives, since it was this work that was planned for year 1.

## PURPOSE AND DESIGN OF THE EVALUATION

Evaluation Data Solutions, LLC, under the leadership of Raeal Moore, Ph.D. began evaluation activities for this grant in February 2018.

The three-year evaluation plan has two foci: (1) to address the fidelity of implementation of the 2+2+2 pathway to a data analytics work force; and (2) to identify the impact that this pathway has at the institutional (e.g., enrollment increases) and individual levels (e.g., increase in the number of student earning data analytics credentials). Appendix A presents the path by which program staff believe the project will impact key outcomes.

Year 1 evaluation activities focused on addressing the progress in creating the DATA curricular content, conceptualizing the internship guide, and identifying the leadership committee. Further, progress on outreach and engagement was addressed given that without external visibility of the program the creation of key deliverables is likely to go unused.

Therefore, the Year 1 evaluation was guided by two evaluation questions:

1. How well is the project progressing in the creation of DATA curricular content, the conceptualization of the internship guide, and the identification of the leadership committee? What challenges, if any, have arisen and how have the staff addressed them?
2. What outreach events have been conducted? What type of reach have these events had on increasing the visibility of the project?

To answer these evaluation questions, a qualitative methodological approach was conducted. Here, archival data (e.g., meeting notes, product artifacts) and survey data were synthesized and then cross-referenced with project goals, objectives, and proposed activities to identify program successes and opportunities for improvement. These data include:

*Meeting notes.* Notes were taken at eight DATA meetings. Three meetings focused on the creation of the Data Analytics and Information Systems Computer Science plan of study (POS), one meeting was to prepare for the DATA Analytics Project Kick-Off & Industry event, one meeting discussed the NSF annual reporting requirements, and three meetings addressed evaluation-related topics. Table 1 summarizes the meetings used to support the evaluative conclusions drawn in this report.

**Table 1.** Meeting description, purpose, and attendees

Description	Purpose	Attendees
February 22, 2018	<b>Evaluation:</b> Discuss the activities completed and meetings conducted from the start of the project to February. Emphasis was placed on describing the redesign of two courses and the preparation of the DATA Kick-Off and Industry meeting.	Arthur N. Monique C. Raeal M.
February 22, 2018	<b>Pre-event preparation:</b> Program staff – both CSSS and EDC – discussed the agenda for the Kickoff event. Emphasis was placed on the order of power point slides, who would be speaking and when, and how the event was expected to achieve project objectives.	Arthur N. Joe I. Joyce M. Monique C. Raeal M.
April 25, 2018	<b>Evaluation:</b> Given the turnover of DATA staff, a re-acquaintance meeting between the CSCC project staff and the external evaluator was scheduled. Focus was given to providing a status update on project deliverables and how the current DATA project builds upon previous NSF grants.	Andrew K. Arthur N. Gloria R. Raeal M. Stephanie H. Tara S.
May 1, 2018	<b>Annual reporting:</b> Focus was given to identifying the work that had been accomplished prior to May. The project coordinator collected project artifacts (e.g., syllabi, course calendars, DATA certificate).	Andrew K. Arthur N. Gloria R. Raeal M. Stephanie H. Tara S.
May 30, 2018	<b>POS:</b> The goal of this meeting was to develop a project plan given the change in project leadership. To do this, a detailed description of the project deliverables was articulated. Emphasis was placed on thinking through the course requirements in the POS.	Andrew K. Arthur N. Gloria R. Raeal M. Stephanie H. Tara S.

Description	Purpose	Attendees
June 13, 2018	<b>POS:</b> This meeting continued the POS discussion from the prior meeting by integrating CSCC faculty feedback. Meeting participants also brainstormed work to be completed in the summer.	Andrew K. Gloria R. Raeal M. Tara S. Stephanie H.
June 27, 2018	<b>POS:</b> A first draft of a completed POS was circulated and reviewed. The computer science department chair provided his feedback on the POS, indicating that the program was comprehensive but that perhaps an introduction to Python should be included.	David N. Gloria R. Raeal M. Tara S.
June 28, 2018	<b>Evaluation:</b> This meeting focused on answering programmatic and evaluative questions the external evaluator had of the work done to date.	Raeal M. Stephanie H. Tara S.

*Event Observations.* Both the DATA Analytics Project Kick-Off & Industry Meeting and the Smart Columbus, Smart Careers were observed by the external evaluator. The goal of the kickoff meeting was to introduce industry partners to the NSF ATE grant, to provide feedback to industry leaders on the Data Worker Responsibilities results, and to obtain feedback from industry leaders on the usefulness of creating an assessment that would evaluate the internship experience. The second event was to provide community stakeholders and students with information and opportunities on careers and educational pathways in industries that aligned to the Smart Columbus initiative. The first meeting was observed by the external evaluator via conference call and the second event was observed in-person. Appendix B provides the agenda for both events.

*Annual Progress Report (APR).* The APR was reviewed to obtain contextual information on key objectives (e.g., curriculum, internship guide) and accomplishments (e.g., Kick-Off meeting, outreach).

*Survey Findings.* After participation in two key events – the DATA Analytics Project Kick-Off & Industry Meeting and the Smart Columbus, Smart Careers – evaluations were administered to event participants. The former event administered two surveys. The first survey was conducted by Evaluation Data Solutions, LLC to obtain participants’ perceptions of the event and a second survey was conducted by EDC to better gauge how industry leaders would prefer

to partner with CSCC. The Rucks Group (an external evaluator for a related NSF grant) administered a survey at the Smart Columbus, Smart Careers event to gauge whether the content presented at the event increased participant awareness. Appendix C presents these survey instruments.

## FINDINGS

**Evaluation Question 1:** How well is the project progressing in the creation of the DATA curricular content, the conceptualization of the internship guide, and the identification of the leadership committee? What challenged, if any, have arisen and how have the staff addressed them?

The DATA team has made significant progress in developing curricular content for the Data Analytics and Information Systems Computer Science plan of study, the creation of an internship guide, and the identification of who from industry will serve on the leadership committee. A status report for each objective is presented next.

### *Develop curricular content*

The DATA team has worked extensively this past year on two inter-connected curricular areas: the development of a Data Analytics and Information Systems Computer Science plan of study and, within this plan of study, the creation of four courses that are data analytics focused.

A series of tailored meetings led to the create a draft Data Analytics and Information Systems Computer Science plan of study (see Table 1 for a summary of these meetings) that defines the courses students will be required to successfully complete (the scope) and in which semesters (the sequence).

The success of this work can be attributed to three factors. First, the team allocated specific time to collaboratively decide how the data analytics program should look, including who within the institution should review and provide feedback to the plan. Second, the student experience was at the center of all decision-making. The team took into consideration the following:

- which courses would best prepare students to learn the skills needed to be data analytics technicians
- whether prerequisite courses hindered or helped students transfer to or from the data analytics program
- the transferability of courses to a 4-year institution



- whether courses were expected to be modified for other institutional reasons

Three, the team strategically used prior work as a catalyst to develop the plan. They integrated data analytics skills into existing courses, modified content from non-credit courses, and used results from prior compression planning (see *Internship Guide Process* below for a description of this process).

To date, the team has also developed two of the four data analytics specific courses, CSCI 2380, Business Intelligence Fundamentals, and CSCI 2385, Business Intelligence Data Analytics/Reports. These existing courses have been modified to include the skills of a data analytics technician like programming (e.g., Python and SQL), data visualization, and data dashboard design.

Leadership turnover was a challenge to curriculum implementation, however. Initial efforts were directed to the creation of the DATA certificate and then redirected to the plan of study once new leadership was put into place. This shifting of priorities, with changing decision-makers, delayed both the finalization of the POS and the creation of the remaining two data analytics courses. Regardless of these challenges, the team's careful consideration to the data analytics plan of study has created a solid foundation for the next two years of the grant. The plan of study is expected to be made available to student in Autumn of 2019, with individual courses available as early as Autumn of 2018.

### *Develop an Internship guide*

The status of the internship guide is informed by two activities conducted in Year 1. First, the DATA team aligned previous CSCC compression planning findings with the data analytics rubric and guide created by EDC<sup>1</sup>. Both skills analyses exposed six duties important for a data analytics technician: (1) initiates the project; (2) sources the data; (3) transforms the data; (4) analyzes the data; (5) closes out the project; (6) engages in professional development. The alignment highlighted that these skills are important at both the national (EDC review) and

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<sup>1</sup> Prior to the DATA grant, CSCC conducted two compression planning sessions, one in 2015 and second in 2017. Compression planning is a 3-step, DACUM abbreviated (Norton, ND), process by which stakeholders rapidly organize to identify the job skills necessary for a specific profession, in this case a Data Analytics Technician. Likewise, Education Development Center, Inc. (EDC), with funding from a previous grant, created the profile of a data practitioner guide and the Data Practitioner rubrics. It is this prior work that laid the foundation for the internship guide.

at the local (CSCC review) levels. These duties will be used as the foundation for the internship guide.

Second, the DATA team sought feedback from industry leaders on these six data technician duties at the DATA Analytics Project Kick-off and Industry Meeting. To this end, industry leaders were asked to indicate, for a series of data practitioner activities, whether a beginning worker, both a beginning worker and an intern, or neither groups should be responsible for the specified work (see Appendix D for the instrument). These results were then presented, in aggregate form, to the industry leaders at the Kick-off event.

Two challenges emerged. First, industry leaders were well versed in identifying which skills interns do not need to know, but less versed in identifying which activities they should know. Second, industry leaders reported less satisfaction with providing feedback on the internship guide relative to other parts of the event. (See Table 2 for a summary of these results and Appendix E for the end-of-event evaluation report in its entirety.)

**Table 2.** Satisfaction with the DATA Kick-Off Meeting

Meeting Component	# Somewhat or Very Satisfied	% Somewhat or Very Satisfied
Pre-meeting communication	5	100%
Length of the meeting	5	100%
Time allocated to each agenda item	5	100%
DATA project overview	5	100%
Providing feedback on data worker responsibilities	4	80%
Providing feedback on how to assess interns	3	60%
Accomplishing the meeting's purpose	3	60%
The meeting overall	5	100%

Note: 5 event participants completed the feedback form.

More specifically, industry leaders were satisfied with prior communication, the length of the meeting, and time allocation to each topic. Fewer industry leaders were satisfied with the activities that sought their feedback, although satisfaction was still relatively high. Respondents suggested allocating more time to assessing the internship process, that CSCC be more open to industry leader feedback and thoughts, and that the meeting end with specific action items for all parties.

The DATA team has begun work to address these challenges. Using a more simplified approach, industry leaders were later asked to identify the skills an intern should have. Between one and three activities per data analytics duty were identified. Second, the DATA team is currently planning an event that would provide industry leaders with an internship guide definition and an explanation for how the guide can be helpful to both the intern and to the employer.

### *Identification of a DATA Leadership Team*

Central to the DATA project is the finalization and expansion of the Industry leadership team. These experts, employees from local Columbus businesses, will lead program activities, including the evaluation of curriculum, employ interns, and provide feedback on the internship guide.

The DATA leadership team came together for the first time on March 2 as part of the DATA Analytics Project Kick-off and Industry Meeting. During the event, participants were asked to indicate whether they would be interested in supporting CSCC students in data analytics. Five participants, representing three Central Ohio employers, responded to the form; Table 3 summarizes these results.

**Table 3.** Percentage of respondents interested in supporting CSCC data analytics study, by supportive action

Supportive Action	Yes	Maybe
Provide input into curriculum development	60%	40%
Provide guest speakers for data courses	0%	75%
Host field trips by students enrolled in data courses	0%	60%
Allow students to “shadow” data workers	0%	100%
Offer paid internships	0%	75%
Conduct mock job interviews	20%	80%
Participate in college sponsored career days	0%	80%
Serve on an Industry Advisory Committee	60%	20%
Provide labor market data, e.g. info about job openings	25%	0%
Provide sanitized data that could be used for real-world examples in courses	0%	50%

Note: not all supportive actions were answered; either a 4 or a 5 was used as the denominator to calculate the percentages.

The following three conclusions were drawn:

- Almost all respondents indicated they would be willing to either (a) provide input into curriculum development or (b) serve on an Industry Advisory

Committee. This is promising given that the primary role of the committee is to provide feedback on curriculum.

- All activities had at least one industry leader who indicated s/he would support or might support if more discussions occurred. Fewer industry leaders were willing to provide data – either labor market data or sanitized data that could be used for real-world examples in courses.
- Outright commitment to participate in activities was low. All respondents, for most activities, wanted to have more discussion before committing.

**Evaluation Question 2:** What outreach events have been conducted? What type of reach have these events had on increasing the visibility of the project?

### *Outreach*

The DATA team has engaged in three central outreach initiatives: participation at the Ohio Educational Technology Conference (OETC), the integration of data analytics at this year's Smart Columbus Smart Careers event, and outreach to collaborators also doing work with data analytics programs. Each is discussed in more detail next.

The DATA project was first advertised at OETC, a conference that attracts educators in the technology field. Here, CSCC staff distributed a one-page summary of the DATA project (see Appendix F).

The DATA project took on a more central focus at the Smart Columbus, Smart Careers event held on May 21, 2018. This two-and-a-half-hour event, with approximately 20 people attending, included two central components: (1) a plenary session with a Smart Columbus overview and an emphasis on how careers in Central Ohio are changing, and (2) academic breakout sessions that described in detail three careers, with Data Analytics being one of those careers.

At the end of the event, participants were asked to complete a short feedback form. Feedback was positive. Participants increased their awareness of skills in demand in the Columbus area and 73% of the survey respondents thought that the Data Analytics break out session was “very interesting” (see Appendix G for The Rucks Group evaluation of this event).

The event had a larger reach than anticipated. Founder and CEO of *At the Core*, Beth Probst, attended the event and summarized the experience in her blog. She wrote,

I attended an event at Columbus State this week (with my new-HS-grad son, see photo of us below!). Smart Columbus and an area workforce development group presented, and then we broke out to learn more about three STEM programs CSCC offers: Data Analytics, Alternative Energy Automotive, and Logistics Engineering Technologies.”

And she continued with, “if you have a teen with any interest in these fields, you owe it to yourselves to check out the programs.”

Last, communication of the project was provided to: (a) the panel that development the Data Practitioner profile, (b) the individuals that validated the Data Practitioner profile, and (c) colleges who partner with EDC on Creating Pathways for Big Data Careers project. A one-page summary of the project was provided via email (see Appendix G).

## RECOMMENDATIONS

Based on the first-year evaluation results, the following recommendations are suggested:

**Collecting stakeholder perceptions to minimize future barriers.** Since the goal of this project is to develop a 2+2+2 pathway, consider reaching out sooner rather than later to secondary and post-secondary institutions. Systematically collecting information from those who will feed into the pathway and those who will be part of that pathway is suggested. Consider also collecting data from early adopters of the program (e.g., students who are enrolled in a data analysis class; faculty who will first teach these courses). Collecting this information could help to identify early on any barriers and benefits to participation in the project.

**Identifying the role(s) of industry leaders.** It is recommended that future conversations be planned where industry leaders can co-plan and co-develop some of the support activities requested of them. Consider capitalizing on the two activities industry leaders are interested in as a foundation in building future collaborative initiatives. Consider also identifying a business partner for which CSCC has had a positive working relationship, who actively employs a CSCC intern, and who has a need for data analysts. Work with this person to better understand the benefits and challenges of hiring and working with interns. In turn, use this information when working with industry leaders on the leadership

committee. This could help to both refine the industry leaders' role as well as identify potential hurdles to the use of the internship guide.

**Outreach and communication.** Continue efforts to communicate the need for data analytics professionals. Data analytics is an emerging field, with many communities unaware of its exists, or if aware, inconsistent in what it encompasses. It is recommended that misconceptions be identified and circumvented when communicating the DATA project and its components (e.g., the POS, courses, internship experience, certificate). Consider also collecting feedback from participants at the outreach events. This would be a good place to identify students who would be good candidates for the program, candidates who might want to enroll in specific data analytics courses, and candidates who might find the DATA certificate of value. Collecting contact information of interested parties would then allow program staff to reach out after the event.

**Documentation and file sharing.** Leadership turnover was the greatest challenge in year 1. Consider being strategic and explicit with project documentation and accessibility of that documentation with the team. Documenting, for example, the process by which the POS was developed and the logic behind this development will provide current and future team member with an explanation for why and how decisions were made. Documentation can also reduce disconnect if turnover occurs in the future. Having these documents accessible (e.g., via google drive or a shared server) to the necessary team members will streamline file requests and ensure appropriate parties have access to the most-up-to-date documentation.

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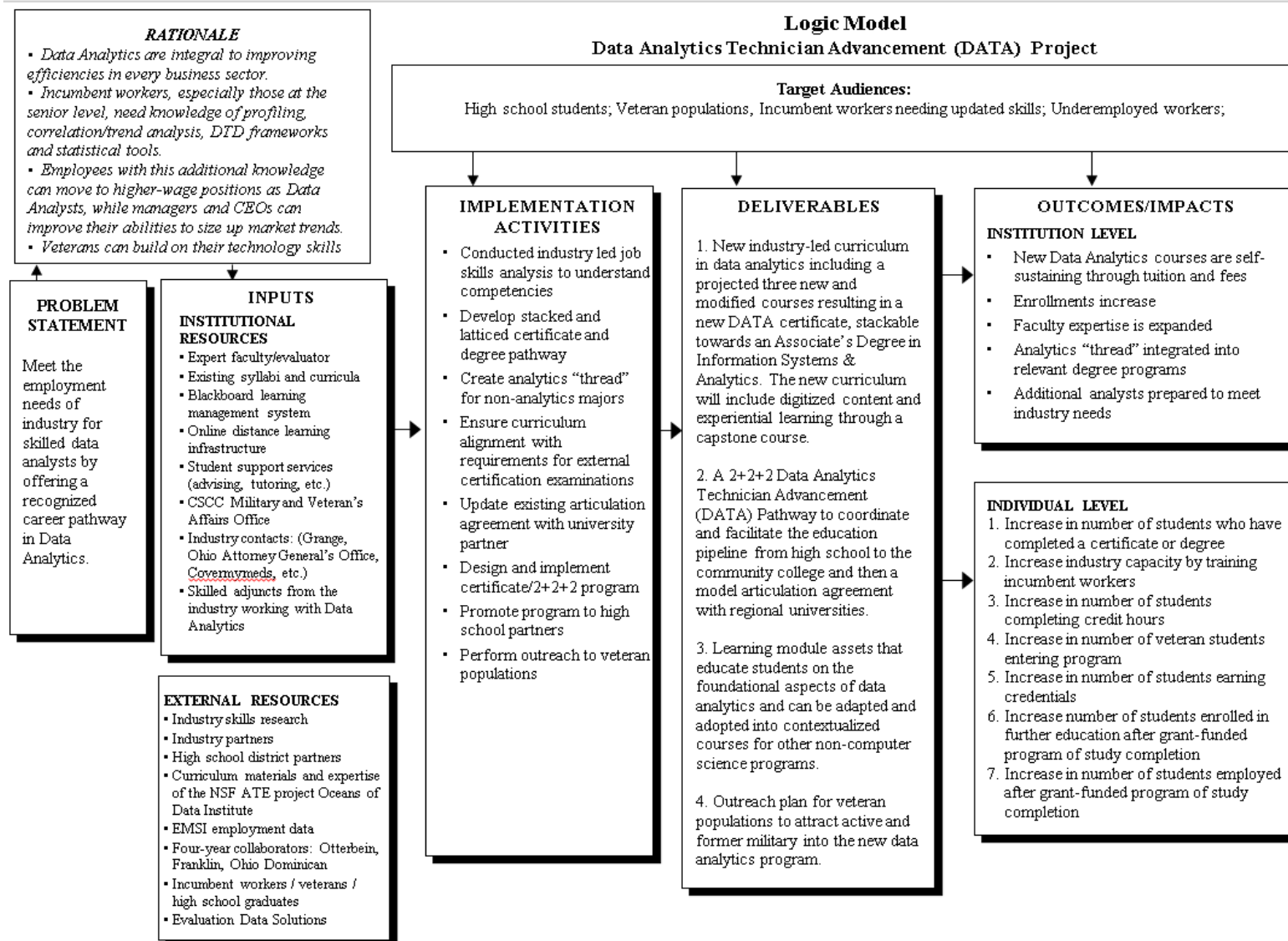
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## APPENDICES

### Appendix A. Data Analytics Technician Advancement (DATA) Project Logic Model





## Appendix B. Event Agendas

### Appendix B1. DATA Analytics Project Kick-Off & Industry Event Agenda

# DATA Analytics Project Kick-Off & Industry Meeting

## Creating a Guide to Assess Performance of Interns and Entry-level Workers

March 2, 2018| 8:00am – 10:30am  
Center for Teaching & Learning Innovation, Room 108

### OVERALL PURPOSE:

To present results of Big Data research while determining innovative ways to build solid high-performing data professionals in central Ohio, resulting in an Internship and Entry-Level Technician's Guide.

### Kick Off

7:45am – 8:00am	Registration & Check-in, <i>Columbus State Staff</i>
8:00am – 8:10am	Welcome & Introductions, <i>Angelo Frole, Dean of Business, Engineering, and Technology, Columbus State Community College</i>
8:10am – 8:25am	National Science Foundation, Advance Technological Education Program Overview, <i>Tara Sheffer, Grants Supervisor, Columbus State Community College</i>
8:25am – 8:45am	National Science Foundation, Data Analytics Grant Award, <i>Arthur Neuman, Co-Principal Investigator Data Analytics, Columbus State Community College</i>

### Industry Meeting

8:45am – 8:55am	Introduction to Education Development Center, <i>Joe Ippolito &amp; Joyce, Maylin-Smith, EDC Partners.</i>
8:55am – 9:20 am	Industry Feedback on Data Worker Responsibilities, <i>Joe Ippolito &amp; Joyce, Maylin-Smith, EDC Partners.</i>
9:20am – 9:35am	Break
9:35am – 9:50am	Industry Feedback on Assessing Internships, <i>DATA team</i>
9:50am – 10:00am	Opportunities for Support, <i>Arthur Neuman, Co-Principal Investigator Data Analytics, Columbus State Community College</i>
10:00am – 10:10am	Survey, <i>Dr. Raeal Moore, Evaluation Data Solutions LLC</i>
10:20am – 10:30am	Closing Remarks / Q&A, <i>DATA team</i>

<div> <div> <div>COLUMBUS STATE</div> <div>COMMUNITY COLLEGE</div> </div> <div> <div>Smart Columbus, Smart Careers</div> <div>Monday, May 21, 2018</div> <div>6:00 p.m. – 8:30 p.m.   Center for Workforce Development</div> </div> </div>	
Plenary Session	
6:00 p.m.	<b>Registration &amp; Resource Tables</b>
6:15 p.m.	<b>Welcome &amp; Overview</b> Angelo Frole, Dean, Business & Engineering Tech John Sherwood, Program Coordinator <i>Columbus State Community College</i>
6:20 p.m.	<b>Smart Columbus Overview</b> Jordan Davis, Director Smart Columbus <i>Columbus Partnership</i>
6:40 p.m.	<b>In-Demand Careers in Central Ohio</b> John Hambrick, Director Business Solutions <i>Workforce Development Board of Central Ohio</i>
Academic Breakout Sessions   Group A	
7:00 p.m.	<i>Travel</i>
7:10 p.m.	<b>Data Analytics   Center for Workforce Development, Room 309</b> Tara Sheffer, Supervisor Grant Projects <i>Columbus State Community College</i>
7:45 p.m.	<i>Travel</i>
7:55 p.m.	<b>Alternative Energy Automotive   Delaware Hall, Automotive Lab</b> Ian Andrews, Instructor <i>Columbus State Community College</i>
<div> <div>COLUMBUS STATE COMMUNITY COLLEGE</div> <div>550 East Spring Street • Columbus, Ohio 43215 • csc.edu</div> </div>	

## Appendix C. Survey Instruments

### Appendix C1. DATA Analytics Kick-Off and Industry Event Evaluation



#### 2018 DATA ANALYTICS INDUSTRY MEETING EVALUATION

Please take a few minutes to answer the following questions. Results will be used to plan future DATA project events.

1. Which of the following best describes your company's industry? Please circle one option below.

- ☐ Secondary Education
- ☐ Post-secondary Education
- ☐ Government
- ☐ Insurance
- ☐ Medical Services
- ☐ Veterans Services
- ☐ Other (please describe) \_\_\_\_\_

2. How satisfied are you with each of the following aspects of the meeting? For each item, please mark with an X the option that best represents your opinion.

	Very Satisfied	Moderately Satisfied	Neither satisfied nor dissatisfied	Somewhat Dissatisfied	Very Dissatisfied
Pre-meeting communication from Columbus State Community College					
Length of the meeting					
Time allocated to each agenda item					
DATA project overview					
Providing feedback on <u>data worker responsibilities</u>					
Providing feedback on how to <u>assess internships</u>					
The meeting overall					

3. Use the space below to elaborate on any of the responses you provided above.

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4. How important is it for your organization to hire entry-level staff with data analytics skills?

- ☐ Extremely important
- ☐ Very important
- ☐ Moderately important
- ☐ Not important at all

5. How many data analytics positions is your organization in need of?

- ☐ None
- ☐ 1-2 positions
- ☐ 2-5 positions
- ☐ More than 5 positions

6. To what degree would you be interested in providing internships to college students

- ☐ Very interested
- ☐ Somewhat interested
- ☐ Not interested at all

7. How many additional projects has your organization been involved with have with collaborations like this one?

- ☐ A lot
- ☐ Some, but not a lot
- ☐ A little
- ☐ None

8. What needs do you hope will be met from your organization's participation in this project?

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9. What factors do you take into consideration when deciding whether to participate in a collaboration like this one?

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10.To what degree would you be interested in collaborating with Columbus State Community College on future project like this one?

- ☐ Very interested
- ☐ Somewhat interested
- ☐ Not interested at all

11. What additional questions do you still have about the DATA analytics project?

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## Appendix C2. Data Analytics Support Form



### Data Analytics Support Form

Thank you for participating in today's meeting. Based upon what you have heard today, please indicate each action you and/or your company are willing to take to support students at Columbus State Community College interested in data analytics.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Telephone \_\_\_\_\_

E-Mail \_\_\_\_\_

Supportive Action	Yes!	Maybe, more discussion needed	No
Provide input into curriculum development			
Provide guest speakers for data courses			
Host field trips by students enrolled in data courses			
Allow students to "shadow" data workers			
Offer paid internships			
Conduct mock job interviews			
Participate in college sponsored career days			
Serve on an Industry Advisory Committee			
Provide labor market data, e.g. info about job openings			
Provide sanitized data that could be used for real-world examples in courses			
Other:			

## Appendix C3. Smart Columbus, Smart Careers Participant Feedback Form

### Smart Columbus, Smart Careers – Participant Feedback

For each item below indicated how you would have rated your level of awareness **BEFORE** the event and **AFTER** the event.

Not Aware	Slightly aware	Some- what aware	Fully aware	← <i>BEFORE THE EVENT</i>	<i>AFTER THE EVENT</i> →	Not Aware	Slightly aware	Some- what aware	Fully aware
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**What did you learn at the event that was most surprising to you? (Could be related to an item above or something else)**

How interesting was each of the following activities for you?	Not interesting at all	Slightly interesting	Somewhat interesting	Very interesting	Can't rate/ didn't attend
Smart Columbus and Columbus State Exhibitors (during check-in)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
Overview of Smart Columbus Initiatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
Central Ohio Workforce & Impact of Smart Columbus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
Breakout Session – Alternative Energy Automotive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
Breakout Session – Logistics & Engineering Technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>
Breakout Session – Data Analytics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>

**What 1 or 2 things would have made the event more interesting or valuable for you?**

Source: The Rucks Group, LLC

## Appendix D. Online Review of the profile of the Data Practitioner



### Data Practitioner- Columbus State Community College

**Welcome to the Online Review of the profile of the Data Practitioner.**

This survey examines an occupational profile of a Data Practitioner that was developed by the Oceans of Data Institute at Education Development Center, Inc. (EDC) with the support of the National Science Foundation. EDC is now partnering with Columbus State Community College to integrate the profile into the school's big data career programming.

The profile describes what it is that a Data Practitioner needs to know and be able to do to be successful in the workplace. It was developed by a panel of Data Practitioners representing a variety of industry sectors under the guidance of senior EDC staff.

The panel developed the following definition of a Data Practitioner which provides the foundation of the profile:

The Data Practitioner, in service of an organization and/or stakeholders, supports the data life cycle by collecting, transforming, and analyzing data, and communicating results in order to inform and guide decision-making.

The survey addresses six major areas of responsibility (duties) identified by the panel as important to a Data Practitioner:

1. Initiates the Project
2. Sources the Data
3. Transforms the Data
4. Analyzes the Data
5. Closes Out the Project
6. Engages in Professional Development

The survey that follows asks you to review and comment upon the panel's description of the work activities incumbent upon Data Practitioners. Your responses will help Columbus State insure that

its programs address the data skills and knowledge deemed most important by local employers.

All responses will be handled confidentially, and only aggregate data will be used for meta-analysis. Completing this survey should take approximately 5 minutes.

If you experience any technical difficulties, please email Joe Ippolito- [jippolito@edc.org](mailto:jippolito@edc.org). Thank you!



Demographic Information

1. Your Name

2. Your Job Title

3. Name of your business/ organization:

4. Please estimate how many employees in your organization perform work requiring data/ big data skills?

- ☐ 0-10
- ☐ 11-50
- ☐ 51-100
- ☐ More than 100
- ☐ I have no idea

5. Your e-mail address

6. How long have you been working with data/ big data?

7. Your ethnicity (Optional):

---

8. What degrees do you hold?

☐ Associate

☐ B.A.

☐ MA

☐ MS

☐ PhD

Other (please specify)

9. What is your role on data/ big data teams?

☐ I am the only person in my organization responsible for working with data.

☐ I am a member of a data team.

☐ I lead a data team of 1-5 members.

☐ I lead a data team of 6-10 members.

☐ I lead a team of more than 10 members.

☐ I am responsible for using data to set strategic direction for my organization.

### Data Practitioner- Columbus State Community College

#### Beginning Worker/ Internship Skills

Again, the definition of a Data Practitioner developed by the panel reads:

The Data Practitioner, in service of an organization and/or stakeholders, supports the data life cycle by collecting, transforming, and analyzing data, and communicating results in order to inform and guide decision-making.

The following statements describe different types of duties (major work responsibilities) and tasks (smaller, related work responsibilities) that might be performed by a Data Practitioner.

Keeping in mind this definition, and reflecting upon data workers in your company, please indicate which tasks you might expect: 1) a beginning data worker to be able to do, 2) BOTH a beginning data worker and an intern under supervision to be able to do, or 3) NEITHER a beginning data worker or intern to be able to do.

## 10. Data Practitioner- Duty One: Initiates the Project

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Translates business problems into analytic needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interviews stakeholders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Refines stakeholder needs.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifies appropriate data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifies whether data exists or not.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performs gap analysis of the data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determines resource needs (e.g., subject matter experts, tools, timelines).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determines feasibility of analysis to be done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creates statement of work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 11. Data Practitioner- Duty Two: Sources the Data

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Determines data source(s).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determines target structure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collects data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exercises quality control (e.g., randomizes selection).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extracts data (e.g., writes SQL, API code).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cleans data (e.g., identifies outliers/ errors).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tests data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creates data dictionary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complies with business, ethical and legal standards.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

---

## 12. Data Practitioner- Duty Three: Transforms the Data

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Merges data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Splits data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Derives new variables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creates new data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Augments data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applies meta-data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purges data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changes data structure.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changes data types.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Normalizes data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interpolates data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finalizes data dictionary.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stores data for analytics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 13. Data Practitioner- Duty Four: Analyzes the Data

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Determines what analysis to run.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applies the research method and tools.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifies dependent and independent variables.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Defines appropriate algorithms.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performs data mining.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Separates any anomalies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Interprets the results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Runs additional tests as needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performs reasonableness tests of results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compares results to previous findings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Confirms results.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conducts causality testing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creates data visualizations (e.g., dashboards, reports, charts, graphs, videos, animation).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 14. Data Practitioner- Duty Five: Closes the Project

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Selects documentation media.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Describes problem, method and analysis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Articulates conclusions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compiles reports.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Presents information to stakeholders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrates feedback from stakeholders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Defends analysis as needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reworks analysis as needed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Prepares final report.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Archives work products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicates future processes, improvements and opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 15. Data Practitioner- Duty Six: Engages in Professional Development

	A beginning worker does this	BOTH a beginning worker and an intern under supervision could do this	NEITHER a beginning worker or an intern does this
Maintains professional qualifications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stays current on emerging technologies, methods and tools.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeks out mentors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shares best practices.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Contributes new knowledge to the field.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attends relevant conferences and seminars.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mentors others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participates in professional organizations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Suggests future projects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



## **Appendix E. Data Analytics Kick Off Meeting End of Event Evaluation Summary**

### **Columbus State Community College Data Analytics Kick-Off Meeting**

Summary of Data Collected

Prepared by: Raeal Moore, Evaluation Data Solutions

March 30, 2018

#### **Introduction**

On March 2, 2018 Columbus State Community College (CSCC) held its Data Analytics Industry Meeting with community partners for the National Science Foundation (NSF) Advanced Technological Education (ATE) grant. The goal of this meeting was to introduce industry partners (i.e., Cardinal Health, Centric, Collin College, Otterbein College, and Nationwide Insurance) to the NSF ATE grant, to provide feedback to industry leaders on the Data Worker Responsibilities results, and to obtain feedback from industry leaders on the usefulness of creating an assessment that would evaluate data analytics internships.

A total of 12 industry leaders participated in the meeting. At the end of the two-hour event, participants were asked to complete two data collection forms. The Data Analytics Support form asked industry leaders to identify how they might support CSCC students interested in data analytics. Industry leaders were then asked to complete a meeting evaluation form, which solicited opinions about the meeting itself, data analytics career pathways within their organization, industry needs, and demographic characteristics about the industry leader (see Appendix C1).

This document summarizes the findings from these two forms. A total of 5 industry leaders responded to the Support Form and 5 participants responded to the evaluation form; it is unclear as to whether it was the same 5 respondents who completed both forms.

#### **Key Findings**

##### *Data Analytics Support*

- Almost all respondents indicated they would be willing to either (a) provide input into curriculum development or (b) serve on an Industry Advisory Committee.
- All activities had at least one industry leader who indicated s/he would support or might support if more discussions occurred.
- Outright commitment to participate in activities was low. All respondents, for most activities, wanted to have more discussion before committing.

##### *Meeting Evaluation*

- Industry leaders were satisfied with prior communication, the length of the meeting, and time allocation to each topic.
- Fewer industry leaders were satisfied with the activities that sought their feedback, although satisfaction was still relatively high. Respondents suggested allocating more time to assessing

internships, that CSCC be more open to industry leader feedback and thoughts, and that the meeting end with specific action items for all parties.

- Most respondents indicate that it was important for their organization to hire entry level staff with data analytics skills, and that the number of these entry-level staff will increase in the next five years.
- Some respondents did not know how many data analytics positions are currently needed at their organization.
- All respondents would be interested in providing internships to college students who participate in this project perhaps because industry leaders need specialized talents in data science, need interns who can meaningfully contribute to the business, and need a good pipeline of data analytics talent in the local community.

### **Recommendations**

1. It is recommended that future conversations be planned where industry leaders can co-plan and co-develop some of the support activities requested of them, if the goal of the project is to increase the ways industry leaders are involved with supporting CSCC students in data analytics. Consider capitalizing on the two activities industry leaders are interested in as a foundation in building future collaborative initiatives.
2. Some industry leaders are unsure of the current data analytic needs of their organization, therefore, consider asking them to collect this type of information from the appropriate person in their company before a working meeting. This way, the industry leaders can provide project staff with the information needed for the project.
3. Consider structuring future industry leader meetings with specified goals and time allocated for discussion and collaboration across attendees. Consider as part of this process that the meeting facilitators mirror back what the industry leaders are communicating. This might assist in the attendees feeling as if their thoughts, ideas and opinions, are being heard. Depending on the nature of the meeting, facilitators can either apply information from industry leaders to the meeting goals during the meeting or synthesize the information after the meeting. If the latter is done, consider obtaining feedback from industry leaders later to ensure that their concerns and ideas were accurately interpreted.

## Appendix F. DATA Project Summary Handout

# D.A.T.A.

## Data Analytics Technician Advancement

National Science Foundation (NSF) Advanced Technology Education (ATE)  
Data Analytics Technician Advancement (DATA) Program (1700454)  
Project Summary

*PI: Gary Clark, Assistant Professor*  
*Co-PI: Arthur Neuman, Instructor*  
*Co-PI: Joe Ippolito, Senior Project Director, EDC*  
*Program Coordinator: Monique Carney*  
*Evaluator: Dr. Raean Moore, Evaluation Data Solutions LLC*

Columbus State Community College, in partnership with Education Development Center (EDC), veterans' organizations, central Ohio employers (Alliance Data, CoverMyMeds, Franklin County Auditor's Office, Grange Insurance, and the Ohio Attorney General's Office), regional high schools (South-Western City Schools, Tolles Career & Technical Center), and two regional universities (Franklin, Otterbein) will develop a new career pathway in Data Analytics. The career pathway will have two tracks: one for incoming students from regional high schools; and one for veterans and underemployed incumbent workers.


**The goal** of the proposed ATE project is to establish a Data Analytics Technician Advancement (DATA) Pathway in the central Ohio region to increase the supply of qualified technicians. The project will create the following deliverables:

1. New industry-led curriculum in data analytics including three new courses resulting in a new DATA certificate that is stackable toward an Associate's Degree in Information Systems & Analytics. The new curriculum will include digitized content and experiential learning through a capstone course.
2. A 2+2+2 Data Analytics Technician Advancement (DATA) Pathway to coordinate and facilitate the education pipeline from high school to the community college. It will include a template articulation agreement with regional universities.
3. A collaboratively developed internship guide for data analytics technicians working with the EDC.
4. Learning modules that educate students on the foundational aspects of data analytics. These will be adaptable for contextualized courses within other non-computer science programs.
5. Outreach plan for veteran populations to attract active and former military into the DATA program.


Recruitment	Columbus State Community College Computer Science Program			Four-Year Institutions (Franklin University, Otterbein University)
Regional High Schools • Central Ohio Compact	Data Analytics Technician Advancement (DATA) Certificate	Information Systems & Analytics Associate's Degree	Intern- ships	Bachelor's Degree (Computer Science /Analytics)
• Underemployed, incumbent workers • Veterans	Employable Exit Point: IT Support Technician, Computer Analyst, Social Science Research Assistant, Business Intelligence Analyst			Employable Exit Point: Analytics Consultant, Intelligence Analyst, Computer Analyst

Total Award: \$ 689,189

Project Period: 9/1/2017 to 8/31/2020



This material is based upon work supported by the National Science Foundation under Grant No. 1700454.



## **Smart Columbus, Smart Careers**

### **Participant Feedback Results**

**Prepared for:**

Tara Sheffer, M.A., Supervisor, Grant Projects  
Division of Engineering & Business Programs, Logistics Grants  
Columbus State Community College  
550 East Spring Street  
Columbus, OH 43215

**Prepared by:**

The Rucks Group, LLC  
714 E. Monument Avenue  
Dayton, OH 45402

June 2018

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**THE  
RUCKS**  
GROUP LLC

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## Background

Columbus State Community College hosted an evening event that provided information and opportunities for discussion on careers and educational pathways in industries that align directly with the Smart Columbus initiative including logistics & engineering technologies, alternative energy automotive, and data analytics. Columbus State has National Science Foundation Advanced Technological Education grants that fund projects focused on each of these industries.

The event was targeted towards community stakeholders, applied students, and prospective students.

At the end of the event participants were asked to complete a paper-pencil survey designed to measure the extent to which the goals of the event were achieved (see Appendix A for a copy of the instrument). More specifically, the survey was designed to answer the following questions:

- To what extent did the event increase participants' awareness of the Smart Columbus initiative and the career opportunities and educational pathways logistics & engineering technologies, alternative energy automotive, and data analytics?
- How interesting were the various elements of the event to participants?
- What changes might have made the event more interesting or valuable to participants?

A total of 17 event attendees completed evaluation. This brief report provides a descriptive summary of the results.

## Findings

Participants' awareness levels increased on every item regarding the Smart Columbus initiative and the technology careers targeted at the event. (N=15)

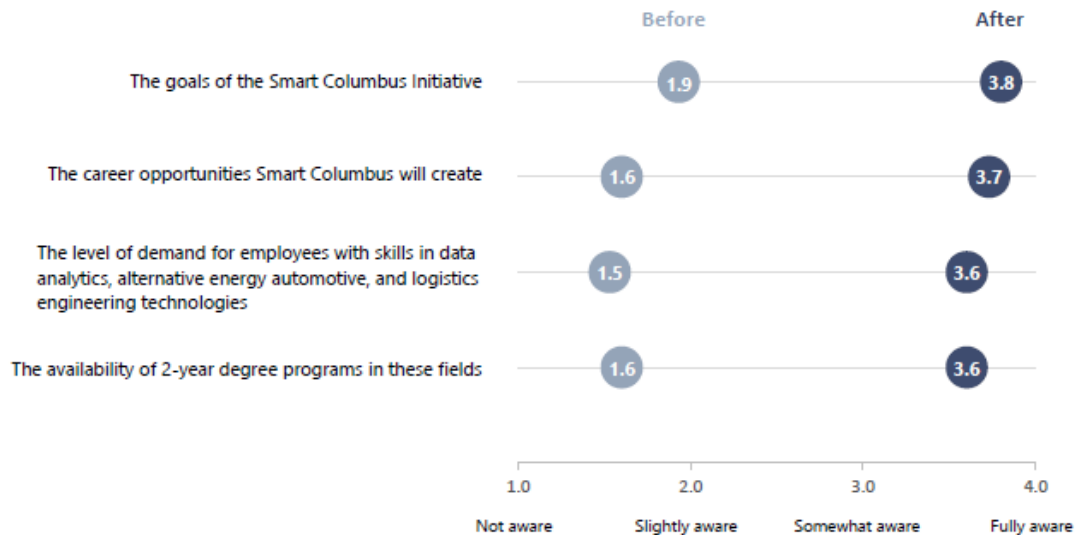


Figure 1. Mean participant response to the question, "For each item below indicated how you would have rated your level of awareness BEFORE the event and AFTER the event."

Participants were asked to describe what they learned that was most surprising.

Three people provided a response:

“ All of the opportunities/available for people transportation.

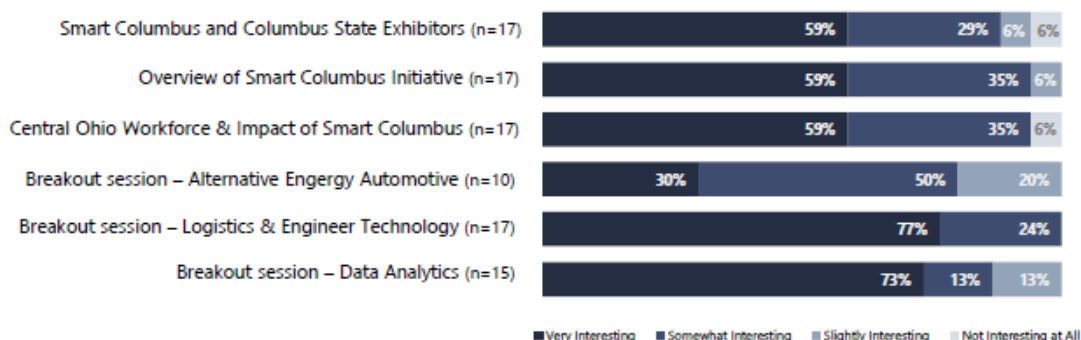
“ Specific examples of what we will see in Columbus with Smart Columbus.

“ The amount of investment in the future of Columbus.

Innovation through Revelation

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The Logistics & Engineering Technologies and Data Analytics breakout sessions received the highest percentage of “Very interesting” ratings.



Participants were asked to describe 1 or 2 things that would have made the event more interesting or valuable.

One person provided a response:

“Hands-on for data analytics (but that’s hard)”

## Final Thought

This brief report is intended to provide a clear and concise summary of participant evaluation of the Smart Columbus, Smart Careers event. The interpretation of this information in relation to this project’s evaluation questions along with corresponding recommendations will be included in the annual evaluation report.