

**EDC**

Education  
Development  
Center

# TOOLS FOR BUILDING A BIG DATA CAREER PATHWAY AT COMMUNITY COLLEGES

July 8, 2020

Joyce Malyn-Smith and Sarah MacGillivray, EDC

Suzanne Smith, Johnson County Community College

James Polzin, Normandale Community College

Michael Harris, Bunker Hill Community College

Paul Hansford, Sinclair Community College

*mentoring*

*new*

*data*

*pathways*



# Today's Presenters:

- Joyce Malyn-Smith, Education Development Center, Waltham, MA
- Suzanne Smith, Johnson County CC, Overland Park, KS
- James Polzin, Normandale CC, Bloomington, MN
- Michael Harris, Bunker Hill CC, Boston, MA
- Paul Hansford, Sinclair CC, Dayton, OH



*This project is funded by the National Science Foundation, grant # 1902568. Any opinions, findings, and conclusions or recommendations expressed in these materials are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

# About our Data Pathways Projects

## Partners:

- Education Development Center's [Oceans of Data Institute](#)
- Bunker Hill, Johnson County, Sinclair and Normandale Community Colleges

## Projects:

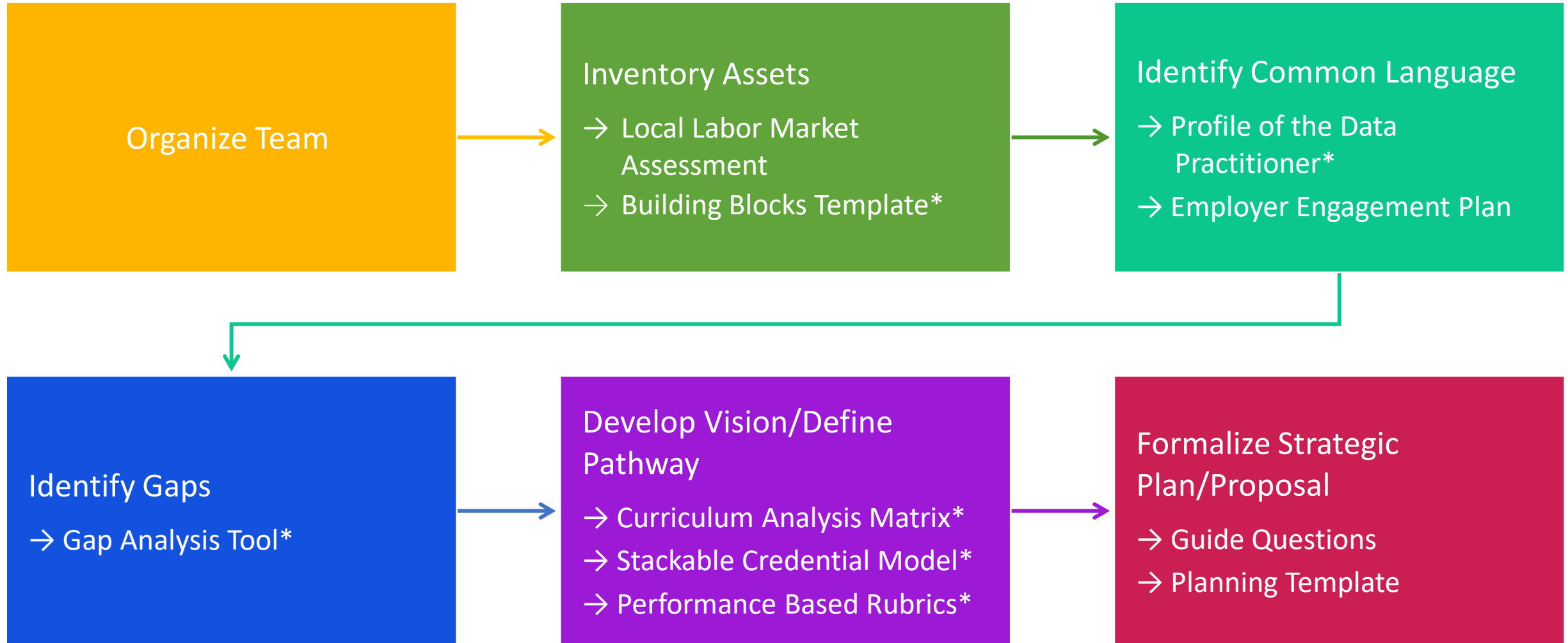
1. Colleges participated as partners in previously funded [Creating Pathways to Big Data Careers](#), developing data programs at their institutions
2. [Mentoring New Data Pathways](#) will engage the colleges as mentors, sharing their experiences developing data programs with faculty from mentee institutions

Funding from NSF's [Advanced Technological Education \(ATE\) Program](#)

# Levels of Involvement

Mentee Colleges	Community of Practice	Project Network
<p>Colleges selected for full participation in the project will be matched with a faculty mentor who is experienced in designing and implementing data pathways in community colleges.</p> <p>Mentors will provide guidance, tools, resources, and support aimed at creating new data pathways at the selected schools.</p>	<p>Colleges interested in developing a data pathway who are not partnered with a mentor can join the community of practice, which has been designed to engage participants in facilitated discussions, informative webinars, and other activities related to data pathway development.</p>	<p>The project network will primarily be used to share updates on project activities, available resources, and opportunities aligned with data program development in community colleges.</p>

# Data Pathway Development Process



# Tools overview

- Building Blocks for a Data Science Program
- Profile of the Data Practitioner
- Performance Based Rubrics
- Gap Analysis
  - Industry-identified needs
  - College programming
- Curriculum Analysis Matrix
- Stackable Credentials

NSF-ATE Creating Big Data Career Pathways  
Building Blocks for a Big Data Career Pathway

Please provide the following information regarding the programs, certificates and courses that relate to your school's development of a

Your School \_\_\_\_\_

Person Comp \_\_\_\_\_

**Two Year Programs**

Name of Program	Indicate if – In place (X) or Planned (P), (with projected start date.)	Names of courses and course numbers	Prerequisites Necessary for Enrollment	Name(s) Prepares

**One Year Certificates**

Name of Certificate	Indicate if – In place (X) or Planned (P), (with projected start date.)	Names of Courses Included and course numbers	Prerequisites Necessary for Enrollment	Name(s) Prepares

Education Development Center, Inc.

# Building Blocks Template

A means of capturing an inventory of the existing courses, programs, certifications, degrees and supportive activities that can be used to develop a data pathway.

*Helps provide a detailed starting point for planning.*

# Profile of the Data Practitioner

A nationally validated document that can be used to help school administrators, faculty and employers to discuss and identify data worker skills needed in the workplace.

*Helps provide common language/content between school and employers for discussing and addressing employer expectations in the workplace.*

**Learning Occupation:** The Data Practitioner, in service of an organization and/or stakeholders, supports the communication of results in order to inform and guide decision-making.

DUTIES		TASKS					
1. INITIATES THE PROJECT	1A. Translates business problems into analytic needs.	1B. Interviews stakeholders.	1C. Refines stakeholder needs.	1D. Identifies appropriate data.	1E. Identifies whether data exists or not.	1F. Performs gap analysis of the data.	
	2A. Determines data source(s).	2B. Determines target structure.	2C. Collects data.	2D. Exercises quality control (e.g., randomizes selection).	2E. Extracts data (e.g., writes SQL, API code).	2F. Cleans data (e.g., identifies outliers/errors).	
2. SOURCES THE DATA	3A. Merges data.	3B. Splits data.	3C. Derives new variables.	3D. Creates new data.	3E. Augments data.	3F. Applies meta-data.	
	3L. Finalizes data dictionary.	3M. Stores data for analytics.					
3. TRANSFORMS THE DATA	4A. Determines what analysis to run.	4B. Applies the research method and tools.	4C. Identifies dependent and independent variables.	4D. Defines appropriate algorithms.	4E. Performs data mining.	4F. Separates any anomalies.	
	4L. Conducts causality testing.	4M. Creates data visualizations (e.g., dashboards, reports, charts, graphs, videos, animation).					
4. ANALYZES THE DATA	5A. Selects documentation media.	5B. Describes problem, method and analysis.	5C. Articulates conclusions.	5D. Compiles reports.	5E. Presents information to stakeholders.	5F. Integrates feedback from stakeholders.	
	6A. Maintains professional qualifications.	6B. Stays current on emerging technologies, methods and tools.	6C. Seeks out mentors.	6D. Shares best practices.	6E. Contributes new knowledge to the field.	6F. Attends relevant conferences and seminars.	
5. CLOSING OUT THE PROJECT							
6. ENGAGES IN PROFESSIONAL DEVELOPMENT							

Copyright ©2016 by Education Development Center, Inc.

All rights reserved.

# Performance Based Rubrics

A collection of contextualized statements that “show” what data worker skills look like when performed at different degrees of proficiency.

*Helps provide concrete indicators for measuring performance of data skills.*

DATA PRACTITIONER: DUTY ONE- INITIATES THE DATA

Performance Area	Level One Basic Competence	Level Two Approaching Proficiency	Level Three Proficiency	Level Four Above Proficiency
<b>Translates business problems into analytic process*</b> (Integrates Task A)	<ul style="list-style-type: none"> <li>Communicates understanding of the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Articulates the problem after consulting with primary stakeholders.*</li> </ul>	<ul style="list-style-type: none"> <li>Proposes a type of analytic process needed to solve the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Intuits the problem and the process needed to solve it.</li> </ul>
<b>Integrates stakeholders’ interests into proposed analytic process</b> (Integrates Tasks B, C)	<ul style="list-style-type: none"> <li>Identifies stakeholder needs by engaging them in active conversations about the proposed analytic process.</li> </ul>	<ul style="list-style-type: none"> <li>Builds consensus among stakeholders around both the problem that has been identified and the proposed analytic process.</li> </ul>	<ul style="list-style-type: none"> <li>Obtains stakeholder approval for revised analytic process.</li> </ul>	<ul style="list-style-type: none"> <li>Enlists stakeholders as partners in the proposed solution.</li> </ul>
<b>Determines what data is needed to execute the analytic process</b> (Integrates Tasks D, E, F)	<ul style="list-style-type: none"> <li>Identifies data that fits within the problem.</li> </ul>	<ul style="list-style-type: none"> <li>Revises the analytic process after determining what data should be excluded and included.</li> </ul>	<ul style="list-style-type: none"> <li>Aligns data to the revised analytic process.</li> </ul>	<ul style="list-style-type: none"> <li>Anticipates how data will be sourced.</li> </ul>
<b>Develops statement of work*</b> (Integrates Tasks G,H, I)	<ul style="list-style-type: none"> <li>Drafts a statement of work that addresses stakeholder interests/needs, includes data/analytic process and resources required to solve the problem (e.g. timeline, budget, personnel, tools, data....).</li> </ul>	<ul style="list-style-type: none"> <li>Integrates primary stakeholder feedback into statement of work.</li> </ul>	<ul style="list-style-type: none"> <li>Finalizes a statement of work needed to solve the problem that addresses stakeholder interests/needs, includes data/analysis processes and all resources needed to accomplish the task.</li> </ul>	<ul style="list-style-type: none"> <li>Enhances the statement of work by drawing on long term relationships with stakeholders and organizational knowledge.</li> </ul>

# Gap Analysis

A tool to facilitate a discussion between school administrators, faculty and employers about the “gap” between the data skills addressed by existing school courses/ programs and the data skills employers expect their workers.

*Helps specify what content schools needs to add and/ or modify to their existing curricula to meet current employer expectations.*

## GAP ANALYSIS TOOL/INDUSTRY IMPORTANCE Creating Pathways for Big Data Careers

Name:

Organization:

Your Position:

Your e-mail:

When using this form, consider those individuals in your company who:

- Are data or data enabled workers
- Have 1-2 years experience
- Are Members of a data team
- Do not supervisor other data workers

INDUSTRY EXPECTATIONS	CODES	KEYWORDS
Not important for Data workers at my company	Not Present 0	
Data workers need to be aware of the knowledge/skill but are not required to use it.	Knowledge Level 1	Vocabulary Facts
Data workers are expected to understand, use and practice this knowledge/skill under supervision.	Practice Level 2	Understanding Use Do and practice Acts with help
Data workers are expected to demonstrate mastery of this skill, solve problems, integrate this with other skill/knowledge sets, apply this learning to new situations and teach others.	Mastery Level 3	Mastery Problem solving Integrate Teach others Complex Act independently Apply to new situations

(CTPAS, VISSP, and Education Development Center, Inc., 1996; adapted 2012)

# Curriculum Analysis Matrix

A tool that enables faculty to compare the extent to which the expected performance of data skills resulting from a pathway's courses meet the expected performance of data skills by pathway graduates.

*Helps organize learning trajectory of data skills within the pathway.*

## Curriculum Analysis Matrix – Data Practitioner

College: \_\_\_\_\_ Program: \_\_\_\_\_ Instructor: \_\_\_\_\_

Code Key: I=Introduced, P=Practiced, M=Mastered, N/A=Not Applicable

Purpose: To compare the level of performance we currently expect of our students in each of our classes to the level students to reach by the end of the program.

Desired Level: Describes the level (I, P, or M) of task performance we desire our students to reach by the end of the

	Desired Level	Course Title:	Course Title:	Course Title:	Course Title:
<b>A. INITIATES THE PROJECT</b>					
A1. Translates business problems into analytic needs.					
A2. Interviews stakeholders.					
A3. Refines stakeholder needs.					
A4. Identifies whether data exists or not.					
A5. Performs gap analysis of the data.					
A6. Determines resource needs (e.g., SMEs, tools, timelines).					
A7. Determines feasibility of analysis to be done.					
A8. Creates statement of work.					
<b>B. SOURCES THE DATA</b>					
B1. Determines data source(s).					
B2. Determines target structure.					
B3. Collects data.					
B4. Exercises quality control (e.g., randomizes selection).					
B5. Extracts data (e.g., writes SQL, API code).					
B6. Cleans data (e.g., identifies outliers/errors).					
B7. Tests data.					

*This tool was developed by Education Development Center and adapted for use with the CT profile. All rights are reserved to EDC and for Conference.*

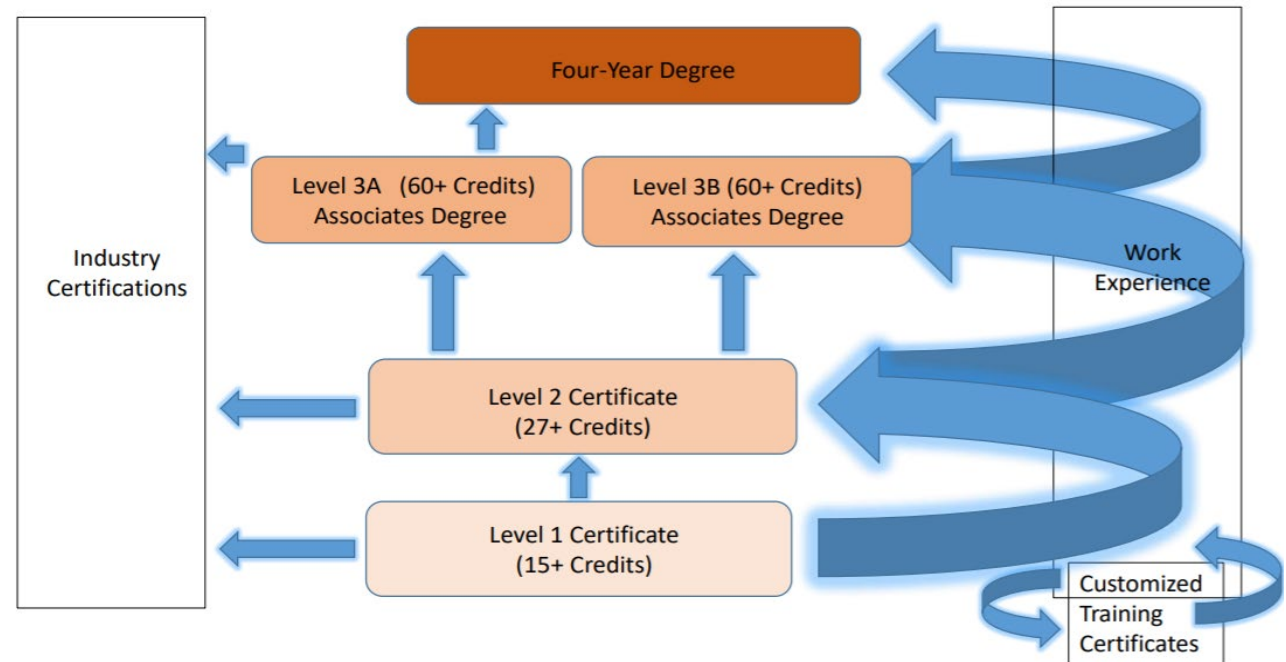
© Education Development Center, Inc. May 1998

# Stackable Credentials Model

A tool that enables faculty to compare the extent to which the expected performance of data skills resulting from a pathway's courses meet the expected performance of data skills by pathway graduates.

*Helps organize learning trajectory of data skills within the pathway.*

Stackable Credentials Model for Data Science and Analytics (Data Practitioner)



# IDENTIFY COMMON LANGUAGE

## Profile of the Data Practitioner

Suzanne Smith, Johnson County CC

### PANEL

*Daniel Boisvert* – Biotechnology  
Biogen  
Cambridge, Massachusetts

*Mike DeFabbo* – Education/ Nonprofit  
OneGoal  
Chicago, Illinois

*Rebecca Hailey* – Marine Science  
Virginia Institute of Marine Science  
Gloucester, Virginia

*Paul Hansford* – Business Consulting  
SimpleSoft Solutions, Inc.  
Dayton, Ohio

*Tony Joy* – Financial Services  
Global Audit Management &  
Consulting  
Urbana, Ohio

*Ryan Kapaun* – Law Enforcement  
Eden Prairie Police Department  
Eden Prairie, Minnesota

*Sean Larson* –  
Medical Device Manufacturing  
Medtronic  
Minneapolis, Minnesota

*Andy Ramlatchan* – Health Care  
Patient Advocate Foundation  
Virginia Beach, Virginia

*Greg Reisz* – Agriculture  
E-4 Crop Intelligence  
Woodbine, Iowa

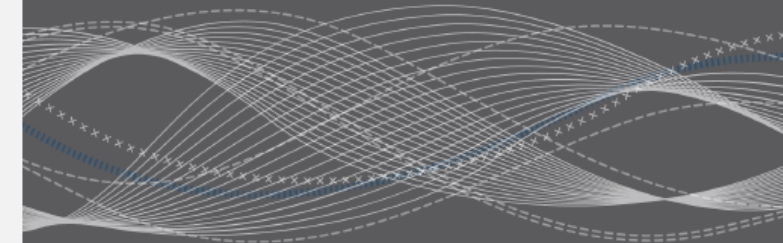
*Joel Wright* – Public Policy  
Wright Consulting Services  
Strawberry, Arizona

### PROFILE FACILITATORS

*Joseph Ippolito*  
Education Development Center  
Cleveland, Ohio

*Joyce Malyn Smith, Ed. D.*  
Education Development Center  
Boston, Massachusetts

# Profile of the Data Practitioner



Initially Developed – April 15-16, 2016  
[oceansofdata.org](http://oceansofdata.org)  
[oceansofdata@edc.org](mailto:oceansofdata@edc.org)



# Data Analytics Certificate

## Suzanne Smith

Johnson County Community College  
Overland Park, Kansas

[www.jccc.edu](http://www.jccc.edu)

### Semester One

DS 210  
Introduction fo  
Data Science  
(3 hr)

DS 220  
Data  
Visualization  
(3 hr)

DS 230  
SQL for Data  
Analysis  
(3 hr)

DS 240  
Statistical  
Programming  
(3 hr)

### Semester Two

MATH 181  
Statistics  
(3 hr)

DS 260  
Data Mining  
(3 hr)

DS 270  
Introduction to  
Machine Learning  
(3 hr)

DS 280  
Big Data  
Architecture  
(3 hr)

## Technologies Taught:

- Python
- Tableau
- Hadoop
- SQL
- KNIME
- Excel

**Learning Occupation:** 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.

DUTIES		TASKS										
1.	<b>INITIATES THE PROJECT</b>	1A. Translates business problems into analytic needs.	1B. Interviews stakeholders.	1C. Refines stakeholder needs.	1D. Identifies appropriate data.	1E. Identifies whether data exists or not.	1F. Performs gap analysis of the data.	1G. Determines resource needs (e.g., SMEs, tools, timelines).	1H. Determines feasibility of analysis to be done.	1I. Creates statement of work.		
2.	<b>SOURCES THE DATA</b>	2A. Determines data source(s).	2B. Determines target structure.	2C. Collects data.	2D. Exercises quality control (e.g., randomizes selection).	2E. Extracts data (e.g., writes SQL, API code).	2F. Cleans data (e.g., identifies outliers/errors).	2G. Tests data.	2H. Creates data dictionary.	2I. Complies with business, ethical and legal standards.		
3.	<b>TRANSFORMS THE DATA</b>	3A. Merges data.	3B. Splits data.	3C. Derives new variables.	3D. Creates new data.	3E. Augments data.	3F. Applies meta-data.	3G. Purges data.	3H. Changes data structure.	3I. Changes data types.	3J. Normalizes data.	3K. Interpolates data.
		3L. Finalizes data dictionary.	3M. Stores data for analytics.									
4.	<b>ANALYZES THE DATA</b>	4A. Determines what analysis to run.	4B. Applies the research method and tools.	4C. Identifies dependent and independent variables.	4D. Defines appropriate algorithms.	4E. Performs data mining.	4F. Separates any anomalies.	4G. Interprets the results.	4H. Runs additional tests as needed.	4I. Performs reasonableness tests of results.	4J. Compares results to previous findings.	4K. Confirms results.
		4L. Conducts causality testing.	4M. Creates data visualizations (e.g., dashboards, reports, charts, graphs, videos, animation).									
5.	<b>CLOSES OUT THE PROJECT</b>	5A. Selects documentation media.	5B. Describes problem, method and analysis.	5C. Articulates conclusions.	5D. Compiles reports.	5E. Presents information to stakeholders.	5F. Integrates feedback from stakeholders.	5G. Defends analysis as needed.	5H. Reworks analysis as needed.	5I. Prepares final report.	5J. Archives work products.	5K. Communicates future processes, improvements and opportunities.
6.	<b>ENGAGES IN PROFESSIONAL DEVELOPMENT</b>	6A. Maintains professional qualifications.	6B. Stays current on emerging technologies, methods and tools.	6C. Seeks out mentors.	6D. Shares best practices.	6E. Contributes new knowledge to the field.	6F. Attends relevant conferences and seminars.	6G. Mentors others.	6H. Participates in professional organizations.	6I. Suggests future projects.		

# IDENTIFY GAPS

## Gap Analysis Tool

James Polzin, Normandale CC



Tools for Building a

## Big Data

Career Pathway

Joyce Malyn-Smith, *Principal Investigator*

Joe Ippolito, *Project Director*

Education Development Center



NSF-ATE DUE 1501927



# Developing a Data Analytics Program

## James Polzin

Normandale Community College  
Bloomington, Minnesota  
[www.normandale.edu](http://www.normandale.edu)

## Associate of Science (A.S.) in Data Analytics

Degree Curriculum: [Degree](#)

Core Courses - 33-35 credits

Code	Title	Credits
CSCI 1111	Introduction to Programming in C	4
CSCI 2001	Computer Programming Concepts	4
CSCI 2002	Algorithms and Data Structures	4
COMT 1181	Database Management Systems	3
DSCI 2000	Introduction to Data Science	3
MATH 2080	Statistical Modeling	3

# Gap Analysis Tool: Industry Importance

## GAP ANALYSIS TOOL/INDUSTRY IMPORTANCE Creating Pathways for Big Data Careers

Name:

Organization:

Your Position:

Your e-mail:

When using this form, consider those individuals in your company who:

- Are data or data enabled workers
- Have 1-2 years experience
- Are Members of a data team
- Do not supervisor other data workers

INDUSTRY EXPECTATIONS	CODES	KEYWORDS
Not important for Data workers at my company	Not Present 0	
Data workers need to be aware of the knowledge/skill but are not required to use it.	Knowledge Level 1	Vocabulary Facts
Data workers are expected to understand, use and practice this knowledge/skill under supervision.	Practice Level 2	Understanding Use Do and practice Acts with help
Data workers are expected to demonstrate mastery of this skill, solve problems, integrate this with other skill/knowledge sets, apply this learning to new situations and teach others.	Mastery Level 3	Mastery Problem solving Integrate Teach others Complex Act independently Apply to new situations

(CTPAS, VISSP, and Education Development Center, Inc., 1996; adapted 2012)

### Industry Partners:

What expectations do you have for the performance of current **Data** workers on the following job functions?

0=Not Present

1=Knowledge Level

2=Practice Under  
Supervision

3=Mastery Level

JOB FUNCTION	Performance Level
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	

# Gap Analysis Tool: School Capability

**GAP ANALYSIS TOOL \ SCHOOL CAPABILITY**  
Creating Pathways for Big Data Careers

Name: \_\_\_\_\_

Course/ Program: \_\_\_\_\_

Email: \_\_\_\_\_

When using this form, consider the current status of curriculum as related to each performance objective

INSTITUTIONAL CAPABILITY	CODES	KEYWORDS
Not covered in curriculum	Not Present 0	
Curriculum introduced through vocabulary, readings and facts.	Knowledge Level 1	Vocabulary Facts
Curriculum provides opportunities to understand, use and practice this knowledge/skill, with the help of an instructor.	Practice Level 2	Understanding Use Do and practice Acts with help
Curriculum provides opportunities to master the skill, solve problems, integrate, act independently, apply this learning to new situations and teach others.	Mastery Level 3	Mastery Problem solving Integrate Teach others Complex Act independently Apply to new situations

(CTPAS, VISSP, and Education Development Center, Inc., 1996; adapted 2012)

**Faculty:**

To what extent does our current curriculum address the performance of these objectives?

0=Not Present    1=Knowledge Level    2=Practice, With Help    3=Mastery Level

DUTY	Performance Level
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	

## Normandale Areas of Specialization

---

# DEVELOP VISION/DEFINE PATHWAY

## Curriculum Analysis Matrix

Michael Harris, Bunker Hill CC

# Data Analytics Certificate and AS Degree

## Michael Harris

Bunker Hill Community College  
Boston, Massachusetts

[www.bhcc.edu](http://www.bhcc.edu)

### Data Management Certificate (FA 2015)

- 5 courses: R, Stats, Problem Solving, Data Vis, SQL (16 credits)

### Data Analytics Certificate (FA 2017)

- 9 courses: R, Python, SQL, Linux

### Data Analytics AS Degree (FA 2019)

- 62-66 cr degree
- Adds Python, Calc, Linear Algebra

## Data Analytics Option AS Semester Breakdown

Semester 1	Semester 2	Semester 3	Semester 4
<b>CIT-113</b> Information Technology Problem Solving	<b>CIT-236</b> SQL Programming	<b>CIT-125</b> Python Programming	<b>CIT-130</b> Data Visualization
<b>MAT-181</b> Statistics	<b>CIT-137</b> Introduction to Big Data with R and R Studio	<b>MAT-291</b> Linear Algebra	<b>CIT-268</b> Windows Operating Systems
<b>MAT-197</b> Pre-Calculus	<b>CIT-234</b> Decision Support Using Microsoft Excel	<b>CIT-187</b> Data Analytics and Predictive Analysis	<b>GenEd-CW</b> Creative Work
<b>ENG-111</b> College Writing I	<b>MAT-281</b> Calculus I	<b>ENG-112</b> College Writing II	<b>CIT-225</b> Advanced Python Programming
<b>GenEd-SR</b> Scientific Reasoning	<b>GenEd-CCC</b> Community & Cultural Contexts	<b>CIT-240</b> Database Programming	<b>GenEd-E</b> General Education Elective

# Curriculum Analysis Matrix

Utilized the CAM for both Curriculum Committee and learning outcomes for course development

Curriculum Committee:

- Used the breakdown of topics for members to understand the organization of the program

Learning Outcomes:

- Focused on the high numbers from the DPP to focus on specific outcomes.
- Helped organize topics in each course, as well as the general progression of knowledge across courses in the program.



	Desired Level	Course Title:	Course Title:	Course Title:
<b>A. INITIATES THE PROJECT</b>		Intro to DS	Data Analytics	Intro to SQL
<b>A1. Translates business problems into analytic needs.</b>	2	I	P	I
<b>A2. Interviews stakeholders.</b>	4			I
<b>A3. Refines stakeholder needs.</b>	2			I
<b>A4. Identifies whether data exists or not.</b>	7	<u>IP</u>	P	I
<b>A5. Performs gap analysis of the data.</b>	8	<u>IP</u>	P	I
<b>A6. Determines resource needs (e.g., SMEs, tools, timelines).</b>	4	I	P	I
<b>A7. Determines feasibility of analysis to be done.</b>	3	I	P	
<b>A8. Creates statement of work.</b>	1			
<b>B. SOURCES THE DATA</b>				
<b>B1. Determines data source(s).</b>	5	<u>IP</u>	P	<u>IP</u>
<b>B2. Determines target structure.</b>	4	<u>IP</u>	M	<u>IP</u>
<b>B3. Collects data.</b>	10	<u>IP</u>	M	<u>IP</u>
<b>B4. Exercises quality control (e.g., randomizes selection).</b>	7	I	P	I
<b>B5. Extracts data (e.g., writes SQL, API code).</b>	8	<u>IP</u>	M	<u>IP</u>
<b>B6. Cleans data (e.g., identifies outliers/errors).</b>	9	<u>IP</u> ,M	M	<u>IP</u>
<b>B7. Tests data.</b>	9	<u>IP</u>	M	
<b>B8. Creates data dictionary.</b>	5		I	I

---

# DEVELOP VISION/DEFINE PATHWAY

## Stackable Credential Model

Paul Hansford, Sinclair CC

# Data Program Offerings

Previous to grant:

- **Data Analytics certificate** as of fall 2012  
**One-year Technical Certificate - 31 Credit Hours**  
[www.sinclair.edu/program/params/programCode/DA-S-CRT/](http://www.sinclair.edu/program/params/programCode/DA-S-CRT/)

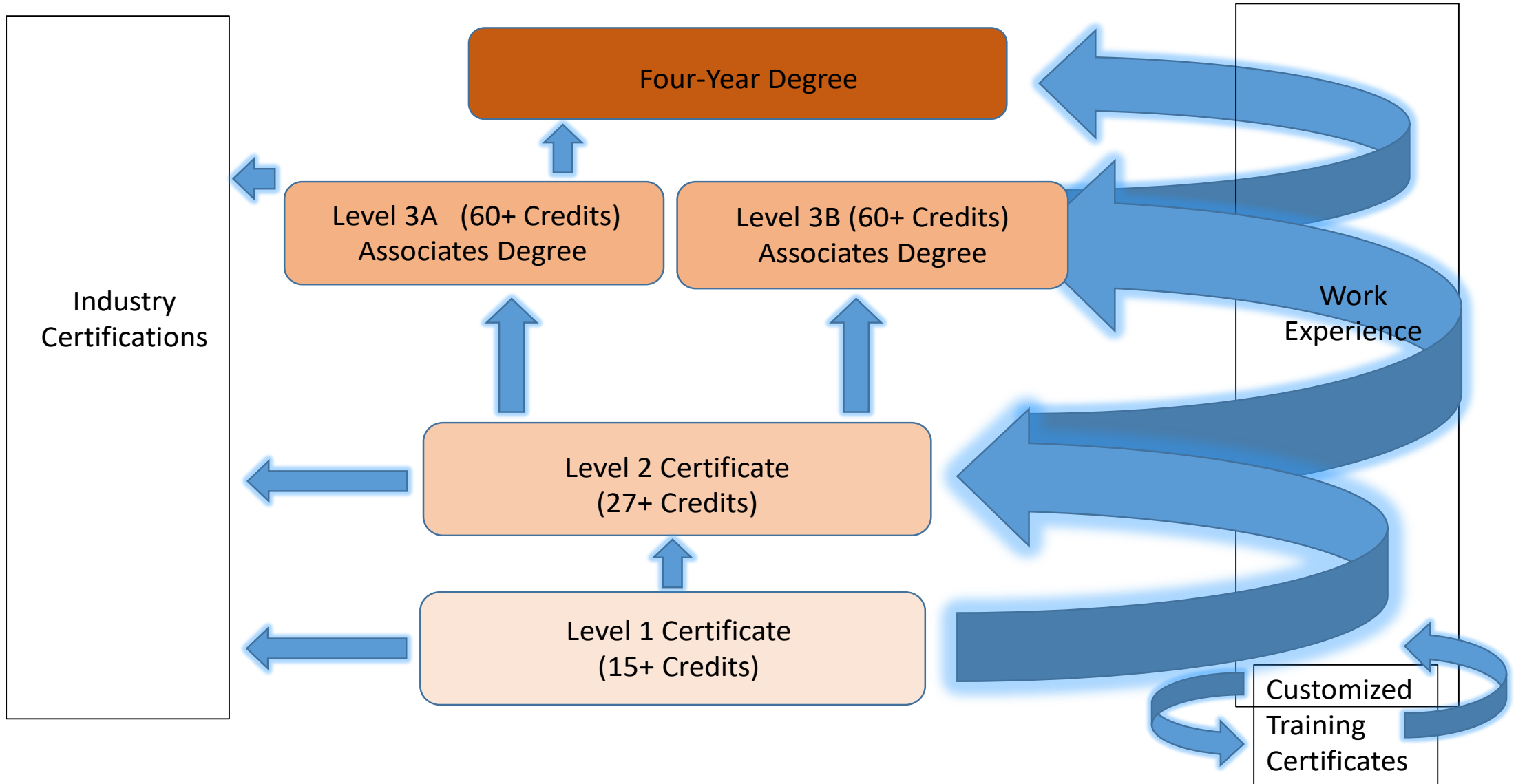
New offerings:

- **Data Analytics Degree** as of fall 2018  
**Associate of Applied Science - 63 Credit Hours**  
[www.sinclair.edu/program/params/programCode/DATA-S-AAS/](http://www.sinclair.edu/program/params/programCode/DATA-S-AAS/)
- **Data Fundamentals** as of fall 2019  
**Short-term Technical Certificate - 22 Credit Hours**  
[www.sinclair.edu/program/params/programCode/DF-S-STC/](http://www.sinclair.edu/program/params/programCode/DF-S-STC/)

## Paul Hansford

Sinclair Community College  
Dayton, Ohio  
[www.sinclair.edu](http://www.sinclair.edu)

# Stackable Credentials Model for Data Science and Analytics (Data Practitioner)



---

# QUESTIONS?

# Tools and Resources

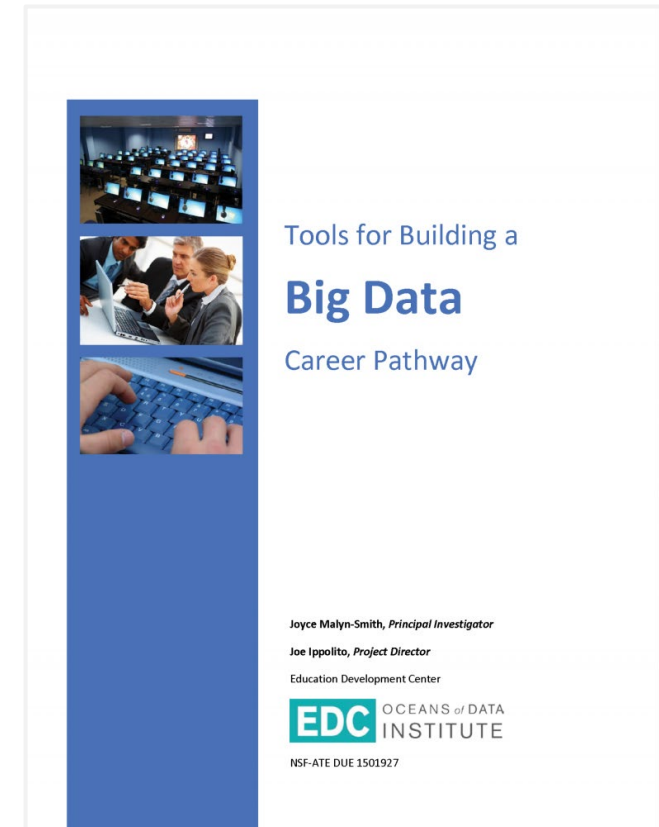
*Tools for building a Big Data Career Pathway*

<https://go.edc.org/BigDataCareer>



*Profile of the Data Practitioner*

<https://go.edc.org/ProfileofDP>



*Additional resources available at [oceansofdata.org](https://oceansofdata.org)*



# JOIN OUR COMMUNITY OF PRACTICE

The *Mentoring New Data Pathways* community of practice will be a place for colleges to learn more about our project, the Data Pathway Development Process, and to interact with and learn from colleagues.

Learn more and sign up on our website:

[oceansofdata.org/data-pathways-community-practice](https://oceansofdata.org/data-pathways-community-practice)

# Thank you!

Sarah MacGillivray, EDC ([smacgillivray@edc.org](mailto:smacgillivray@edc.org))

Joyce Malyn-Smith, EDC ([jmsmith@edc.org](mailto:jmsmith@edc.org))

Suzanne Smith, Johnson County CC ([ssmit348@jccc.edu](mailto:ssmit348@jccc.edu))

James Polzin, Normandale CC ([james.polzin@normandale.edu](mailto:james.polzin@normandale.edu))

Michael Harris, Bunker Hill CC ([mdharris@bhcc.edu](mailto:mdharris@bhcc.edu))

Paul Hansford, Sinclair CC ([paul.hansford@sinclair.edu](mailto:paul.hansford@sinclair.edu))



*NSF ATE grant # 1902568*