



The Analytics Management Capstone

While the coursework of the SMB-A is designed to develop the skill sets of students in Management Analytics topics, equally valuable for managers is experience in managing analytics teams. For that reason the, Analytics Management capstone of the SMB-A is designed to allow students to demonstrate skills gained in coursework, while also exposing them to challenge of managing a small analytics team.

In most cases, the composition and responsibilities of the team will be as follows:

Personnel	Role	Responsibilities
SMB-A Director	Instructor for all Capstones	Provides instruction, guidance, frameworks and timelines for developing and delivering capstone project outcomes. Facilitates pairing of SMB-A students with Project Advisor. Makes final determinations in Project Mentee assignments.
SMB-A Student	Project Lead	Serve as primary contact to data context. Establish tasks and timelines for team. Coordinate any required NDAs across team. Lead descriptive / predictive / prescriptive analysis. Lead report writing and presentation work.
Fisher Undergraduate Student	Project Mentee*	From Feb (start) to April (end): Assist in basic literature search activities. Assist in basic data collection/cleaning activities. Assist in the development of visual artifacts. <i>[Optional: Lead proof-of-concept dashboard development]</i>
Fisher Faculty	Project Advisor*	From Dec (start) to June (end): Recommend on project focus and relevance. Recommend on methods and analysis (as applicable). Reviewer of report writing and presentation. <i>[Optional: Lead publication effort as applicable]</i>

** The SMB-A directors will provide guidance on the recruitment and selection of available and interested Project Mentees and Faculty Advisors.*

For highly proprietary in-organization projects, the SMB-A directors realize that NDAs may be required for faculty advisor and project mentee participation. If data access is too restrictive to allow for Fisher undergraduate mentee opportunities, SMB-A students should identify in-organization mentees (i.e., employees at that same firm who can fulfill the project mentee role).

Project Planning Resources

To help guide initial thoughts, and the ultimate development of this project and its deliverables, students and their teams will make use of several frameworks.

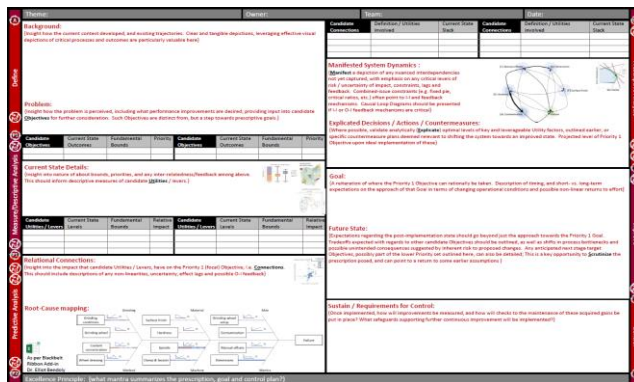
The OUTCoMES Cycle

An iterative process used to structure otherwise unstructured or poorly structured real-world problems. The approach identifies core performance objectives, critical levers and salient limitations on managerial decision making. Used with a host of analytical tactics, the approach aims to provide actionable prescriptions to practice.



<https://fisher.osu.edu/graduate/smb-a/outcomes-cycle>

Systems-Oriented A3

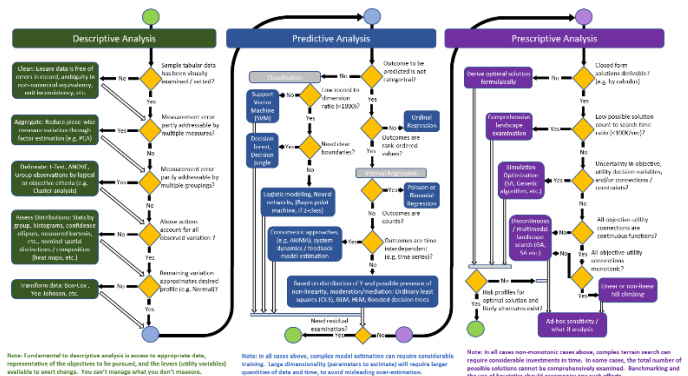


<http://www.experimental-instruments.com/SystemsA3.pptx>

To support documentation throughout the OUTCoMES Cycle, and to assist in the final presentation of project results, students and their teams must complete both a preliminary A3, for early feedback on project plans, as well a final A3 for presentation and as part of your final project report. A soft-copy of an A3 in PPT form is publicly available, mapping to steps in the OUTCoMES cycle.

Management Analytics Decision-Tree

To help you think about the analytical tools and tactics that might prove useful in each stage of your project journey, the International Institute for Analytics provides a useful decision-tree framework. This framework can guide you in the selection of analytical approaches from descriptive, to predictive and through prescriptive stages of your work.



www.experimental-instruments.com/DataAnalyticsFramework.pdf

Rough Schedule of Sessions with Capstone Director / Instructor

(for all SMB-A students, regardless of team project advisor)

{L = In-person/Live}{A = Asynchronous}

Fall Seminars (1-hour sessions every two weeks)

1. Introduction to the OUtCoMES Cycle, Systems-Oriented A3, and Management Analytics Decision Tree. Q&A Session on Capstone Project.{L}
2. Identifying opportunities on the job and with industry partners; Current needs versus stretch projects. [Mapping current states A3].{A}
3. Assembling and managing an analytics team – Assessing availability, Roles/responsibilities, Setting and meeting timelines, Correspondence.{A}
4. Sharing and Feedback Advisory (Note: Project Topic/Concept Draft, and identification of data access sensitivity - Oct){L}
5. Objectives: Specifying and rating candidate objectives by priority, value, measurability and prospective impact. [Tracking and reference on A3].{A}
6. Utilities: Specifying and rating candidate utilities (levers) by priority, value, measurability and prospective impact. [Tracking and reference on A3].{A}
7. Sharing and Feedback Advisory (Note: Objective and Utility concept mapping, and faculty advisor identification due – December){L}

Spring Seminars (1-hour sessions every two weeks)

8. Sharing and Feedback Advisory (Note: Mentee application review begins – January; Project Team Commits Due – February 1){L}
9. Connections-1: Documenting likely dependencies and fundamental univariate rules binding objectives and utilities. [Tracking / reference on A3]{A}
10. Connections-1: Anticipating impacts of utilities on objectives, and impact of utility shifts on the bounds of others. [Palisade suite and related tools]{A}
11. Sharing and Feedback Advisory (Note: First Compreh. A3 Draft Due - Mar){L}
12. Manifest: Sufficiently-systematic model rendering. Sandboxing models, use of simulation tactics. [Palisade suite and related tools]{A}
13. Explicate & Scrutinize: Prescription, practical examination, and returns to assumptions. Decision Tree revisited. [Palisade suite and related tools]{A}
14. Sharing and Feedback Advisory (Note: SMB-A feedback on Project Mentee contributions due end of April) {L}

Summer Advisory (Two 1-hour sessions every week for 7 weeks)

(Note: Project Reports due June, Presentations in end of June){L}

Overview and Checklist of Deliverables

- ☐ Project Topic/Concept Draft *(Due October)*
 + Identification of data access sensitivity
- ☐ Objective and Utility Mapping *(Due December)*
 + Identification of Faculty advisor
- ☐ Mentee Review Begins *(January)*
- ☐ Project Team Commits *(Due February 1st)*
- ☐ First Comprehensive Draft A3 *(Due March)*
- ☐ Feedback on Mentee Contrib. *(Due April)*
- ☐ Project Report *(Due end of June)*
 - ☐ 1. Introduction
 - ☐ 2. Background
 - a. Organization
 - b. Problem being examineded
 - c. Available data
 - ☐ 3. Data
 - a. Sample selection
 - b. Sample size and structure
 - ☐ 4. Analysis
 - a. Descriptive
 - b. Predictive
 - c. Prescriptive
 - ☐ 5. Conclusions/Recommendations
 - a. What was learned
 - b. Suggested interventions
 - c. Expected outcomes
- ☐ Final Presentation A3 *(Due end of June)*
- ☐ Slides + Oral Presentation *(Due end of June)*

Sample Report Outline

SMB-A Capstone Project Report – BUSML 7249 Project Title

by ...

1. Introduction

Provide a general overview of your project and the main conclusions of your analysis. The introduction should motivate the reader to want to continue to read your report.

2. Background

Provide (a) relevant background information on the organization/client your project is intended to serve; (b) describe the project's motivation and clearly articulate project's goals/objectives and the substantive question/questions being examined in your analysis.

3. Data

Discuss the sample and variable selection processes and how the particular variables you have selected to study are relevant to the substantive questions (in the introduction), etc. Describe the data (sample size and structure) you have used in your analysis, including descriptions of the variables, data sources, any issues with it (e.g., missing values) and how you have dealt with those data quality issues.

Also describe your findings from any exploratory data analysis, including any interesting patterns or relationships that could be important, any findings that prompted you to consider transformations, and any coding issues that you had to address (such as coding qualitative data with dummy indicator variables, etc.).

You might also like to include a few well-chosen graphs that reveal particularly interesting patterns in the data, or a table containing some relevant summary statistics (such as means, standard deviations, minimums, maximums, category proportions, etc.).

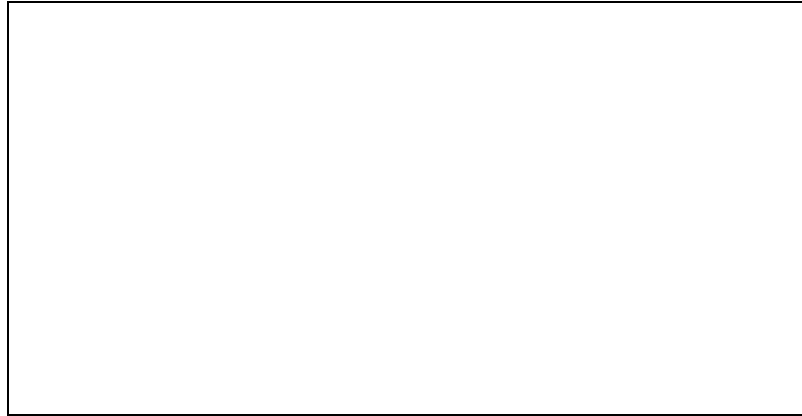


Figure 1. The upper left graph shows a histogram of some variable or other and shows The upper right graph shows boxplots of some variable for different categories represented by some other variable and shows The lower left graph shows a scatterplot of variable Y versus variable X and shows The lower right graph shows a bar chart of frequency counts of categorical variable Z and shows

Table 1. Summary statistics for variables in the dataset. Column 1 contains Column 2 contains Column 3 contains Column 4 contains. There were N missing values for variable X and M missing values for variable Y – see below for how we dealt with this in subsequent analysis.

Figure 1 contains graphs showing the most interesting and relevant patterns we observed in the data. Table 1 contains summary statistics for the variables. We dealt with the missing values in variables X and Y by This had such and such an impact on subsequent analysis.

Also make sure to describe how you partitioned the data for subsequent analysis into training, validation, and test samples.

4. Analysis (using Descriptive, Predictive and Prescriptive Techniques)

Give a thorough, but concise description of the descriptive, predictive and prescriptive analyses you conducted to address the substantive questions outlined in the introduction.

Make sure that you provide sufficient details that anyone reading your report could replicate what you have done.

Include details of any relevant calculations, useful output, charts, etc.

If, as recommended and when feasible and appropriate, you employ more than one technique to analyze your data, make sure you compare and contrast the relative strengths and weaknesses of each technique in relation to your sample.

This “analysis” section should be the longest section of your report, but don’t feel the need to provide all the “gory details” of everything you did. Model building is a very creative process, invariably involving many false starts and back-tracking. By all means briefly mention some of the less successful or inconclusive things you tried, but devote more of the limited space you have telling me about the things you did that worked and that proved to be important and useful for achieving the main goals for the project and understanding the questions you were trying to answer.

5. Conclusions and Recommendations

Draw appropriate conclusions from your results and relate them back to the questions from the introduction. What was learned? Present your conclusions clearly, but don’t overstate what you’ve found; e.g., many of the techniques rely on particular assumptions being satisfied, and you may well have found significant relationships between certain variables, but these are more than likely evidence of probable associations, not necessarily evidence of cause and effect.

What are the implications of your findings for your client organization? How would you recommend they use these findings? What would be the expected benefit/impact/outcomes? What would you recommend they do next? You could also mention possible follow-up studies that would be useful based on your results and conclusions.

Summarize the most important and relevant results from your analyses in a separate section. Take care to present your findings in a compelling way, using tables and/or graphs if appropriate.

You might consider doing additional calculations based on your results that show the value of your analysis – this might require you to make some assumptions about costs, or customers, or something else so that you can provide some “potential scenario outcomes.” For example, you might be able to come up with some projected net profit figures assuming costs are such and such – if costs are twice this, net profit would be reduced by \$X.

Appendix

Try to limit the main part of the report to about 15 pages (11 or 12 point font, 1" margins), but if you need to include supplementary material (e.g. supplementary information, markdown files, R output, etc.) you can include this in an appendix. There is no guarantee that we will read the appendix; however, so make sure that everything important goes in the main part of the report.