

NATIONAL UNIVERSITY OF SINGAPORE
School of Business
Department of Analytics and Operations

DSC4215 Supply Chain Visualization

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Course Outline

Broadly speaking, business activities typically fall into three categories: (i) making sense of a situation, (ii) making a decision and (iii) executing on decisions. As the title implies, this course is about the use of visualization to support analysis (of the present state of affairs) and decision making (comparison/advocacy of alternative courses of action).

We will work with relational data sets (collections of related tables), manipulating the data and generating visual representations. We will build a thorough conceptual understanding of how data aggregation processes support reporting and visualization. We will see how interactivity supports data exploration and counterfactual (“what-if”) analysis. Through this, we will learn how to tell stories with data and communicate ideas more effectively.

This course will include a substantial hands-on-learning component, and supports the development of highly marketable skills in visualization. Applications will be drawn from operations, supply chain management and other aspects of business.

Learning Outcomes

Building on an existing foundation of business analytics knowledge, with this course, students will:

- Gain some understanding of underlying data aggregation processes
- Gain familiarity with the elements of visualization on a two-axis canvas
- Learn to explore and interrogate data sets using (possibly “multi-level”) aggregations, filters, “highlighters”, and other tools
- Learn to create interactive visualizations for effective communication
- Gain awareness of the major aspects of data-driven IT projects

Software and Technology

We will use Tableau, a Business Intelligence software tool (for which skills are highly sought), to explore data, create interactive visualisations and develop data-driven presentations. *Students may obtain 1 year student licenses via the website (student status letters that indicate the duration of enrolment will be required as supporting material). Arrangements are being made with Tableau to obtain licenses in bulk. Students may make use of the default 14-day trial in the interim.*

We will also explore various means of engagement and collaboration.

Assessment Breakdown

Class Participation	10%
Individual and Group Assignments	40%
Mid-term	20%
Final Group Project	30%

Class Participation

This component of assessment will be based on the instructor's subjective "holistic evaluation" of the "quality and quantity" of contributions to the learning of the class. Aside from the usual in class discussions, students may, in groups of three or fewer, contribute through brief 5 min "how to presentations" on Tableau or visualization methods in general. Emphasis is placed on value to the class.

Individual and Group Assignments

The following is most of the guidance that will be provided for the various assignments. This is a course for senior students and you will be expected to interpret the requirements. Do showcase of any specialized knowledge/experience that you have. While the rest of the outline may be fluid, this assessment plan is mostly stable. (The specificity below is meant to be an aid. Deviations are subject to approval: e-mail me.)

Business Intelligence Product Brief I (3%)

- Select a business intelligence product and provide a briefing on its value proposition
- Your submission should be no longer than two pages (single spaced); one if there are no diagrams

Supporting a Business Idea (Group Assignment) (15%)

- A data set will be provided to the class (probably one with a geographical element)
- Develop a "business idea" (e.g.: a service) and support it using the data set
- This is intended to be a substantially scaled down version of the final project

- You should submit a short “pitch deck” (at most 20 slides; printed, 2 slides per side preferably) and a short pitch video (up to 5 minutes) pitching the business idea
- A simple narrated video that alternates between slides and dashboards would be sufficient
- Upload the video to YouTube and make it unlisted if necessary (we may view some in class)
- Note: Most groups should be formed by the end of week 3.

Adding Interactive Visualization to Past Work: How and Why (7%)

- Select a past assignment and describe how it might be enhanced using interactive visualization
- Design supporting visualizations (possibly “multi-diagram”; hand-drawn submissions welcome)
- Focus on the interactions and explain how they add value to the respective task
- Your submission should be substantially visual and no longer than 5 pages

Business Intelligence Product Brief II (15%)

- This is an expanded version of a previous assignment
- You are part of a 5000-strong organization and senior management has identified the need to improve/build certain capabilities (what and why) and have tasked you to identify a business intelligence tool for adoption
 - Task: You are to make up the rest of the context and articulate it under the heading “Background” as if for a new independent director. (Up to 1 page in length)
 - Here, you are framing the problem and gathering requirements.)
- You have identified one such tool and you are to write a proposal for adoption
 - Task: Pick one, possibly different from that in your previous assignment that is not Tableau
 - You are not required to include a detailed comparison of alternatives
 - Your proposal should be no more than 5 pages in length
- In all, your submission should be no longer than 6 pages (single spaced)

Mid-term

This will be a one hour written paper covering the content of the first half (pre-Recess Week) of the semester. This is tentatively scheduled to be held in week 8.

Final Group Project

Project teams will be responsible to seek out a business problem with an accompanying data set, apply an appropriate business analytics solution methodology and present the situation and a proposal. The data set need not be “big”, but visualization **must** play a crucial role. Problem domain issues may be organized and presented using appropriate frameworks such as the Five Forces, Business Model Canvas, and so on.

While business problems from companies are more desirable, students are welcome to create “synthetic data sets” and present work that is more methodological (focuses on demonstrating technique). Students required to and are responsible for seeking the instructor’s approval for topics. This should be done before the end of week 7.

Groups should provide the instructor with a printed set of slides (2 per page or 4 per page as appropriate; light/white backgrounds) prior to their presentation. *Tentatively*, each group will have 15 minutes split between presentation and Q&A, with a maximum of 10 minutes for presentation.

Final submissions are to be placed in a thumb drive and should generally include:

- a report (up to 15 pages single spaced; both pdf and source format)
- the data set
- dashboards
- a presentation deck (possibly in the same file as the dashboards)
- a video describing the use of the dashboards
- (also include the video from your previous Group Assignment for “record purposes”)

Groups will be assessed on: (i) comprehensiveness & rigor, (ii) “value added” through analytics, (iii) presence & clarity of presentation, (iv) ability to respond to “reasonable” questions, (v) subjective impressions of the instructor, and (vi) optional peer review (submitted by individuals to the instructor).

References

Nathan Yau (2011), Visualize This: The FlowingData Guide to Design, Visualization and Statistics, Wiley.

Cole Nussbaumer Knaflic (2015), Storytelling with Data: A Data Visualization Guide for Business Professionals, Wiley.

Allen B. Downey (2015), Think Stats: Exploratory Data Analysis, 2nd Edition, O’Reilly.

Steve Wexler and Jeffrey Shaffer (2017), The Big Book of Dashboards: Visualizing Your Data Using Real-World Business Scenarios, Wiley.

Tentative Schedule

Students should note that the schedule, assignments and due dates are subject to change. Assignments are due by the end of class for a student’s respective section in the respective week.

<i>Week</i>	<i>Visual Analytics</i>	<i>Tableau</i>
<i>1</i>	Introduction to Visual Analytics	Introduction to Tableau
<i>2</i>	Data Aggregation for Reporting <i>Assignment Out: Business Intelligence Product Brief (2 weeks)</i>	Data Sources to Views Elements of Charts “Pills” (Fields) to Charts
<i>3</i>	Exploratory Data Analysis <i>Assignment Out: Supporting a Business Idea (Group Assignment; 7 weeks)</i>	Organizing Data Interactivity (Part 1)
<i>4</i>	Communicating Information Visually Storytelling with Data <i>Due: Business Intelligence Product Brief</i>	The Analytics Shelf Dashboards and Stories
<i>5</i>	A Dip into Visual Design Front End Planning for Analytics Projects	LOD Expressions: Working at Multiple Levels of Detail
<i>6</i>	Visualization for Decision Support	Table Calculations: Computations on Aggregates
-	Recess Week	
<i>7</i>	Experiments in Business	Cross Sheet Interactions
<i>8</i>	“Midterm” <i>Assignment Out: Adding Interactive Visualization to Past Work: How and Why (5 weeks)</i>	Animations via Pages Dashboard Design
<i>9</i>	Analytics & Operations: Impact on the Buy/Make/Move/Sell Supply Chain Levers <i>Assignment Out: Business Intelligence Product Brief II (4 weeks)</i> <i>Due: Supporting a Business Idea</i>	Additional Topics in Tableau <ul style="list-style-type: none"> • R/Python Integration • NoSQL Data Sources • Extracts
<i>10</i>	Introduction to “Data Science” Working with “Data Scientists”	
<i>11</i>	Innovation with Analytics in Organizations Data Ethics, Privacy and Public Policy	
<i>12</i>	Final Project Presentations	
<i>13</i>	<i>Spare</i> <i>Due: Adding Interactive Visualization to Past Work: How and Why</i> <i>Due: Business Intelligence Product Brief II</i> <i>Due: Final Project Submissions</i>	
-	Reading Week	