RBS’ New BAIT Major: Business Analytics and Information Technology

“Introducing the New Business Analytics Major”
October 5, 2011
Special Thanks To:

- **Thomas A. Capone**, MTP-USA
- **David Hunt**, Oliver Wyman (subsidiary of Marsh and McLennan)
- **Gary Oeters**, Bloomberg
- **David Rosner**, Deloitte

For their support and participation in this event.
What is “BAIT”?  

• Short version: computers and math for business  
• Longer version: business is in the information age  
• There are three levels to using information:  
  – Information Technology: using computers to capture, store, organize, and search your data  
  – Data Analysis: understanding patterns in the data  
  – Decision Modeling: using the data to make better decisions and plans  
• Together, these are Business Analytics and Information Technology (BAIT)  

• Thomas A. Capone, Chairman & CEO, MTP-USA: “Business Analytics and Information Technology (BAIT) is the future of business”
Information Technology and Analytics – a natural progression

- Information technology (IT)
  - How do we set up the firm’s information systems?
  - How do we organize and manage the firm’s data?

- Analytics: using the information
  - Understanding what the information means – finding trends and relationships
  - Planning and decision making (possibly complicated) using the information

- Information systems must do increasing amounts of analytics
JOBS: Projected shortage of 140,000-190,000 people with deep analytical talent in the US by the year 2018.

Source: “Big data: The next frontier for innovation, competition, and productivity,” McKinsey Global Institute, June 2011
BAIT-Related Core Courses
Required for All Business Majors

- **Management Information Systems (33:623:370)**
  - IT: computer tools for storing and organizing information
  - Accounting majors take “AIS” (33:010:458) instead

- **Statistical Methods in Business (33:623:385)**
  - Analytics / understanding: statistical tools for understanding what your data mean
  - Second statistics course: Statistics department teaches first statistics course (01:960:285)

- **Operations Management (33:623:386)**
  - Analytics / decision making and planning
  - Building mathematical models of business situations
  - Also builds spreadsheet skills
Business Analytics and Information Technology Major

- **Approved** by the RBS faculty in May 2011

- **Available** starting with Rutgers graduating class of 2014

- **Balanced** combination of “traditional” IT and analytics
  - *IT* – computer systems managing information
  - *Analytics* – taking advantage of the information
    - To better understand business and customers
    - To make smart plans and decisions
Why should you be interested?

• There is a shortage of qualified IT hires

• Analytics is currently a “hot” business topic
  – But with staying power

• Interesting, useful material
  – Not tied to one particular industry
  – Distinguish yourself with important skills
Business Analytics Careers:

- Life Sciences
- Education
- Financial Services
- Energy
- Information Technology
- Entertainment
- Government
- Wholesale Trade
- Manufacturing
- Banking
- Electronics
- Retail Trade
- Food Processing
- Consulting
- Transportation & Logistics
BAIT Curriculum Designed by

• Distinguished Rutgers Faculty

• Distinguished Representatives from:
  - Accenture
  - Bloomberg (2)
  - Citi Group (2)
  - Deloitte
  - Johnson and Johnson
  - Oliver Wyman (subsidiary of Marsh and McLennan)
  - Price Waterhouse Coopers
  - Thomson Reuters
BAIT Curriculum:

- All RBS core courses
- Four required courses
  - 33:623:485 Time Series Modeling for Business
  - 33:623:400 Business Decision Analytics under Uncertainty
  - 33:623:388 Foundations of Business Programming
  - 33:623:470 Business Data Management
- At least three electives drawn from
  - 33:623:471 Information System Security
  - 33:623:487 Large-Scale Business Data Analysis
  - 33:623:494 Data Mining for Business Intelligence
  - 33:623:473 Enterprise Information Architecture (in development)
  - 33:623:405 Risk Modeling
  - 33:623:486 Optimization Modeling
  - Up to two courses from approved “external” list (Computer Science, Statistics, Mathematics, Supply Chain)
BAIT Career Aspects

• IT aspects

• Analytical aspects
  – Understanding available data
  – Using the data and understanding to make potentially complicated plans

• And our example was for just one possible industry
  – Both IT and Analytics apply in nearly every modern firm beyond a few employees
  – Valued by employers in all industries
  – Especially IT-focused employers
Example

- I go to an airline website and
  - Reserve a flight to Chicago
  - Pay by credit card
- A few weeks later, I go to the airport and get on the plane
Many of the IT Aspects are Visible

- Browsing flights and seats on the web
- Paying by credit card over the web
- Check-in and boarding passes at airport

Technology behind it...
Relational Databases

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## Linking Databases and Web Servers

### Nonstop Flights from $219

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But there’s a lot of Analytics behind the scenes too...
What size plane to use on that flight?

• Where does that plane fly in from?
• Where does it go next?
• Need to understand customer demand for flight and relationship of the flight to the entire flight network
Data Analysis the Airline Needs

- What will customer demand for a given flight be, depending on ticket prices and date?
- How is demand for a particular departure shaping up?
- What factors influence consumer choice for flights?
- Where are fuel prices headed?
Flight crew and cabin crew

• Are they flying in from somewhere else first?
• If so, where?
• Where do they go next?
Setting up the route network
Analytics in use: Local Government Policy
The Cross Harbor Tunnel

- **Problem**
  - If a new freight rail tunnel is built to link NJ and Long Island, how much traffic would it attract?

- **Analytical Tools**
  - Logistics regression (choice model)
  - Maximum likelihood estimation
  - Spreadsheet modeling
  - Microsoft access database

- **Real-World Problems**
  - Working with a data sample
  - Local politics (strong opinions for and against this tunnel)

- **Results**
  - The estimated traffic volumes are being used in further analytical studies to estimate economic and environmental consequences.
Analytics in use: Federal Government Policy
National Rail Capacity Model

- Problem
  - A US Senate Commission asked how much it would cost to expand US freight rail capacity to meet the demand in the year 2035?

- Analytical Tools
  - Forecasting
  - Parametric statistical model
  - Spreadsheet modeling
  - Microsoft access database

- Real-World Problems
  - Railroads were reluctant to share information
  - Risky: never before been modeled

- Results
  - It will require $148 billion investment to eliminate the congestion in the top map (shown at right), to achieve the bottom map. Results were presented at a press conference on Capital Hill.
Analytics in use: International Business Decisions
Kazakhstan National Railroad – Reducing Operating Costs

- Problem
  - What changes can the National Railroad of Kazakhstan make to lower operating costs?

- Analytical Tools
  - Shortest path algorithm
  - Microsoft access database
  - Oracle database
  - Oliver Wyman developed railroad planning models

- Real-World Problems
  - Huge databases
  - Different way of thinking about railroad operations
  - Language

- Results
  - We were able to identify several opportunities for more direct routing of trains that lead to over $25 million in savings to the railroad.

Source: David Lefebvre, April 2016
Analytics in use: International Business Decisions
South Africa Railroads – Locomotive Utilization

- Problem
  - How can Transnet, the South African freight railroad, better utilize their locomotives so they can haul more freight?

- Analytical Tools
  - Optimization (Integer Programming)
  - Mosel/Xpress Optimization Solver
  - Oracle database
  - C++

- Real-World Problems
  - Messy data
  - Multiple layers of acceptance
    - Management
    - Field operations

- Results
  - Presented a new operating plan that more efficiently utilized their locomotives and increased the amount of tons they could haul.