Course Summary

Summer 2003
Where Have We Been?

- Course Philosophy and Approach
- Decision Trees
- Probability – Discrete and Continuous
- Simulation
- Regression
- Decision Making Examples and Exercises
- Communicating with Data
What Have We Learned?

Concepts
- Uncertainty, distributions
- Populations, samples, estimates, confidence intervals
- Central Limit Theorem, correlation, diversification
- Simulation, estimation, validation
- Decision heuristics (informal rules)

Analytical Tools
- Trees, laws of probability, regression, Crystal Ball, ...

Thinking Skills
- “Seeing as”
Decision Analysis Procedure

- List the GOOP
- Construct a decision tree
- Evaluate the endpoints (outcomes)
- Assess probabilities for the branches
- “Expect out and fold back” – Backwards induction
- Sensitivity Analysis
- Interpretation – what does it mean? What decisions should we make?
The Need for Simulation

If we know data with *certainty* (as we supposedly do when preparing analyses based on historical data), calculating EMV (etc.) is trivial…

However, when the data are uncertain, as they are when estimating *future* results or generalizing from a *sample* to a *population*, the *uncertainties* associated with random variables result in a large number of scenarios…

Just looking at a *single* profit figure based on expected values totally ignores the fact that actual results may deviate significantly from the expected value.
“Seeing As…”

Don Schon, MIT Professor for many years, wrote about how professionals learn to see a real-life situation from a new and useful viewpoint. He called this mapping process “seeing as.”

In this course, we were trying to help you take business problems and see them in new ways: transformed in ways that can be analyzed with our tools.

But you must also step back and ask the larger questions about validity, appropriateness, usefulness, and effectiveness.

Communication is a part of every business problem. Statistical analyses do not convince most people! You don’t want to be the “Cassandra” of your company.
Analysis and Judgment

Analysis informs judgment, builds intuition

Analysis is not a substitute for judgment
The “As If” Game

“Seeing as” means thinking “as if”
- Discrete distributions may be treated as continuous
- Averages are distributed normally
- Nonfinancial issues can be given $ value
- Situations are a sample from some population, so unique problems can be handled in generic ways

But, don’t forget that “as if” is only a hypothesis
- Use the models for insights, not just answers
- Check the validity of the models
- Step back and think about the big picture
- Keep developing your judgment and thinking skills
Implications for Communicating

- Know your audience! Try to understand what they want, what they know, how they think, and their attitude toward you and your message.

- Most people frame decisions and make estimates in very intuitive ways that are concrete and based on simple heuristics.

- You can choose to educate the audience to other ways of framing and analyzing a problem, or to “start where they are at” and give them information in ways that will be persuasive.
How Do People Decide?

- Guesswork
- Experience
- Extrapolation
- Calculation

Intuition → Analysis

- Framing (structuring of problems): reference points, etc.
- Anchoring and adjustment
- Availability and confirmation biases
- Similarity and concreteness
- Communicating about risk
Experts and Models

- What do experts do best?
- What do computers do best?
- How can they be combined?
- Should we give the model to the expert or give the expert to the model?
Batterymarch Example

- Stock portfolio company
- Manage $12 Billion with 37 employees
- Experts identify variables, suggest rules, design tests, deal with clients
- Computer keeps databases, runs tests of rules, buys and sells stocks
- 10-12 rules identify attractive stocks
The Necklace Problem

A woman buys a $78 necklace at a jewelry store. She gives the jeweler a check for $100. Because he does not have the $22 change on hand, he goes to another merchant next door. There he exchanges the woman's check for $100 in cash. He returns and gives the woman the necklace and her change. Later the check bounces and he must repay the other merchant. He originally paid $39 for the necklace. What is his net cash (out-of-pocket) loss?
Lessons From the Necklace Problem

- There are easier and harder ways to frame the necklace problem
- We like confirming evidence (agreement)
- We often find ourselves with others who agree with us (availability)
- But, not everyone agrees with us
- It’s important to seek out disconfirming information from those with different viewpoints
- Just like in diversification and multiple regression, having some quasi-independent inputs helps!
Where To From Here?

- Leadership, Strategy, Innovation, Marketing courses
- Advanced statistics courses (e.g., Barnett)
- Simulation and modeling courses, including System Dynamics (e.g., 15.871, 15.874 Sterman)
- Advanced Communications courses (15.281)
- Decision Making/Negotiation courses (e.g., 15.067, 15.665 Kaufman, Curhan)
- Organizations courses (e.g., 15.569 Orlikowski/Senge, 15.394 Leading Entrepreneurial Organizations)
- Do an interesting thesis!
- Have a great life!
Final Thoughts

- This has been a challenging course!
- It is only the beginning
- It is up to you to continue practicing ways to “see” differently, and ways to integrate what you are learning from different courses into your business (and personal) decisions