Critical Thinking with Structured Analytical Techniques

Presented by Darrel Raynor, PMP, MBA
DARaynor@DataAnalysis.com
Objectives

• Understand what **Structured Analytical Techniques** are
• Understand why structured approaches are necessary
• Recognize **common cognitive biases** that can adversely affect decision making
• Recognize situations where Structured Analytical Techniques can be used
Exercise – 5 Seconds!

• A bat and a ball cost $1.10 together. The bat costs $1.00 more than the ball. What is the price of each?
Answer

• If you answered $1.00 for the bat, and $.10 for the ball, you are in good company!
  – Over 50% of Ivy League graduate students gave this answer
  – And it is wrong
• Correct Answer
  – $1.05 for the bat
  – $.05 for the ball
Heuristics

• Often used when we want a quick answer
• Not necessarily wrong to use
  – What if your son said he was on his way to the store to buy a bat and showed you that he was taking $.50 with him?
  – Even the wrong calculation would answer the question “Do I have enough money?”
• But Heuristics are seldom enough for important decisions
  – What if this had been your daughter’s make-or-break entrance exam question to college?
• For these sorts of questions, we must employ analytical methods
Classification of Analytical Methods

- Expert Judgment (Qualitative)
- Quantitative Methods (w/ Expert Generated Data)
- Quantitative Methods (w/ Empirical Data)
Evolving Issues with Current Methods

- Growing complexity of problems
- Requirements to share information
  - Analysis and Decision making by separate entities
  - Growth of Governance & Compliance
- Dispersion of expertise
  - Across organizations, between organizations
- Identify/judge validity of alternative mental models
Issues Based Upon Individual and Group Thinking

- **Individuals**
  - Cognitive Biases
  - Framing that encourages/discourages
  - Pattern Misrecognition

- **Groups**
  - Sidetracks
  - Bullying
  - Personalizing differences of opinions
  - Committee Think…
Consider Cognitive Biases

- Economic theory assumes the individual is perfectly rational

- This ignores the often demonstrated fact that individuals are actually “boundedly” rational

- Often seek “satisfactory” answer vs. the optimal one

- Some have anti-quantitative bias
Examples of Cognitive Biases

- Over Confidence
- Sunk Costs
- Recency Effect
- Confirmation Bias
- Anchoring Bias
- Illusory Correlation
- Hindsight Bias
Example #1: Sunk Cost

- Money already spent
  - Should ignore sunk costs and proceed by marginal cost alone

- High sunk costs have been shown to escalate this effect
  - Perhaps due to “loss aversion”
  - High NFL draft choice isn’t working out, but played anyway since not to do so would be to “waste the money” spent on him
Example #2: “Recency” Effect

- Recent experience biases judgment
- May be the most available information
- “Things are different this time”
  - Dot Com bubble of the late 90s – entrepreneurs did not have enough experience with speculative bubbles to recognize one. In their judgment, older business leaders “just didn’t get it”.
Example #3: Confirmation Bias

- After a point, additional information gathered to help make a decision does not add anything to the process (see graph)
  - Confirms us in already reached decision.
  - Information is discounted that does not agree with already reached decision.
Confirmation Bias

Probability Of Correct Decision

Assumed Relationship

Amount of Information Considered

Actual Relationship
Example #4: Hindsight Bias

- Remember the wins, forget the losses
- Tends to become greater with passing time
  - Polls taken after an election sometimes show that a higher percentage of people claim to have voted for the winning candidate than the actual election results demonstrate
Additional Methodology Necessary

Analytical Methods

- Expert Judgment (Qualitative)
- Quantitative Methods (w/ Expert Generated Data)
- Quantitative Methods (w/ Empirical Data)
- Structured Analysis
Structured Analysis

• Technique by which internal thought processes are externalized for purposes of:
  – Sharing
  – Critiquing
  – Expanding upon ideas
• Breaks down problems into specific parts
• Specifies step-by-step process for dealing with the parts
• Ensures effective communications at the problem-solving level
Structured Analytical Techniques

• “Technique” preferred to “Method” because it is a guide rather than a way of determining a definitive answer
• In practice, these techniques together form a methodology
  – Principles
  – Procedures
• Helps counter current analysis issues
• Supports team approach
Structured Analytical Techniques

• Based upon
  – Understanding of cognitive limitations
  – Previous mistakes and negative consequences
  – Need for decision makers to understand how conclusions were reached
Classification by Analysis Implementation Stage

Structured Analytical Techniques

Divergent Techniques

Convergent Techniques
Classification by Approach

- Structured Analytical Techniques
  - Diagnostic Techniques
  - Contrarian Techniques
  - Imagination Techniques
More Recently…

• One more recent breakdown uses eight (8) tool categories (next slide) utilized across twelve (12) types of analysis circumstances, including situations such as:
  – Defining a Project
  – Understanding Data
  – Monitoring Triggers
  – Predicting the Future
  – Seeing Other’s Points of View
8 Tool Categories

- Decomposition and Visualization
- Idea Generation
- Scenarios and Indicators
- Assesment of Cause and Effect
- Challenge Analysis
- Conflict Management
- Hypothesis Generation and Testing
- Decision Support
Defining a Project

• Decomposition and Visualization
• Idea Generation
Understanding Data

• Decomposition and Visualization
  – Chronologies and Timelines
  – Sorting
  – Network Analysis
  – Mind Maps
  – Concept Maps

• Idea Generation
  – Cross-Impact Matrix
Monitoring Triggers

• Scenarios and Indicators
• Challenge Analysis
Predict the Future

• Scenarios and Indicators
• Hypothesis Generation and Testing
  – Analysis of Competing Hypotheses
• Assessment of Cause and Effect
  – Key Assumptions Check
  – Structured Analogies
• Challenge Analysis
• Decision Support
  – Complexity Manager
Seeing Other Points of View

• Assessment of Cause and Effect
  – Key Assumptions Check
  – Role Playing
  – Red Hat Analysis

• Challenge Analysis
  – Red Team Analysis
  – Delphi Method

• Conflict Management
Full List – Twelve Analysis Situations

- Defining a Project
- Identifying Key Factors to Consider
- Understanding Data
- Explain a Situation
- Monitoring Triggers
- Developing/Testing Hypotheses
- Assess Possibility of Deception
- Predict the Future
- Challenging Ways of Thinking
- Seeing Others Points of View
- Managing Conflicting Opinions
- Assisting in Choosing Between Alternate Courses of Action