

Leadership for Solving Complex Problems with Data

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Outline

- What We Have Learned about Leadership
- Large, Unstructured, Complex Problems as Opportunities
- Insights into the Leadership Required for Solutions
- Overview of the Theory for Solving these Problems
- The Journey: Advice on the Steps Senior Leaders Can Take

What We Have Learned about Leadership

- Much More than Managing
- Critical Components to Leadership
 - Strategic Vision
 - Ability to Communicate the Vision
 - Getting the Right People in the Right Positions
 - Making Sure that these People Have the Resources to Succeed
 - Holding People Accountable
 - Active Engagement!

Important Keys to Success

- Understand the Big Picture
- Understand Constancy of Purpose
- Why Does the Organization Exist
 - Whale Oiling Companies No Longer Exist (from Deming)
 - Did Not Understand the Real Reason They Existed!
- Modern Example – Kodak

Identifying Opportunities

- Leaders Concentrate on the Major Opportunities for the Organization
- The Sexy – New Markets
 - The Next I-Phone
 - Disruptive Innovation
- Not so Sexy – Improving What the Organization Does
 - More than Lean Six Sigma, Continuous Improvement
 - Requires Critical Focus on What the Organization Does and Why
 - Often (Not Always!) Incremental Innovation
- Both Involve Problems that “Keep You Awake at Night”

Major Opportunities

- Are:
 - Large
 - Unstructured
 - Complex
- Cut Across the Organization
- Require the Proper Data!
 - Properly Collected
 - Properly Analyzed
 - Properly Interpreted
- Proper Solutions Must Be Sustainable

Leadership to Create Sustainable Solutions

- Sustainable Solutions Require Strong Leadership at All Levels
- Over Reliance on Consulting Companies
 - See Short Term Success
 - Disappears Soon After the Consulting Contract Ends
- Success Requires Leadership that Is:
 - Strong
 - Focused
 - Committed
- Such Leadership Starts at the Top – Jack Welch

Senior Leadership for Sustainable Solutions

- Set the Organization Direction
 - Provide Resources
 - Monitor Results
 - Ensure Solutions Produce the Desired Results
- Identify the Right People
 - Provide Proper Training
 - Create Solution Teams with the Proper Blend of Talents
 - Technical
 - Personal

The Science for Solving Large, Unstructured, Complex Problems

- Emerging Discipline – Statistical Engineering
- Combines
 - Academic – Basic Tools
 - Practical Experience – How to Apply the Tools
- Currently, No Text Discusses Large, Unstructured, Complex Problems!
- Examples:
 - DuPont
 - Scott Paper
- Much More than a Six Sigma Project

Scientific Method

- The heart of Statistical Engineering is the scientific method.
- Most theories underlying statistical engineering involve strategic application of the scientific method.
 - Deming-Shewhart PDCA (Plan, Do, Check, Act)
 - DMAIC (Define, Measure, Analyze, Improve, Control)
- The Scientific Method Is
 - Fundamental Approach for Discovery and Problem Solving
 - Inductive/deductive problem solving process

Scientific Method

- The Basic Process:
 1. Define the problem (deductive)
 2. Propose an educated theory, idea or model (deductive)
 3. Collect data to test the theory (inductive)
 4. Analyze the results (inductive)
 5. Interpret the data and draw conclusions (inductive)
- This process continues until a reasonable solution emerges.
- The scientific method is a sequential learning strategy!

Summary of the Scientific Method

- Understand the Real Problem at Hand
- Define the Problem
- Discover Solutions
 - Abstract from the concrete to the abstract
 - Develop a theory
 - Test the theory using data
 - Modify the theory as necessary
- Strong Need for Interdisciplinary Collaboration

Scientific Method and Data

- Data are the keys to the successful application of the scientific method
 - Data collection
 - Data analysis
 - Data Interpretation
- Quality Engineering/Industrial Statistics are the handmaiden.
- Very important role in solving large, unstructured, complex problems.

Strategy of Statistical Engineering

- Identify Problem
- Provide Structure
- Understand Context
- Develop the Solution Strategy
- Develop and Execute Tactics
- Deploy Final Solution

Tactics of Statistical Engineering

- Data Acquisition
- Data Exploration
- Analysis
 - Traditional Statistical Methodologies
 - Modern Analytics (Big Data)
- Inference to the Process/Problem
- Deployment of Tentative Solution
 - Does It Work?
 - Is It Sustainable?

Overarching Methodologies

- Data Visualization
- Project Management
- Teamwork
- Organizational Culture

The Journey

- Solutions Involve a Journey
 - There Is a Well-Defined Road Map
 - However, Each Journey Is Unique
- Success Requires:
 - Teamwork/Collaboration
 - Proper Blend of Skills
 - Technical
 - Statistical
 - Personal
 - Strong Leadership!

The Journey

- Be Aware that the Science Exists!
- Seek Collaborators to Assist in the Journey
 - Academic
 - Other Organizations on Similar Journeys
 - ISEA – The International Statistical Engineering Association
- Identify Opportunities
- Train Critical Personnel
 - CICEA III
 - Universities
- Key Point: There Are Resources to Help You Lead the Process

Background on ISEA

- New Professional Society
- Focus: The Emerging Discipline of Statistical Engineering
- Steering Committee
 - 17 Members
 - 4 Countries – EEUU, Canada, the Netherlands, Spain
 - 5 Academics
 - 12 Practitioners – Large Corporations, National Labs, NASA, DoD
- Global Summit in October

Important Keys to Organizational Success

- Strong Leadership
- Understanding the Big Picture
- Identifying Major Opportunities
- Creating the Proper Environment to Solve Large, Unstructured, Complex Problems
- Active Engagement
- Getting the Proper Support
- Start the Journey!