

**ENBIS Workshop:**  
**Statistical Consulting and**  
**Change Management**  
**Section 1**  
*Introduction and Overview*

**Newcastle, United Kingdom**  
**September 17, 2005**

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1.1

**Table of Content**

1. Introduction and overview.
  2. Understanding human behavior.
  3. Resistance to Change
  4. What is effective communication?
  5. Assertiveness
  6. Practical hints, do's and don'ts.
- Appendix 1: Ethics.  
Appendix 2: Billing and rates.  
Appendix 3: Contracts.  
Appendix 4: References and further readings.

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1.2



## Learning Objectives

- The objective of this workshop is not to teach “everything you ever wanted to know” about statistical consulting
- The purpose is to share some of our experiences and introduce to you a number of sources of further reading and issues to study – essentially getting you off to a good start, or helping you further along towards becoming a more effective consultant
- Some of the materials will hopefully stimulate discussions and make us all think
- Other materials will be hands-on concrete advice, hints, tricks of the trade, resources

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1.3

## Preliminaries

- Who are we?
  - Søren: Statistician and engineer with more than 25 years of experience in consulting
  - Sue Ellen: Psychologist and management consultant with more than 20 years of experience in counseling
- Who are you?
  - Are you new to consulting or have you already practiced consulting?
  - What do you expect from this workshop?

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1.4

## Disclosures and Limitations

- There are many types of consulting and many areas of applications
- Our experience is primarily with consulting to industry on engineering, operations and quality management type problems
- We also draw on extensive experiences working with service, healthcare and government type organizations
- We will not discuss issues involving consulting with biomedical and pharmaceutical research clients or academic consulting
- We will also not discuss consulting on surveys and censuses

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1.5



## Why This Workshop?

- Often, what may appear to be irrational to you, is completely rational to your client!
- What is rational, is relative
- What is rational depends on your perspective and the information you have
- Example 1:
  - Mr. Y.: "...if we discover how to increase the yield, we will be in a whole lot of trouble!"
- Example 2:
  - Dr. K.: With a doctorate in materials science and an expert in finite element simulation, statistics was to him "bad science". Further, he was not familiar with statistics, but THE company authority in the old approach. For him it was urgent to show that "Six Sigma was a bunch of baloney"
- After such consulting experiences, the two of us often discussed the psychology of consulting – hence this workshop

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1.6



## Consultants Defined

- Consultants: From Webster's New World Dictionary:
  - From Latin *consultans*, prp. of *consultare*; A person who consults with another or others; An expert who is called on for professional or technical advice or opinions. Synonyms: Adviser, expert, counselor, authority, specialist
- Typically an outside expert/specialist hired to advise on particular technical, commercial or legal aspects of the organizations activities
- Not a licensed or controlled profession. Anyone can call themselves a consultant
- Consultants have no managerial authority within the firm that hire him/her.
- The consultant give advise that the manager can choose to follow or ignore
- Decisions are made by the client, *not* the consultant
- The client ultimately has responsibility for the decisions made

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## Some Humorous Definitions

- Definition: “*A consultant is someone who borrows your watch to tell you what time it is and keeps the watch!*”
- “Those who can, do. Those who can’t, teach (...or consult).”
- Bohr’s Law: “*An expert is someone who has made all the possible mistakes in a very narrow field of study.*”
- Harry Truman (1955): “*I have found the best way to give advice to your children is to find out what they want and then advise them to do it.*”

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1.8

## Types of Consultants

- **Internal Consultants:**
  - Typically someone in an organization with special skills — a staff person
- **External Consultants:** Someone who perform technical or professional services on a temporary basis
- **Independent Consultants**
  - Someone who hires himself/herself out for specific consulting jobs
- **Consulting Brokers:** The broker takes on the a contract with a client for a specific job, typically requiring onsite and then subcontract the work to independent consultants who works with the client, but bills the broker than in turn bills the client

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1.9

## Three Consulting Roles\*

- Depending on the job the consultant, external or internal, may choose to play different roles:
  1. The Expert
  2. A pair-of-hands
  3. The catalyst/collaborator/coach (Schein calls this Process Consulting, PC)
- Which role is “best” depends on the situation, you, your client and the problem at hand
- It is important to recognize and be aware which role you assume so you make a conscious choice

\*Based on Schein (1985) and Block (2000)

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1.10

## The Expert Consultant

- The consultant brings special skills to the table
- The manager/client defines the problem sometimes in collaborations with the client
- The organization's members provide the consultant with data and information
- Further data and information may be gathered from outside the organization
- The consultant analyzes the data and develops a solution to the problem
- The consultant hands-over the solution to the client typically in the form of a report and a presentation

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## A-Pair-of-Hands Role

- The client hires the consultant as an extra pair of hands
- Typically a "dirty job" the client does not want to do
- The consultant takes detailed orders from the client about what needs to be done and what data needs to be collected
- The client retains control
- Collaboration is typically not necessary
- Communication is limited

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1.12

## The Catalyst/Collaborator/Coach Model: Process Consulting

- Coach Consulting:
  - The consultant assumes a collaborative role
  - Issues to be dealt with need a joint effort, a team approach
  - Problem solving becomes a joint undertaking
  - Equal attention to technical and human side of the diagnosis, problem solving and implementation
  - The consultant does not solve the problems. The consultant apply his/her skills to help the client solve problems
  - Analogy: A football coach. The coach does not play; the team scores all the goals

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1.13

## Know Why You Were Hired

- Sometimes consultants are hired to do or say something the client does not want to say, do or be blamed for
- Other times the client may already know the answer to the problem, but wants to be able to say that the consultant said so or need the authority of the consultant to confirm his/her hunch
- Your role may also be to role model a more scientific or statistical approach to problem solving
- Your role may change over time

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1.14

## Internal Consultants

- Don't think the clients will come to your office to ask for your help
- Most non-statisticians have limited understanding of what a statistician can do to help; they may not know they have a problem or identify their problems as statistical problems
- You need to walk around and identify problems you can help with
- Take a genuine interest in the clients problems
- And you need to make potential clients comfortable with you helping them
- Christer Helstands way – the “bubba” approach

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## Statistical Consulting

- Successful statistical consulting involves far more than technical statistical expertise!
- Additional non-statistical skills required:
  - Interpersonal skills
  - Psychology
  - Pragmatism
  - A feel for politics
  - Problem solving skills; understanding of scientific method
  - Subject matter knowledge
  - A certain degree of self-confidence
  - Ability to manage yourself, others and provide leadership
  - Ethics, ability to stand up straight
- Observation: It is inadequate non-statistical skills that reduces the consultants effectiveness
- Consulting skills can be learned by doing consulting

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1.16



## A Useful Consulting Model

- Structure the consulting session(s) around the steps of the Six Sigma problem solving model of Define, Measure, Analyze, Improve and Control, DMAIC (or more generically: define the problem, diagnose the problem, develop a solution, check that it worked)
- Force the client/team to deliberately follow the DMAIC steps
- Have the client bring along data
- A productive approach: Sit around a conference table and use a PC and a PC projector to do live interactive analysis and conduct deliberate discussions
- Keep Box's zig-zag iterative learning model in mind: interactions between theory and data/deductions and induction

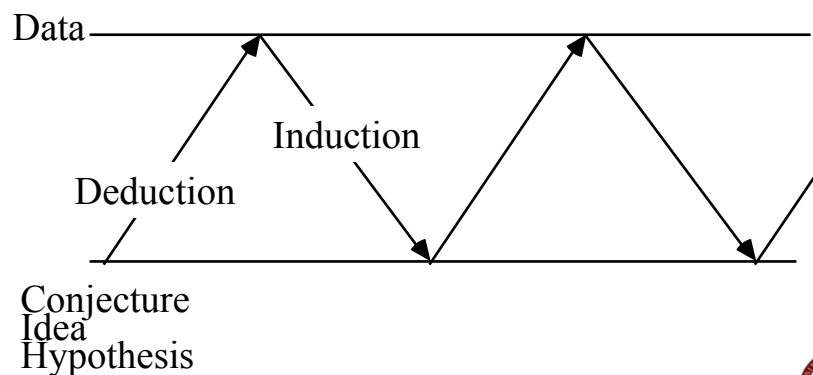
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1.17

## Iterative Process of a Scientific Investigation: *Induction and Deduction*



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1.18

## A Powerful Approach: *Show Me The Data!*

- The statistician's most powerful trick:
  - Ask the client if she/he has data related to the issue
  - Plotting the data is one of the most powerful methods for finding out what the problem is
  - And often the plots immediately suggests a possible solution
- We are often taught that we should carefully define the problem first before we attempt to solve it
- That may have some truth to it, but we have found that plotting the data in several ways often quickly reveals what may be wrong with a process even if we or the client did not know beforehand what the problem was

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1.19

## An Empirical Foundation

“For the best and safest method of philosophizing seems to be, first diligently to investigate the properties of things, then establish them by experiment, and then to seek hypotheses to explain them.”

Sir Isaac Newton

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1.20

## Hold Your Horses!

- John Dewey (1910) *How We Think*, page 13.
- “The most important factor in the training of good mental habits consist in acquiring the attitude of suspended conclusion, and in mastering the various methods of searching for new materials to corroborate or to refute the first suggestions that occur. To maintain the state of doubt and to carry on systematic and protracted inquiry – these are the essentials of thinking.”

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1.21

## Be Inquisitive!

- It is OK (indeed required) that you ask many and probing questions
- Ask probing questions: Examples
  - How was the data sampled?
  - Was the experiment randomized?
  - How did you measure X?
  - Was the measurement process calibrated, stable, and in statistical control before you ran the experiment?
- Don't be afraid that the client may think your questions are “stupid”
- If you don't ask now you may not understand what follows and then it will be even more embarrassing that you don't know and don't understand

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1.22

## Minimum Skills Needed

- Interpersonal skills
- Listening skills
- Diagnosis, Analysis and problem definition
- Problem solving skills and statistics
- Doing/implementing/maintaining
- Time management/working to a schedule
- Managing meetings
- Public speaking
- Writing
- Selling and marketing

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## Statistical Consulting

- Cochran and Cox (1954), “The statistician who expects that his contribution to the planning will involve some technical matter in statistical theory finds repeatedly that he makes a much more valuable contribution simply getting the investigator to explain clearly why he is doing the experiment, to justify the experimental treatments whose effects he proposes to compare, and to defend his claim that the completed experiment will enable its objectives to be realized.”

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1.24

## Why Change Management?

- Most industrial consulting work is requested because someone (the client or someone in upper management) in the organization wants, or perceives the need for a change
  - Examples: Quality improvement, productivity improvement, efficiency, new product development
- Typically the client wants to make fundamental changes in how they conduct business to cope with a new and challenging economic environment
- Most corporate change programs are a failure or at best only marginally successful.
- Why?
  - Typical patterns, typical errors made
  - Lessons learned
- Change needs to be carefully managed!

Adopted from Kotter, HBR (1995)

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1.25

## Eight Steps to Transform An Organization

1. Establish a sense of urgency
2. Form a Powerful Guiding Coalition
3. Create a Vision
4. Communicate the vision
5. Empower others to act on the vision
6. Plan for short term wins
7. Consolidate improvements and produce further changes
8. Institutionalize the new approach

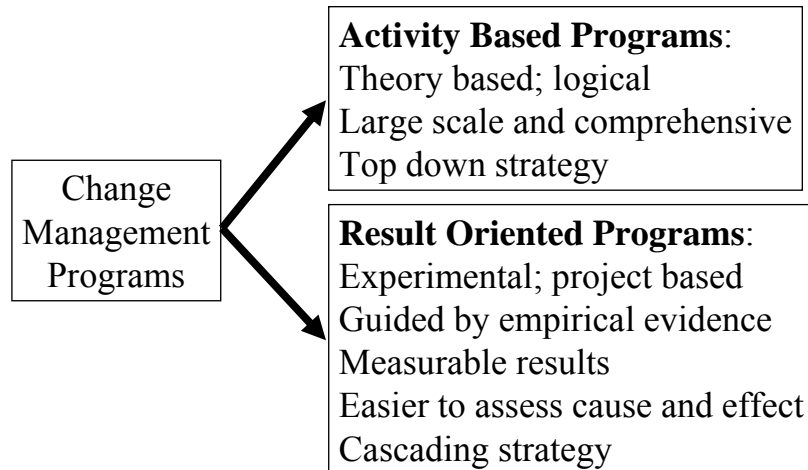
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1.26

## Consulting: Two Alternative Approaches\*



\*Based on Schaffer and Thomson, *Harvard Business Review* (1992)

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1.27



## Activity Centered Programs

- Activity Based Programs: The pursuit of activities that sound good but contribute little to bottom line performance
- Assumption: If we carry out enough of the “right” activities, performance improvements will follow
- Consultants to managers: “You need not and should not focus directly on improving results. Eventually results will follow.”

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## An Alternative: Results-Driven Improvement Programs

- Results-Driven Programs: Focus on achieving *specific, measurable, operational* improvements within a few months
- Examples of specific measurable goals:
  - Increased yield
  - Reduced delivery time
  - Increased inventory turns
  - Improved customer satisfaction
  - Reduced product development time

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## An Effective Strategy

1. Map out how the organization should look after a major change
2. Use a series of rapid cycle projects that provide the employees opportunities to develop their skills in managing change
3. As they learn to change, mount increasingly larger scale, more strategic efforts and move upstream
4. Periodically review and modify the overall strategic plan

***Benefit: The projects pay for the program***

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1.30

## Result Oriented Programs:

- Project based
- Experimental
- Guided by **empirical evidence**
- Measurable results
- Easier to **assess cause and effect**
- Cascading strategy



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1.31

## “Logical” Top Down vs. an Incremental Approach

- It may sound logical and rational to thoroughly analyze the whole organization, make a careful assessment, develop a comprehensive plan for change and then institute changes
  - Examples: TQM, ISO 9000, EFQM
- In practice it works better to immediately start solving the most obvious problems, create short term wins and then roll out the change programs to wider areas of the organization
  - Example: Six Sigma



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1.32



## The Focus of Six Sigma

- Accelerating fast breakthrough performance
- Significant financial results in 4-8 months
- Ensuring Six Sigma is an extension of the Corporate culture, not the program of the month
- Results first, culture change will follow!

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1.33

## Conclusion

- Consultants are typically hired to help with or guide organizational change programs
- The reason is most often competitiveness problems, poor quality, high costs, etc.
- Consultants should be familiar with basic concepts of organizational change

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1.34