

Professional Development for Statisticians: Useful Skills in a Multi-Disciplinary Setting

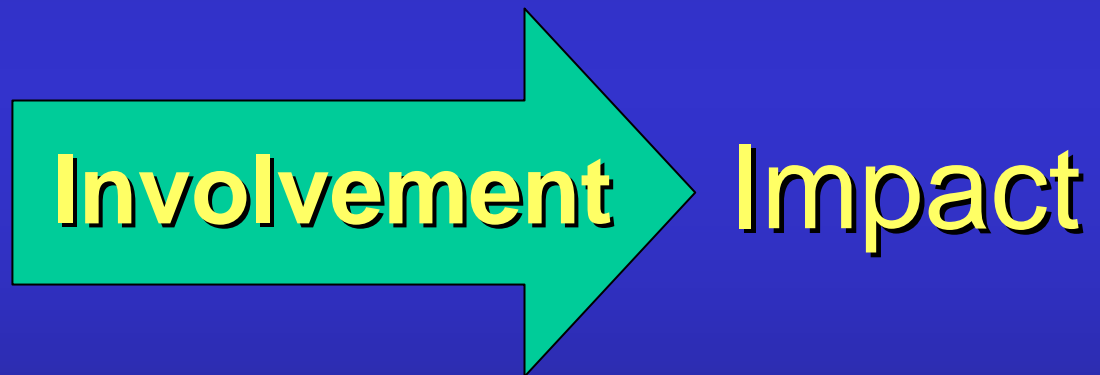
Janice Derr, Ph.D.

U.S. F.D.A. / Center for Drug Evaluation and Research

Office of Biometrics

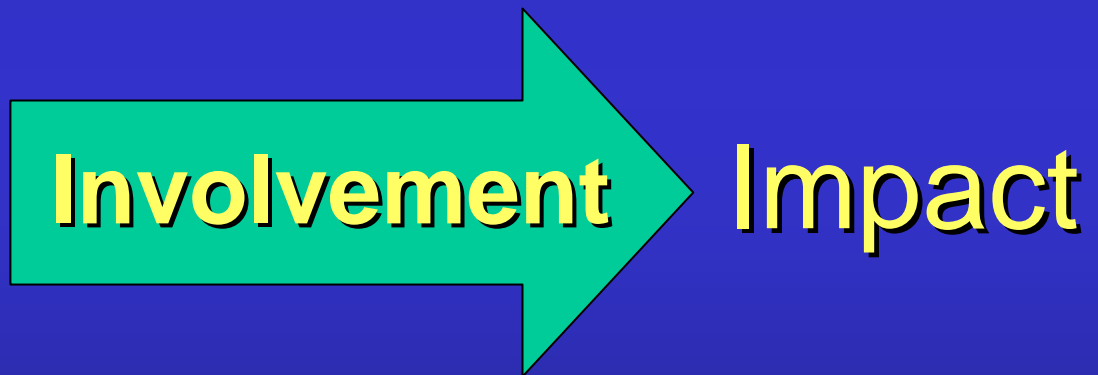
What does it take for a statistician to have an impact in a multi-disciplinary setting?

- Statistical Expertise
- Vision of Broad Role
- Non-Statistical Skills



What does it take for a statistician to have an impact in a multi-disciplinary setting?

- **Statistical Expertise**
- Vision of Broad Role
- Non-Statistical Skills

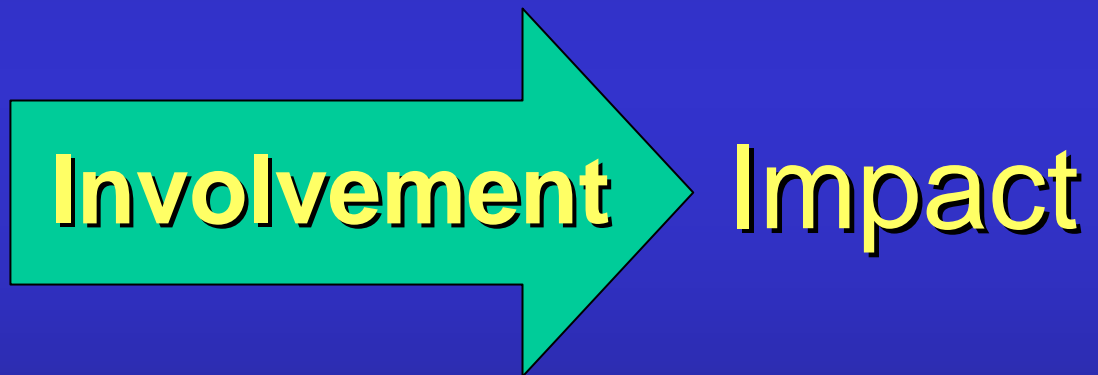


What does it take for a statistician to have an impact in a multi-disciplinary setting?

➤ Statistical Expertise

➤ Vision of Broad Role

➤ Non-Statistical Skills



When the Role is Too Narrow ...

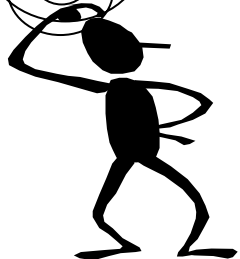
- An investigator came to my office asking for sample size requirements
- I could never get a clear picture of the overall situation
- She put my questions aside, all she wanted was “the number”
- After I finally coughed up a number for her she never got back to me
- I admit I did not try very hard to follow up with her either
- My impression is that the number was too large

When the Role is Too Narrow ...

They didn't appreciate all of my hard work on their problem.

They didn't understand how my work addresses their questions.

Clients from this field seem to think they can just ignore the statistical evidence and make arbitrary decisions.

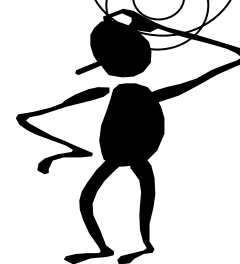


Statistician

Her solutions don't look very realistic..

We don't understand the report or the relevance of her input.

Statisticians don't give us answers that we can use. We'll just make a decision based on what we've always done in the past.



Client

Vision of the Broad Role -- Academia

“Helping clients think through their scientific goals, working out details of study design and implementation, and figuring out how to display and interpret results are major tasks. In fact, refining a good idea for a research study into concrete specific aims and study design is one of the most challenging parts of doing research, and something with which an experienced statistician can be a great help.”

Kevin Cain, *The Statistical Consultant*, Fall, 2006

Vision of the Broad Role -- Industry

“To create a culture where statistical methods are routinely used in the decision-making process and statisticians are partners within the company organization.”

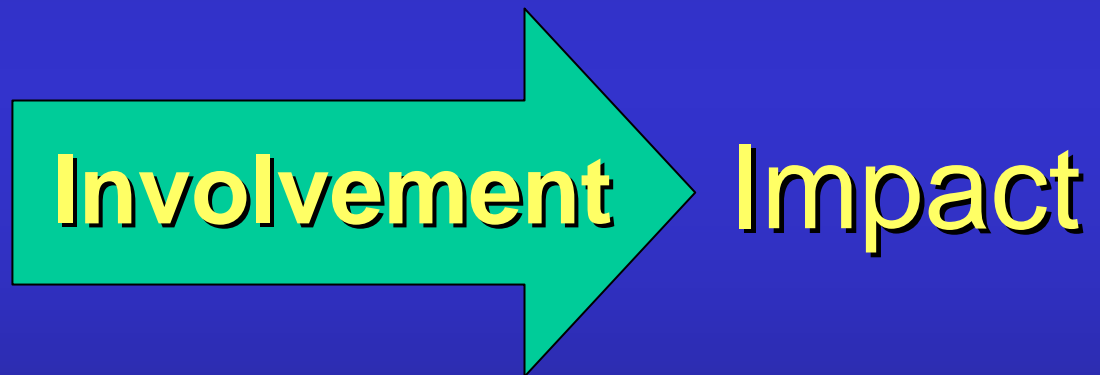
Vision statement of an internal consulting group of statisticians in a manufacturing company

Vision of the Broad Role -- Government

“One of the critical things I have learned through experience in the federal government is to be careful about language, to be careful about jargon, and to become a member of a team that solves a problem as opposed to showing off my technical mastery ... We want people who can communicate easily and across disciplines, and who will have the other team members understand what statisticians are trying to tell them.”

What does it take for a statistician to have an impact in a multi-disciplinary setting?

- ◆ Statistical Expertise
- ◆ Vision of Broad Role
- ◆ Non-Statistical Skills



Non-Statistical Skills

- ◆ Collaborative Research and Statistical Consultancy
 - ◆ Communication
 - ◆ Problem solving
 - ◆ Maintain good working relationships
 - ◆ Informal teaching of clients
 - ◆ Familiarize one self with subject matter paradigms
 - ◆ Time management

On the Job: Core Competencies

- Continuous Development
- Problem Solving
- Oral Communication
- Written Communication
- Collaboration / Partnering

Continuous Development

- Identifies personal skill areas to be developed
- Invests time and resources to learn, grow and develop
- Looks for opportunities to learn from mistakes
- Looks for ways to improve performance and efficiency on the job
- Provides others with tools and approaches to solve problems and improve processes

Oral Communication

- Tailors communication to the level and experience of the audience
- Utilizes strong listening skills to formulate direct, responsive answers to questions
- Effectively communicates complex ideas using analogies, visual and other techniques
- Creatively identifies and utilizes effective communication channels and methods

Problem Solving

- Asks meaningful and relevant questions to understand problems and potential causes
- Uses logical, systematic approaches to break down and solve problems
- Creatively comes at problems in new and different ways that lead to innovative solutions
- Analyzes costs, benefits, risks and chances for success of potential solutions

Learning Non-Statistical Skills

➤ On the job

- Short courses and workshops
- Continuing education degree programs
- Experience / feedback / mentoring

Learning Non-Statistical Skills

- As a student
 - Statistical consulting experience
 - Involvement in research teams
 - Internships

Programs in Undergraduate Statistical Science

- Emphasize real data and authentic applications
- Include experience with statistical computing
- Encourage synthesis of theory, methods, and applications
- Offer frequent opportunities to develop communication skills

Graduate Training in Statistical Consulting

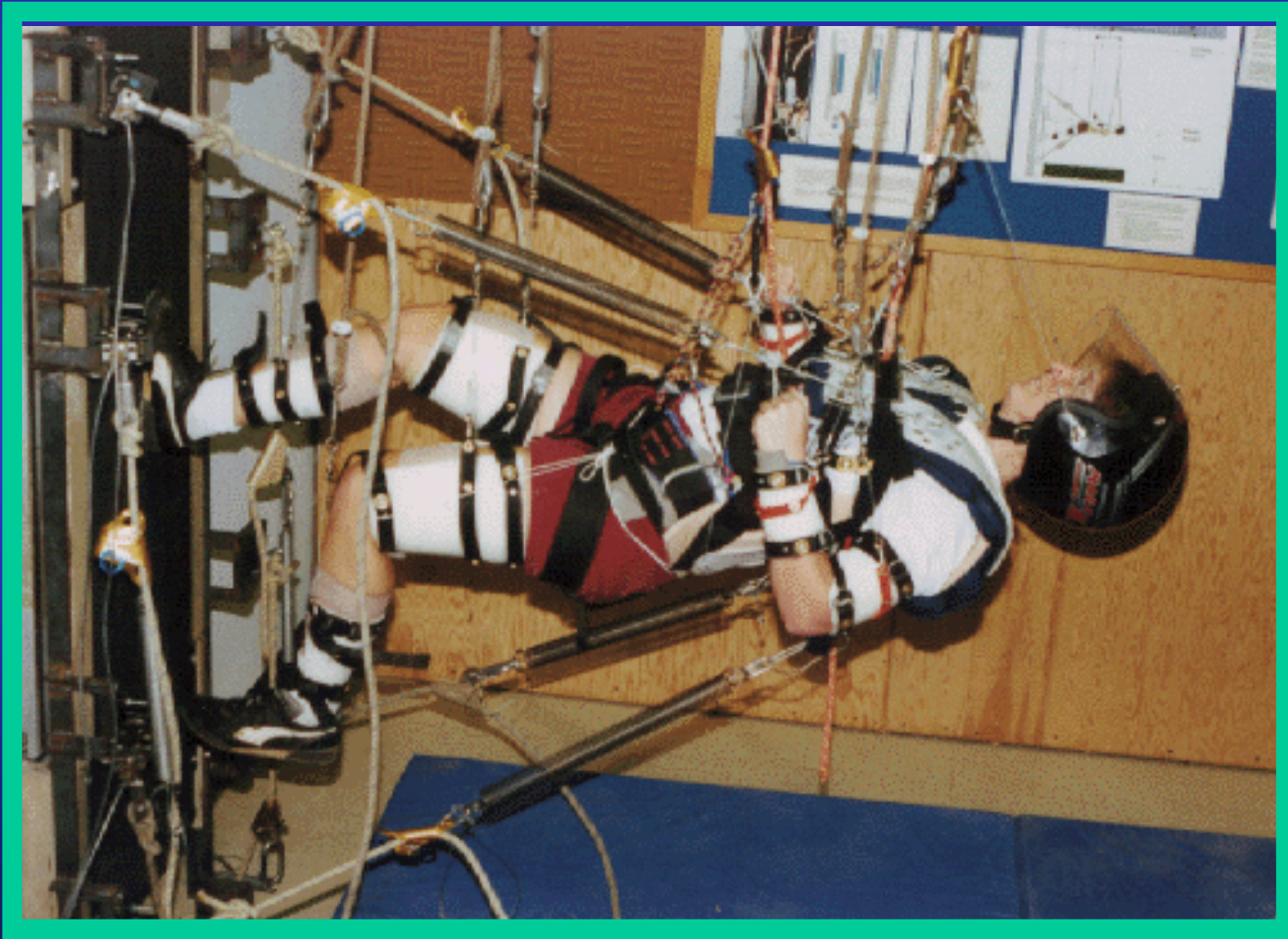
◆ In class

- ◆ Use video examples to raise awareness
- ◆ Use case studies and examples to help students identify what questions to ask
- ◆ Help students practice explaining about statistics
- ◆ Invite experienced statisticians
- ◆ Invite clients

Graduate Training in Statistical Consulting

- ◆ Outside the classroom
 - ◆ Provide structured consulting experiences
 - ◆ Record student consulting sessions, assess their performance and provide coaching
 - ◆ Find opportunities for students to work in multi-disciplinary teams
 - ◆ Create opportunities for students to practice speaking, presenting and writing about statistics to a non-statistical audience

A Study of Tethered Human Exercise in Simulated Microgravity



“This experience allowed me to see what a consulting statistician actually does. I had to meet with other team members from other disciplines, understand their aspects of the project, and be able to explain the statistical aspects to them. I had to learn enough about the mechanics of running on a treadmill to be able to hold and understand conversations concerning what was expected to come out of each experiment and what form the information was going to be in.”

Sandy Balkin, M.S. student in Statistics

Currently: Ph.D. in Management Science, Dr. Balkin is a Health Care Investment Analyst

“This was my first exposure to conducting research with an interdisciplinary cadre of colleagues. ... Regardless of academic experience, each student taught many fundamental principles of his/her major discipline to the other students on the grant. Also, because each student was considered the ‘expert’ in his/her discipline, that student felt a certain responsibility that his/her contributions to the research be correct.”

Jean McCrory, PhD Student in Biobehavioral Health

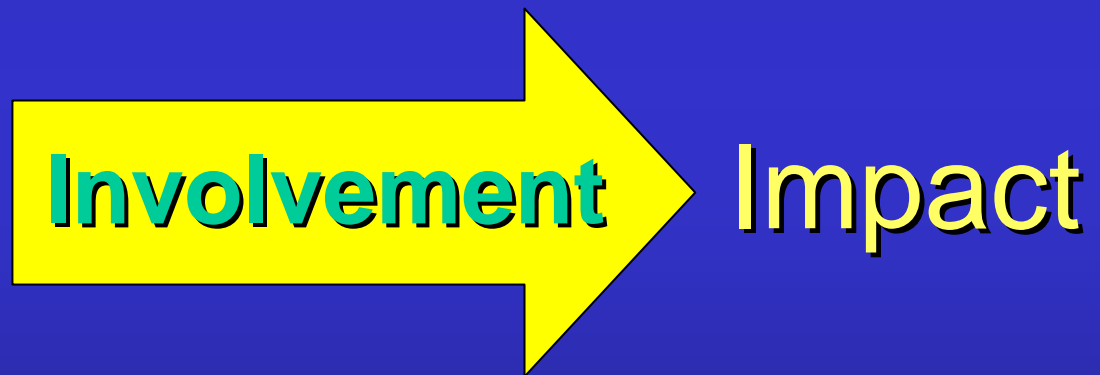
Currently: on the faculty of the Health and Physical Activity Department at the University of Pittsburgh

“In order for the experiment to operate smoothly, everyone belonging to the research team had to contribute to the research and remain informed as to the role each person played during the experiment. I learned that communication was essential. ... When we all contributed to the discussion, we began to realize where possible problems may arise with the experiment and how these problems could be corrected. Everyone had different insight on how to solve the problems. ... These lab meetings helped me to develop problem solving skills.”

Heidi Baron, B.S. Student in Psychology and Exercise Science

What does it take for a statistician to have an impact in a multi-disciplinary setting?

- Statistical Expertise
- Vision of Broad Role
- Non-Statistical Skills



Barriers to Involvement

- ◆ Clients not aware of benefits of collaboration
 - ◆ Lack of previous collaborative experiences
 - ◆ Client discipline does not have a tradition of involving statisticians
- ◆ Institutional barriers
 - ◆ Limited resources
 - ◆ Position of statistician in the organization

Getting Involved

