

# Georgia Day

## *Statistical Consulting*

Professor J.-C. Lu

The School of Industrial and Systems Engineering  
Georgia Institute of Technology

# Acknowledgements

Many Thanks to

- The University of Georgia, Department of Statistics and the Conference Center
- Conference Organizer:
  - Nicole Lazar and Abhyuday Mandal
- Steering Committee:
  - Nicole Lazar, C. F. Jeff Wu, Lance Waller
- Local Organizing Committee, Staff and Student Support

# Table of Contents

1. Introduction
2. A Story from My Consulting Experience
3. Consulting Leads to Research
4. External Funding
5. Student Involvement
6. Classroom Teaching
7. Training for Consulting Career
8. Conclusion

# 1. Definition

A **statistical consultant** provides a range of services to clients including statistical *advice, analysis and training*. Clients can come from a wide variety of subject areas including business, medicine, environment and government, but they all have one thing in common; they wish to collect and analyze data to make *evidence-based decisions*.

# Process (1)

1. The start of a typical project will often involve **liaising with a client to define its scope**. For example, does the client require advice so that they can carry out analysis themselves or would they like you to analyze their data for them?

## Process (2)

2. It is common to write up a detailed **proposal** of the work including *what data* will be required, the *methods* that will be used, the **deliverables** and the **timeline** for completion. Of course, the consultant will discuss with the client about the pay-rates.

## Process (3)

3. The consultant will carry out the analysis, advice or training in the agreed time frame. **Effective communication** is an essential part of the role and a consultant must ensure that any client *reports* or *presentations* are clear, concise and intelligible and do not contain any unnecessary technical detail.

# Remarks

- Statistical consultants often provide bespoke statistical **analyses tailored specifically to the requirements of their clients**. This means that the techniques used will often differ from one project to another (especially when working with clients from a variety of different sectors). *As it is unlikely that all of these techniques will have been covered by undergraduate and postgraduate studies, “on the job” learning* can sometimes be necessary.

## 2. A Story from My Consulting Experience

- Health-Care Insurance Project
- Developed Problem-solving Methods
- Delivered A Computer System that Includes Implementation of the Methods
- Tested in Real-life Operations (patent application)
- Company Grown Significantly
- Company Sold in 12 Million Dollars

# 3. Consulting Leads to Research

- **University Consulting**
  - External (pay-based projects)
  - Internal (“free consulting”)
- **Real-life Problems with Data**
  - Example: Bivariate Zero-Inflated Poisson Data Model
- **Need Experience of Linking Problems to Research Issues**
  - Example: Wavelet-based Data Reduction for Fault Classification and Monitoring
- **Require Follow-up Studies for Publications**
  - Examples: Initial Experiment, Layer-of-Experiments

# 4. External Funding

- Industry Funded Projects
  - Examples: Notel, Nortel-Wireless, ...
- NSF Industry-University Training Projects
- One Multi-Million VIGRE Project
- Follow-up Studies led to NSF Research Projects
  - Examples: Degradation Studies, Wavelet-based Data Reduction, Initial Experiment, ...
- Inspire One NSF Engineering Education Project

# 5. Student Involvement

- 4 – 15 students working for various companies in the NC-RTP area for company “in-house” consulting projects
  - These opportunities generate many interesting problems and real-life data sets
- Ph.D. students have been benefited from the problems/data and also funds generated from these projects
  - Sometimes, they served as consultants for BS and MS students working on company projects.

# 6. Classroom Teaching

- Consulting Problems and Data have been used in **Teaching Courses** such as
  - Data Mining, Business Analytics and Statistical Modeling (Regression)
- Consulting Experience Inspire **Course Development**
  - Example: Data Mining and Business Analytics
- GT-ISyE Undergraduate **Senior Design Teaching**
- **Clients Come to Classroom for Presentation**

# 7. Training for Consulting Career

- GT-ISyE UG Senior Design Courses
- Projects in Courses such as Quality Methods, Data Mining and Business Analytics
- Statistics Departments Have Consulting Courses
  - Teach how to communicate with clients in problem formulation, project proposal preparation, project study (including data analysis basics), report and presentation
- Some Programs Have “Statistics Center”

# 8. Conclusion

- Consulting is a rewarding activity in various university operations
  - Research Problems, Funding Opportunities, Teaching Materials, Student Training, ...
- Need to Balance Between Consulting and Other Activities (e.g., Teaching and Research)
- Due to the fast growth of **Analytics Programs** in GT and GT-ISyE, statistical consulting will continue to be in high demand.

Q & As

**Thank you!**