A Glimpse Into Environmental Statistics

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Abstract: *This is a programmatic level presentation, focusing on the important contributions that statistical analysis, probability quantification, and stochastic decision analysis make to various project types. Each element in the spectrum of deliverables and its contribution to alternative project types is discussed. The stochastic modeling approach used by Dr. Chamberlain is presented as a more realistic alternative to the application of classical methods, particularly in addressing difficult problems.*

Several examples are given, some building upon others, to develop an overall conceptual theme. The culminating discussion covers the technical foundation of the project "Decision Simulation," which Dr. Chamberlain led and subsequently presented to the National Academy of Sciences, in which an optimal sampling regime of the Hanford Single-Shell nuclear waste tanks was proposed, that maximized the performance of the tank disposition decision rules. However, to maintain a project management perspective, technical material is presented briefly at a conceptual level where the benefits are clearly seen - technical aspects are minimized.

Topics Discussed/Methods Used: *Stochastic Decision Analysis, Decision Performance, Uncertainty Analysis, Assurance Probabilities, Why Minimize Uncertainty?, End-Use and Decision-Driven Sampling Plans and Data Quality Objectives, Multi-Criteria Decision Methods,Variance Components, Laboratory Uncertainty, Field Sampling Uncertainty, Robust Outlier Rejection, Gaussian Plume Guided Sampling, Optimal and Robust Nonparametic Regression, Monte Carlo Method, Data Cleaning, Hypothesis Testing, Prediction Intervals, Kriging, Bootstrap Resampling and Estimation, Latin Hypercube Sampling, High Level Nuclear Waste Sampling, Nuclear Wasteform Simulant, Classification/Misclassification Probabilities, Neural Network Based Classification Decisions, Forensic Sampling for International Treaty Verification, Sensitivity Analysis of Coupled Mechanistic Models.*

Who should attend? Program managers, Project Managers, Scientists, and Engineers. They will:

- come away with an increased understanding of how statistical and uncertainty analysis can be used to quantify and reduce the uncertainty of decisions and scientific information in general,
- gain an intuition of how the performance requirements of decisions and other end uses of data can be incorporated into the design of field sampling, and
- be introduced to some of the methods used to accomplish the tasks in these functions.

Duration is approximately 2 hours; allow an additional 30 minutes for followup discussion. Here are some comments from PM's that have attended:

> *"I wish I knew about this earlier. A project that I just finished could have used your help."*
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> *"It sounds like you can work with difficult problems and provide a useful result."*
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> *"I may be needing a trend analysis like the one in your first example – how much would it take to do it?" Answer: about 100 hrs (about $13k) plus report. Comment: "That sounds good."*
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> *"I just got back from a meeting where they were talking about what you've presented here, that the decisions to be made and their uncertainty goals should be used in determining how to sample. I think that it's a reasonable, realistic approach."*
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> *"I see the value in this (stochastic decision analysis) in assessing various decision rules"*

Background: Since 1995, Dr. Pete Chamberlain has been Principal Scientist and Owner of Enviro-Sci Consulting in Big Lake, Alaska. Prior to founding Enviro-Sci, Pete was a Senior Research Scientist with Battelle-Pacific Northwest National Laboratory (PNNL) in Richland, Washington, near the Hanford nuclear site. While at PNNL he provided statistical consulting to numerous projects at the Hanford site and later worked there as an Environmental Scientist doing human health risk assessments at several Superfund sites, multimedia contaminant fate/transport modeling, development of integrated transport/exposure models, and finite element groundwater/contaminant model development.

Pete has also served as Director of Statistical Research at the former Crop-Hail Insurance Actuarial Association, and as Visiting Assistant Professor at Texas A&M University.

Dr. Chamberlain holds a joint Ph.D. from Texas A&M University in Statistics (linear models, theoretical probability, parametric inference) and in Agricultural Economics (industrial engineering methods applied to agriculture, stochastic optimal control). Pete is also a B.S. level Structural Engineer with an additional educational background in engineering hydrology.

Owing to his diverse educational and experience background, Pete is a Multidisciplinary Consulting Scientist, and his perspectives enable him to bring other technical expertise into his statistical analyses, from crafting trend analysis tests realistically consistent with groundwater plume movement, to developing decision methodologies, to assessing uncertainty of multiattribute based decisions.

Pricing and Other Terms

Pricing: <11 attendees.....$2500

11-20 attendees.....$3300

>20 attendees.....$4000

Other costs: $1500 fee for travel expenses, unless otherwise arranged.

Materials: Unless otherwise specified, copyright ownership of presentation materials is retained by Enviro-Sci Consulting.

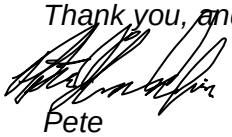
Payment: 25% payment plus $1500 travel fee required to reserve a presentation date – both are nonrefundable. Remaining 75% due prior to travel date, also nonrefundable at date of travel.

For more information, contact Enviro-Sci Consulting at (907) 232-8974

Dear Prospective Hosting Organization:
This seminar covers a huge amount of information, but an overall conceptual theme will become evident. During the presentation I'm always on the lookout for elements of wit and humor and I welcome this from the audience, which adds an element of fun and helps cognition and retention. After the presentation, the attendees like to stay and either discuss the subject matter and explore applications or solutions in their own projects, or just listen and eventually ask some questions. I'm always glad for their interest and participation, and I'll happily spend an hour or more in discussion with them after the presentation.

I look forward, not only to providing some valuable insight and understanding to your staff, but also to establishing a rapport with each of them. And I welcome subsequent interaction with attendees - they should feel free to call my office or email me with questions, observations, or to request that I provide an informal or formal proposal on some prospective work. This interaction is also valuable for my acquiring new clients, so it's a win-win encounter!

Thank you, and again I look forward to speaking at your organization,



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