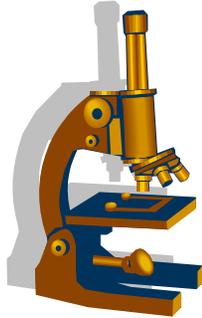


A large, central version of the SCAM logo, rendered in a bright blue color with a dark blue outline, giving it a 3D effect.

Simplicity, Complexity and Modelling



A couple of months in the laboratory can frequently save a couple of hours in the library.



Research Idea/Question

- What solutions can we find to the general problem of producing good models for complex situations by investigating different approaches across the EPSRC disciplines?
 - What can we learn about optimal compromises between simplicity and complexity in modelling?
 - How should model uncertainty be propagated to predictions?

Tower of Babel Problem

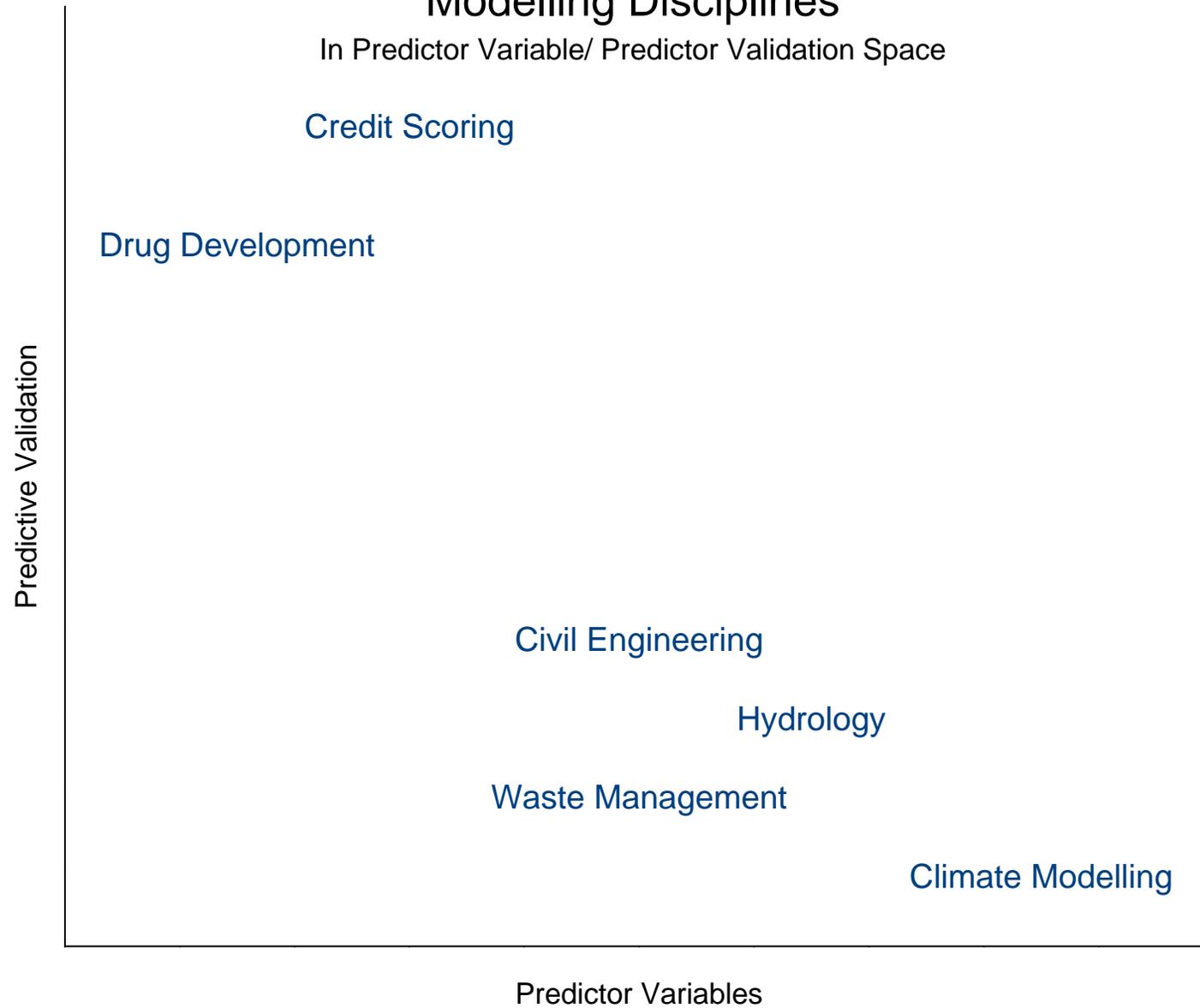
Some Statistical Terminology

- Random effects
- Penalised likelihood
- Ridge regression
- Bayesian shrinkage
- Bayes factors
- Discrete and continuous model expansion
- Prequential approach
- Bias-variance trade-off
- Partial least squares
- LASSO



Modelling Disciplines

In Predictor Variable/ Predictor Validation Space



*Hiawatha, who at college Majored in
applied statistics*

Consequently felt entitled

To instruct his fellow men on

Any subject whatsoever,

Maurice Kendall

Objectives

- To encourage interdisciplinary dialogue as regards this problem
- To allow disciplines to learn from each other
- To facilitate understanding of alternative approaches
- To promote best practice

Deliverables

- Review of practice across disciplines
 - Must be easily understandable to a researcher in *any* of the disciplines
 - Possible simultaneous publication in several journals
 - Perhaps official EPSRC report
- Interdisciplinary lexicon
- Modelling web page

Impact

- Improved modelling practice
- Greater interdisciplinary dialogue
- Research synergy
- Research efficiency
- Better prediction and uncertainty estimation

All models are wrong;
some models are useful.

George Box



Methodology/Approach

- Desk-work in respective disciplines by grant-holders
- Multidisciplinary workshop(s)
 - Grant-holders
 - Stakeholders
 - Guest lecturers
 - Do not become co grant-holders
- Appointment of writing team
- First draft of report
- Review by grant-holders (stakeholders?)
- Publication

Team



Who	Discipline	Field of Application
Peter Challenor	Statistician	Climate modelling
Mike Christie	Engineer	Oil industry
Andrew Cliffe	Mathematician	Nuclear waste disposal Fluid mechanics
Suraje Dessai	Environmental scientist	Climate modelling
Jim Hall	Civil engineer	Flood defence
Zoran Kapelan	Civil engineer	Water systems
Jeremy Oakley	Statistician	Food safety Health economics
Stephen Senn	Statistician	Drug development
Phil Dawid	Statistician	DNA profiling

Externals

- Stakeholders
 - EPSRC
 - FSA
 - NERC
 - NICE
 - DEFRA
 - EA
- Invited lecturers?
 - Data-mining
 - Machine learning

Resources

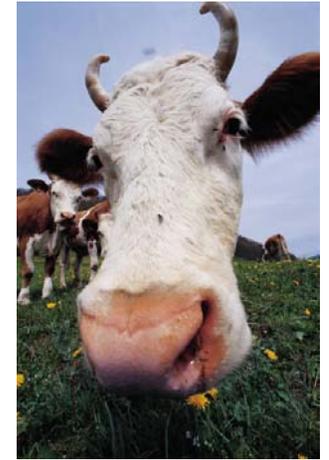
- Time 24 months
- Resources £190k
 - £100 K for buyout of team members time
 - £20 K secretarial
 - £10 K travel, etc
 - £10 K miscellaneous expenses
 - £50 K workshops

How does this agree with the sand-pit objectives?

From the call. Modelling complexity and the impacts of conceptual uncertainties Should process models be simple or detailed? How do we account for all the uncertainties within the models of complex processes that inform decisions? How do we resolve different results arising from different modelling assumptions?

Rather well, we think!!!!

Finally...Our contribution to poetry week



Skyward soars the alp.

The Scot sees the cow and asks:
'is this a high coo?'

