

## EXPERT ELICITATION METHODS FOR BAYESIAN NETWORKS

A course for the Australian Bayesian Network Modelling Society Conference (Nov 2011, Brisbane)

Presenters:

- Samantha Low-Choy (Cooperative Research Centre for National Plant Biosecurity; Mathematical Sciences, STEM Faculty, QUT)
- Marissa McBride (Australian Centre of Excellence for Risk Analysis, University of Melbourne)

### 9.00-11.00: PART 1

1. Introduction to probabilistic thinking (Sama)
2. Common traps and pitfalls
  - a. Logical fallacies (Sama)
  - b. Cognitive biases (Sama/Marissa)

### 11.00-11.30: MORNING TEA

### 11.30-13:00: PART 2

3. Tools to improve accuracy
  - a. Calibration (Marissa)
  - b. Feedback (Sama)
4. Designing structured elicitation from beginning to end (Sama, Marissa)

### 13:00-14:00: LUNCH

### 14:00-15:30: PART 3

5. Methods and Software: Eliciting a number
  - a. The 4-step elicitation method for eliciting a number (Marissa)
  - b. The Elicitor outside-in method for eliciting a number (Sama)
  - c. A smörgåsbord of methods (Sama)

### 15:30-16:00: AFTERNOON TEA

### 16:00-16:45: PART 4

6. Populating a CPT: Eliciting a bunch of (related) probabilities (Sama)
  - a. CPT calculator
  - b. Elicitor
7. Validation (optional/if time permits)

### 16:45-17:00: CLOSE

## READING LIST

For attendees who would like a preview of the course content, we suggest the following background reading would be an advantage, or provide a useful reference. During the course we will provide a more extensive list of references, targeted to specific topics.

For a general introduction on eliciting from experts in the ecological context (Part 1), we recommend Aspinall (2010). For an introduction to elicitation (in any context) Spetzler and Stael von Holstein (1975) provides a seminal but readable paper; it provides a useful introduction that is still relevant. For eliciting probabilities within the Bayesian network context, we suggest a look at Renooij (2001) and Marcot et al. (2006).

On the topic of designing elicitation processes (Part 2) the course will follow Low-Choy et al. (2009). On eliciting a number (Part 3), the course will refer to Low-Choy et al. (2009, 2011) as well as Speirs-Bridge et al. (2010) and Burgman et al. (2011).

A readable introduction to the Elicitor software (Part 4) is an upcoming book chapter (Low-Choy et al. 2011). Unfortunately we will not be able to provide this until the book is released (this month), so redirect you to James et al. (2010) which describes the software and method. We will help you upload it during lunch time at the course.

## BIBLIOGRAPHY

Aspinall, W. (2010) A route to more tractable expert advice. *Nature*, 463, 294-295.

Burgman, M.A., McBride, M., Ashton, R., Speirs-Bridge, A., Flander, L., Wintle, B., Fidler, F., Rumpff, L. & Twardy, C. (2011) Expert status and performance. *PLoS One*, 6, e22998.

James, A., S. Low Choy, J. Murray, and K. Mengersen (2010). Elicitor: An expert elicitation tool for regression in ecology. *Environmental Modelling & Software* 25 (1), 129-145.

Low Choy, S., R. O'Leary, and K. Mengersen (2009). Elicitation by design for ecology: using expert opinion to inform priors for Bayesian statistical models. *Ecology* 90, 265-277.

Marcot, B. G., J. D. Steventon, G. D. Sutherland, and R. K. McCann (2006). Guidelines for developing and updating Bayesian belief networks applied to ecology. *Canadian Journal of Forest Research* 36 (12), 3063-3074.

Renooij, S. (2001) Probability elicitation for belief networks: issues to consider. *Knowledge Engineering Review*, 16, 255-269.

Speirs-Bridge, A., Fidler, F., McBride, M., Flander, L., Cumming, G. & Burgman, M. (2010) Reducing overconfidence in the interval judgments of experts. *Risk Analysis*, 30, 512-523.

Spetzler, C. S. and C.-A. S. Stael von Holstein (1975). Probability encoding in decision analysis. *Management Science* 22 (3), 340-358.

Available in November 2011:

Low-Choy, S., A. James, J. Murray, and K. Mengersen (to appear November 2011). Elicitor : a user-friendly, interactive tool to support the elicitation of expert knowledge. In A. H. Perera, C. A. Drew, and C. J. Johnson (Eds.), *Expert Knowledge and Its Applications in Landscape Ecology*, Chapter 3. Springer, NY