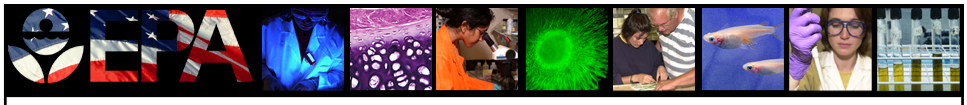
SAB Review of Expert Elicitation Task Force White Paper - Overview

Bob Hetes and Harvey Richmond
U.S. EPA – Office of Research and Development
Office of Air and Radiation

Expert Elicitation Task Force White Paper
Science Advisory Board Review
February 25-26, 2009



Expert Elicitation Task Force

Co-chairs: Harvey Richmond, OAR and Bob Hetes, ORD

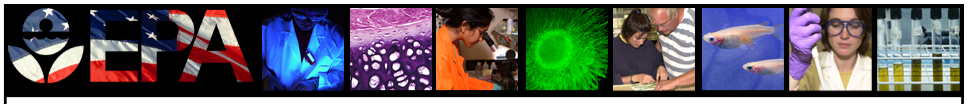
SPC Staff: Kathryn Gallagher
Chapter Leads: 1 Kathryn Gallagher 2 Bob Hetes
3 Cynthia Stahl, Lester Yuan 4 Mark Corrales, Bob Hetes
5 Harvey Richmond 6 Neil Stiber

Task Force members

• Gary Bangs/ORD	Mike Messner/OW	Resha Putzrath / ORD
• David Chen/OCHP	Steve Nako / OPP	Zubair Saleem /OSW
• Lisa Conner/OAQPS	Barry Nussbaum	Brad Schultz/Reg 5
• Ila Cote / ORD	Marian Olsen / Reg 2	Nathalie Simon / OPE
• Jane Leggett/OAR/OAP	Nicole Owens/OPEI	David Simpson/ OPEI
• Joe Greenblott/ OCFO	Zachary Pekar/OAQPS	Holly Stallworth/SAB
• Bryan Hubbell/OAQPS	Brad Venner	

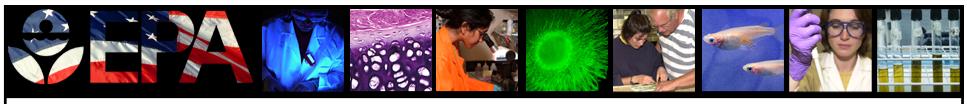
SPC Workgroup Champions: Rob Brenner/OAR, Kevin Teichman/ORD and William Farland/ORD (retired)

2



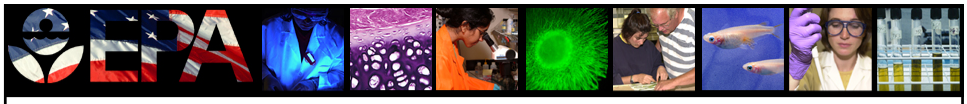
Expert Elicitation White Paper: Overview

- Chapter 1: Introduction
- Chapter 2: Background: Interest /experience in Expert Elicitation (EE)
- Chapter 3: What is EE?
- Chapter 4: What to consider in deciding whether to use EE
- Chapter 5: How to conduct an EE
- Chapter 6: How to present and use results
- Chapter 7: Findings and Recommendations
- Appendices:
  - Appendix A: Factors to Consider in Making Probability Judgments
  - Appendix B: Glossary of Terms



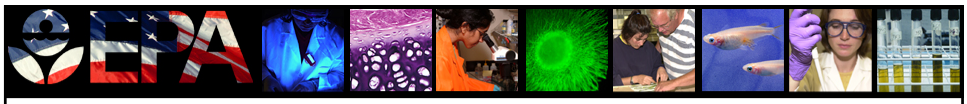
What is Expert Elicitation?

- Task Force defines EE as "formal systematic process of obtaining and quantifying expert judgment" – probability as degree of belief and is a subset of the broader category of approaches involving expert judgment
  - Focuses on science not societal values and preferences (other tools address values and preferences)
  - Characterizes state of knowledge not creation of new empirical data
- Task Force recognizes that EE represents one type of tool and that whether to use it and the degree of resources and time needed to conduct an EE depend on:
  - Nature of the question
  - Context
  - Intended use of the results
- Well suited for critical uncertainties and data gaps



Is Expert Elicitation the Same as Expert Judgment?

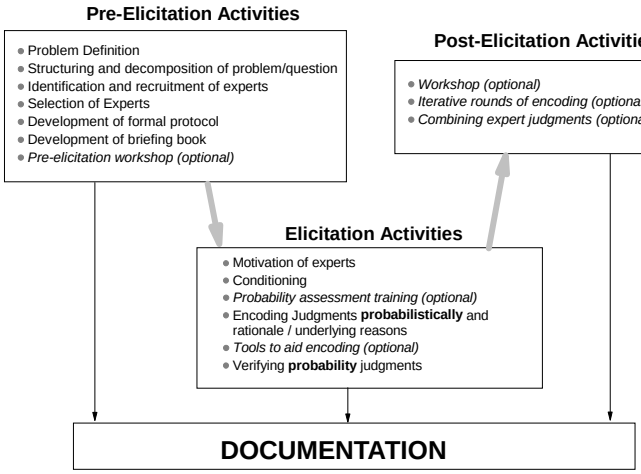
- **Expert judgment** is inherent in the scientific process and covers a range of activities
  - Analysis – problem formulation, choices among studies and models, efforts to fill in data gaps, estimations of uncertainty
  - Evaluation and interpretation of results
- **Expert peer review** draws upon the expert judgments of others to provide feedback on planned or completed products and projects
- **Expert Elicitation** (EE) offers a formal, systematic, and transparent process for obtaining and quantifying expert judgment



When is something an Expert Elicitation versus Expert Judgment?

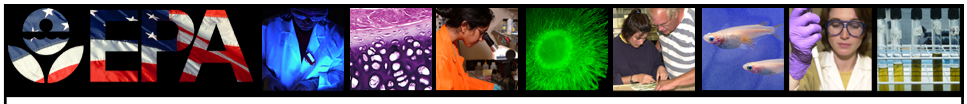
- There is no bright line between EE and Expert Judgment
  - Depends on rigor and the needs of the assessment
- Minimum elements
  - Problem definition -- meets Clairvoyance Test,
  - Formal protocol -- required to ensure consistency in elicitation and control for heuristics and biases,
  - Identification, summary, and sharing of the relevant body of evidence with experts,
  - Formal elicitation -- encoding of probabilistic values or distributions of expert (interactively involving EE practitioner and subject matter expert), and
  - Output: judgment (degree of belief) is expressed quantitatively (in terms of probabilities)

Overview of Expert Elicitation Process



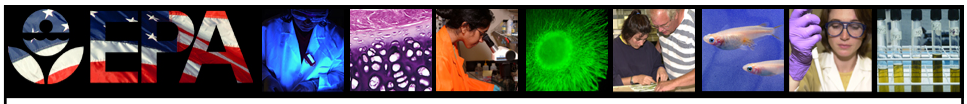
Ch. 4: What to Consider in Deciding Whether to Use EE

- How Important is it to Consider Uncertainty?
- What is the Nature of the Uncertainties to be Addressed?
- What are Other Methods to Characterize Uncertainty?
- What Role may Context play for an EE?
- What Resources are Required for an EE?



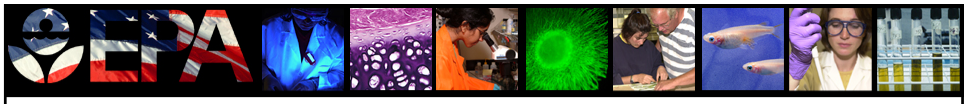
Ch. 5: How to Conduct an EE

- What are steps in an Expert Elicitation?
- What are Pre-Elicitation Activities?
- What approaches are used to conduct Expert Elicitation?
- What Post-Elicitation activities should be performed?
- When and what type of peer review is needed for review of an Expert Elicitation?



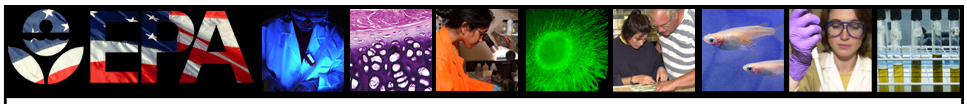
Ch. 6: How to Present and Use Results

- Does the presentation of results matter?
- What is the stakeholder and partner communication process?
- How can communications be stakeholder-specific?
- What is in a technical support document?
- What are examples of effective expert elicitation communications?
- How can EEs be transparent, defensible, and reproducible?
- Should expert judgments be aggregated for policy decisions?
- How can expert elicitation results and other probability distributions be integrated?
- How can an expert elicitation be evaluated post hoc?



Chapter 7: (selected) Findings

- EE is powerful and accepted tool to characterize uncertainty/provide estimates for specific data gaps
  - EE is not always appropriate or best in all cases and is not a panacea in addressing emerging uncertainty requirements
  - EE is not equivalent to valid empirical data, nor should it be used as a substitute for collecting additional data, where such studies are feasible within timeframe and resources available
- Generally, EE requires significant investment of resources and time to provide sound results
  - Use of EE is appropriate for some situations and not for others
  - Users must be aware of both strengths and limitations of this approach
  - Analysts should keep in mind that there are other approaches
- Nature of the regulatory process introduces complexities and variety of considerations that will influence decisions on:
  - Whether to conduct an EE
  - How to conduct the EE
  - How to communicate and use the results.



Chapter 7: (selected) Recommendations

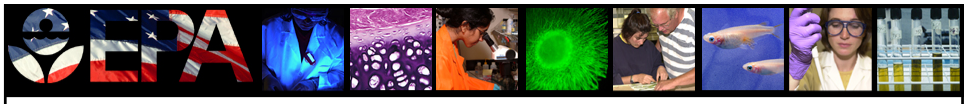
- Decision to conduct an EE should involve discussions between staff organizing the EE and managers.
- EPA should develop guidance and/or policy, training and tools supporting the conduct and use of EE
  - Consult White Paper until they are ready
- Credibility, acceptability, and utility of using EE within EPA will depend on early efforts
  - Collaboration with knowledgeable staff within EPA and/or external EE practitioners
  - Provide training and tools (e.g., develop a clearinghouse on EE to facilitate sharing of methods, lessons learned, etc.
- Peer review of EE draft reports should focus on the process of elicitation and scientific evidence used

Charge

- Does the White Paper provide a comprehensive accounting of the potential strengths, limitations, and uses of EE? Please provide comments that would help to further elucidate these potential strengths, limitations, and uses. Please identify others (especially EPA uses), that merit discussion.

Charge (cont….)

- Transparency is important for analyses that support Agency scientific assessments and for characterization of uncertainties that inform Agency decision making. Please comment on whether the White Paper presents adequate mechanisms for ensuring transparency when
  - 1) considering the use of EE (chapter 4),
  - 2) selecting experts (chapter 5); and
  - 3) and presenting and using EE results (chapter 6).
- Please identify any additional strategies that could improve transparency.

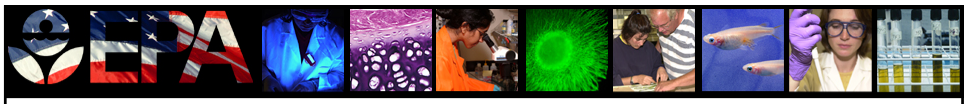


Charge (Cont…)

Please comment on the technical issues below and any other technical issues that are presented in the White Paper.

- Section 5.2 considers the process of selecting of experts.
  - Does this White Paper adequately address the different criteria and strategies that may be used for nominating and selecting experts?
- Sections 5.4 and 6.7 present multi-expert aggregation.
  - Does this White Paper capture sufficiently the range of important views on this topic?
- Section 5.2.2 discusses how the problem of an EE assessment is structured and decomposed using an "aggregated" or "disaggregated" approach.
  - Does this discussion address the appropriate factors to consider when developing the structure for questions to be used in an EE assessment?
- Sections 7.1 and 7.2, presents the Task Force's findings and recommendations regarding:
  - 1) selecting EE as a method of analysis,
  - 2) planning and conducting EE, and
  - 3) presenting and using results of an EE assessment.

  Are these findings and recommendations supported by the document?
- Please identify any additional findings and recommendations that should be considered.



Charge (Cont….)

- As EPA considers the future development of guidance beyond this White Paper,
  - what additional specific technical areas should be addressed?
  - What potential implications of having such guidance should be considered?
  - Do the topics and suggestions covered in the White Paper regarding selection, conduct, and use of this technique provide a constructive foundation for developing "best practices" for EE methods?