



## OSAC Research Needs Assessment Form

**Title of research need:**

**Keywords:**

**Submitting subcommittee(s):**  **Date Approved:**

*(If SAC review identifies additional subcommittees, add them to the box above.)*

### Background information:

#### 1. Description of research need:

The study of human factors includes focusing on how humans make decisions. Specific to Forensic Toxicology, human factors relate to whether cognitive and contextual biases play a role in how a case is analyzed and conclusions made. Forensic toxicologists should make decisions on how to analyze a case and draw conclusions from task-relevant information (e.g. empty prescription bottle found next to a decedent; pre-determined criteria for reporting a substance), and not from other task-irrelevant evidence in the case (e.g. prior convictions).

Human factors areas potentially affecting the discipline of forensic toxicology include:

- Case information (e.g. what information is relevant and what is not)
- Base rate bias (e.g. when expectation, not the data, drive/mediate the decisions)
- Motivational issues
- Fitness for duty (e.g. fatigue, visual acuity)
- Scientific culture and group dynamics
- Error management

Research is needed to determine which, if any, cognitive and/or contextual biases exist in order to provide guidance to laboratories so analyses performed are not subject to any real or perceived bias. Human factors should be considered prior to any document/procedure approval and implementation by a laboratory.

Research is also needed into which facts forensic toxicologist should consider (i.e. task-relevant information) and which facts they should not consider (i.e. task-irrelevant information) when determining how to proceed with testing and/or drawing conclusions. Further, research should focus on variability of potential biases based on the case type (e.g. suspected impaired driving cases versus a death investigation.)

Finally, research is needed into effective ways to address cognitive and contextual biases so as to avoid exposing forensic toxicologists to task-irrelevant information; e.g. consider how case management, sequential un-masking, or other context management procedures might be implemented.

## 2. Key bibliographic references relating to this research need:

- Dror, I. E., & Charlton, D. (2006). Why experts make errors. *Journal of Forensic Identification*, 56, 600–616.
- Dror, I. E., Charlton, D., & Peron, A. (2006). Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International*, 156, 174–178.
- Dror, I.E., & Rosenthal, R. (2008). Meta-analytically Quantifying the Reliability and Biasability of Forensic Experts. *Journal of Forensic Sciences*, 53(4), 900-903.
- Kassin, S.M., Dror, I.E., & Kukcka, J. (2013). The forensic confirmation bias: Problems, perspectives, and proposed solutions. *Journal of Applied Research in Memory and Cognition*, 2: 42-52.
- National Research Council. (2009). *Strengthening Forensic Science in the United States: A Path Forward*.
- Risinger DM, Saks MJ, Thompson WC, Rosenthal R. (2006). The Daubert / Kumho implications of observer effects in forensic science: hidden problems of expectation and suggestion. *California Law Review*, 90: 1–55.
- Stoel, R.D., Berger, C.E., Kerkhoff, W., Mattijssen, E., and Dror, I. (2015). Minimizing contextual bias in forensic casework. In Strom K. and Hickman, M.J. (eds) *Forensic Science and the Administration of Justice*. New York: Sage.
- Thompson W.C. (2011). What role should investigative facts play in the evaluation of scientific evidence? *Australian Journal of Forensic Science*, 43(2-3): 123-34.

### 3a. In what ways would the research results improve current laboratory capabilities?

Results from Human Factors research would allow laboratories to become aware of, and implement procedures to avoid, discipline specific cognitive and contextual biases. Research results could additionally help protect laboratories from the occurrence of cognitive and contextual bias (real or perceived).

Research would also assist laboratory management in determining which context management procedure(s) works best in their laboratory environment.

### 3b. In what ways would the research results improve understanding of the scientific basis for the subcommittee(s)?

It is the charge of the OSAC Toxicology Subcommittee to prioritize and draft standards and guidelines for the field of Forensic Toxicology. Research into Human Factors will allow the Subcommittee to consider how cognitive and context management procedures might be implemented in their standards and guidance documents so forensic toxicologists can be less influenced by, or take steps to avoid exposure to, task-irrelevant information.

### 3c. In what ways would the research results improve services to the criminal justice system?

Research into Human Factors would reduce both real and perceived biases (e.g. responding to concerns raised in the 2009 NRC Report) and allow for an increase in objective, science based decision making in toxicology casework. Error management could also be reduced by addressing cognitive biases such as analyst and reviewer fatigue.

4. Status assessment (I, II, III, or IV):

	I		
		<b>Major gap</b> in current knowledge	<b>Minor gap</b> in current knowledge
<b>No or limited</b> current research is being conducted		<b>I</b>	<b>III</b>
<b>Existing</b> current research is being conducted		<b>II</b>	<b>IV</b>

*This research need has been identified by one or more subcommittees of OSAC and is being provided as an informational resource to the community.*

Subcommittee	Approval date: pending
<i>(Approval is by majority vote of subcommittee. Once approved, forward to SAC.)</i>	
SAC	
1. Does the SAC agree with the research need? Yes      No <input type="radio"/>	
2. Does the SAC agree with the status assessment? Yes      No <input type="radio"/>	
If no, what is the status assessment of the SAC: <input type="text"/>	
Approval date: <input type="text"/>	
<i>(Approval is by majority vote of SAC. Once approved, forward to NIST for posting.)</i>	