



# Solution-focused risk assessment

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## Abstract

Adam Finkel has proposed “Solution-Focused Risk Assessment” (SFRA) to largely replace what he describes as “analysis run wild” in problem assessment. His major objective is to have detection of a “signal of harm” followed first with consideration of possible solutions jointly between risk assessors and risk managers. Rigorous risk assessment of the potential value of a broad range of solutions to decreasing risk would then ensue with what he believes will be greater likelihood of effective responses. Among the questions that need to be addressed in practice include how does SFRA differ from sustainability, the precautionary principle, environmental justice, public health, green chemistry, and similar proposals to improve environmental decision making; whether SFRA brings risk assessment too close to risk management; how will “signal of harm” be determined, and what would be a fair trial to determine if SFRA is of practical value?

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Risk assessment, Risk management, Environmental Protection Agency, Clean Water Act, Clean Air Act.

## 1. Introduction

Adam Finkel is one of the more thoughtful, provocative and adventurous leaders in the field of risk analysis. He is an academic whose understanding of the use of risk assessment has been bolstered by time spent at OSHA. Many of his insights were crystallized in his proposal for Solution-Focused Risk Assessment (SFRA). In this review I will do my best to capture and critique these insights, to place SFRA into the context of other ongoing debates about the role, the methodology and the value to society of risk assessment and to briefly consider the implications of SFRA to the field of toxicology.

## 2. What is SFRA?

Finkel wants us to rethink the risk assessment/risk management (RA/RM) framework so that the initial emphasis is on solving the problem rather than analyzing its extent [1]. Importantly, the focus of risk assessment would be on providing information relevant to the choice of options for reducing risk following perception of a “signal of harm”, bypassing the present emphasis on analyzing the problem in depth before considering options. The proposed alteration is far more than a tweak in the RA/RM framework. It includes a conceptual change and in many ways a cultural change. Notable in his first essay on the subject is the amount of space given to clarifying what SFRA is not. More recently, he and his colleague Andrew Maynard have developed a helpful video which further clarifies SFRA [2].

Finkel claims that in earlier conceptual approaches, such as the Red Book [3], risk assessment precedes options development. The six-part iterative framework in the Presidential/Congressional Commission of Risk Assessment and Risk Management begins with problem definition, proceeds to risk analysis and then to options development [4,5]. Irrespective of whether his claims are historically accurate, or whether problem-focused risk assessment suffers from “analysis run wild”, his proposal to focus more emphasis on considering solutions before rigorous problem analysis deserves consideration.

In large part his argument builds beyond the 2009 NRC Committee Report “Science and Decisions: Advancing Risk Assessment” [6]. The Committee, of which he was a member, called for much closer interaction between the risk assessor and the risk manager. The role of risk assessment in option selection is repeated throughout [6,7].

But Finkel is critical of the idea that option development should be subsequent to risk assessment and appears to feel that the NRC Science and Decisions document did not go far enough [1]. One example he gives of a broader option not considered in traditional RA/RM is not painting a plane and thereby saving the fuel cost of the additional weight rather than only analyzing which paint and solvent emits less pollution [1]. However, this example could be considered one of problem formulation — which is primarily a function of risk managers who are the ones to decide whether the plane needs to be painted.

The 1983 Red Book impetus to risk assessment led to establishing EPA's Risk Assessment Forum which included risk assessors from each of the EPA program offices and had the intended purpose of including risk management input into the general guidance for risk assessment. Its 1984 "Risk Assessment and Management: Framework for Decision Making" set the tone for continued efforts to reconcile the goals and methods of risk assessment in response to EPA's risk management responsibilities [8]. This framework was updated in 2017 in response to the 2009 NRC Science and Decisions document [6,9]. The 2017 *Framework* does claim to focus on options. However, it also says:

"Rather than establishing new guidance, the *Framework* compiles existing Agency policy, guidance and guidelines into a single coherent document" [9].

I suspect that Finkel is skeptical of whether a process that took eight years to simply compile existing EPA policy really represents a refocusing of its activities toward options compatible with his concept of SFRA.

As Finkel recognizes [1], risk assessment already is involved in option selection. The antecedents of risk assessment in engineering were inherently solution focused. Further, engineering as a discipline includes systems analysis, which is at the core of SFRA and which accounts for much of its overlap with other solution-focused approaches (see below). SFRA as conceived by Finkel also fits in well with Haimes holistic approach that links systems analysis with risk analysis using the lens of business management solution-focused insights [10]. Finkel also recognizes the importance of incorporating rigorous cost-benefit analysis and utilizing value of information and decision analysis processes.

One context of considering SFRA is congressional actions rejecting risk-based standards in favor of technology-based standards, e.g., the 1972 Clean Water Act (Best Available Technology; BAT) and the 1990 Clean Air Act Amendments for hazardous air pollutants (Maximum Available Control Technology, MACT [11,12]). Risk assessment does remain part of the decision process for EPA to choose among the technological options for BAT or MACT, and to consider residual risk following MACT [13]. Similarly, the feasibility assessment routinely used in Superfund cleanup decisions includes the use of risk assessment as part of the decision process [14]. The requirements for all three, and for many other uses of risk assessment, are based on laws. While, as suggested by SFRA, other options may be worth considering (e.g., do we really need to clean up every Superfund site?) this would require changing the thinking of Congress, not the thinking of the risk assessment community. Finkel appears to be unfairly blaming risk assessors for doing their job to help risk managers chose among the suite of options available to them under the law [15].

The often narrow legal authority to act also would seemingly limit the ability of proponents of alternate approaches to risk management, such as SFRA, to consider a broader range of options. It is often unclear whether the "signal of harm", or the solutions, are focused on emissions, exposures, or health effects. This makes a difference. For example, benzene's ability to cause acute myelogenous leukemia (AML) is the rationale for many EPA regulations controlling petroleum products. We found that actions under the HAP provisions of the Clean Air Act were only about one-tenth as effective in reducing AML mortality than was the decline in cigarette smoking [16]. But EPA has no direct authority over cigarette smoking. Perhaps the only nexus between the two occurs at the level of a state health or environmental department which might be able to choose whether to invest their resources in control of tobacco use or benzene emissions – and obviously AML would not be the only consideration for either. This example is relatively simple in that benzene clearly causes AML. But what about chemicals for which the "signal" of an effect is not as strong, such as endocrine disruptors? How can one decide priority setting without in depth analysis of the problem? To the extent that risk assessment of chemicals is simply another government indicator that helps in prioritization [17], will moving risk assessment away from evaluating problems be useful?

A more prosaic issue, but one of central importance to its acceptance, is whether SFRA will add to the time burden imposed by current risk assessment practices, and is a major source of criticism of EPA's Integrated Risk Information System (IRIS). Finkel argues it will not, in large part because he believes that much of EPA's risk assessment effort is wasted in considering the problem rather than the solution. However, he does state that there would still be rigorous risk assessment at the options phase [1] Further, he calls for quantitative uncertainty analysis as part of SFRA, a currently cumbersome procedural challenge which he supports but which inevitably will add time [18,19].

### 3. How does SFRA fit into other discussions about the role, methodology and value of risk assessment?

In reaching out beyond the usual EPA RA/RM framework, Finkel is aware that SFRA enters territory occupied at least partly by other approaches to environmental health risk:

"One way to think about SFRA is as a synthesis of some of the features of lifecycle analysis, cumulative risk assessment and "beyond risk" processes devised to set broad agendas for environmental protection and other social priorities" [1].

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