

The Winter 2006 issue of *Issues in Science and Technology*, a publication of the National Academy of Sciences and the University of Texas at Dallas, published my invited response to an article appearing in its Fall 2005 issue. My comment is the first of several in the "Forum" section, under the heading "Can We Anticipate Disasters?"
<http://www.issues.org/22.2/forum.html>

"Flirting with Disaster" by James R. Phimister, Vicki M. Bier, and Howard C. Kunreuther lays out several issues confronting high-hazard enterprises and regulators vis-a-vis the precursor analyses meant to help them ward off operational threats. Underlying those issues is the question of the scope and quality of the event analyses that delineate the precursors.

To develop more robust event analyses in any high-hazard industry, a first step is to recognize that precursor reporting systems' effectiveness depends on the extent to which boards of directors, executives, and senior managers define these local efforts as being as structurally necessary to meeting their public responsibilities and their financial goals as any other basic production activity, and allocate intellectual and financial resources accordingly. But when those resources are understood in accounting terms to be "indirect" administrative contributions to production, the tendency is to minimize them. The scope and depth of event reviews suffer.

A second precondition is to reconsider processes for evaluating precursors' risk significance. In nuclear power, accident sequence precursors and probabilistic risk analyses rely on global scenarios of meltdown threats; because these cannot account for local component interactions and dependencies introduced by upgrades and maintenance, their value as reference points is limited. To validate precursors' risk significance requires statistical analyses that are unlikely to take into account contexts other than those of material, mechanical, and physical systems. The cultural, economic, political, and cultural systems that deep analyses find as the precipitating contexts of major accidents, despite being well-recognized locally as "error-forcing conditions," have not been regarded as being risk-measurable. At the least, it is possible to make these measurable and reportable by incorporating so-called "subjective" measures, which are already widely used in risk modeling and are derived from validated methods of eliciting and structuring

expert opinion. Formalized reporting and trending systems built up out of aggregated data would then also reflect such substantive evidence.

A third precondition is to reexamine the sources and meanings of “complacency,” a catch-all precursor. The absence of curiosity and doubt that it implies may, however, be a consequence of the well-observed insularity of those in high-hazard industries. Hermetic systems of language and talk, resistance to outsiders’ ideas, consultants and contractors who play “NASA chicken” (not being first to bring up an issue), internal turfs, and judging the credibility of knowledge by organizational rank all these and others fence out diverse perspectives and new questions.

Locally, “expert opinions” should also include those of creditable outsiders. Globally, the rare informal discussions of issues in joint meetings of industry executives, technical experts, and social, political, and behavioral scientists concerned with the many facets of high-hazard enterprises (biotech, chemicals, medicine, nuclear power, security, and transportation) need to be shaped into a permanent forum for amplifying the fund of intellectual capital being drawn on to stay ahead of disaster, for their sakes and ours.

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