Keene STATE COLLEGE Wisdom to make a difference.

Connecting Professionalism, Safety & Ethics: Opportunities & Challenges

Understanding the Dimensions of Risk

Ralph Stuart, CIH, CCHO
Chemical Hygiene Officer
Keene State College
Chair, Committee on Chemical Safety

August 2019

20^{th} Century Risk Assessment

What elements are missing from this equation?

Important missing elements (among others):
Who assumes the risk and *who benefits from the risk?*

Monument to the X-ray and Radium Martyrs of All Nations, Hamburg, Germany

Marie Curie statute at the Radium Institute, Warsaw

20th Century Chemical Ethics

- In 1964, in a *Journal of Chemical Education* article, Dr. Livingston states: *"Legal requirements… are outside the competence of our committee… Certainly if* ***humanitarian and ethical requirements*** *are met, there are not likely to be any issues that will require legal action."*
- This approach to chemical safety relies on chemical and ethical ***intuition*** rather than ***critical thinking***.

H.K. Livingston,
first CCS chair in 1963, newly moved to Wayne State University after 13 years at DuPont

Despite the intrinsic interest of these unusual compounds, this laboratory has provisionally discontinued all experimental work requiring the preparation or use of the dibromides or their hydrolysis products.

There is no *a priori* reason to believe that these particular compounds are more dangerous to man than several related substances widely used as industrial chemicals; however, of the three laboratory workers who have used the dibromides and bromohydrin VII, two later developed similar pulmonary disorders which contributed to their subsequent deaths. The third has exhibited minor skin sensitivity reactions.

Department of Chemistry
University of California
Los Angeles 24, California
S. Winstein

Received February 23, 1961

Thinking Critically about Ethics

Academic Ethics
Mission: educate citizens and/or entrants to the profession
Decisions made: content covered and students' grades
Values: doing your own work while demonstrating theory
Response to Problems: described in syllabus

Thinking Critically about Ethics

Academic Ethics	Science Ethics
Mission: educate citizens and/or entrants to the profession	**Mission:** develop new technical tools based on emerging information and understanding
Decisions made: content covered and students' grades	**Decisions made:** To publish or not to publish
Values: doing your own work while demonstrating theory	**Values:** scientific misconduct (identified by the NSF as fabrication, falsification, and plagiarism)
Response to Problems: described in syllabus	**Response to Problems:** peer review of specific cases

Thinking Critically about Ethics

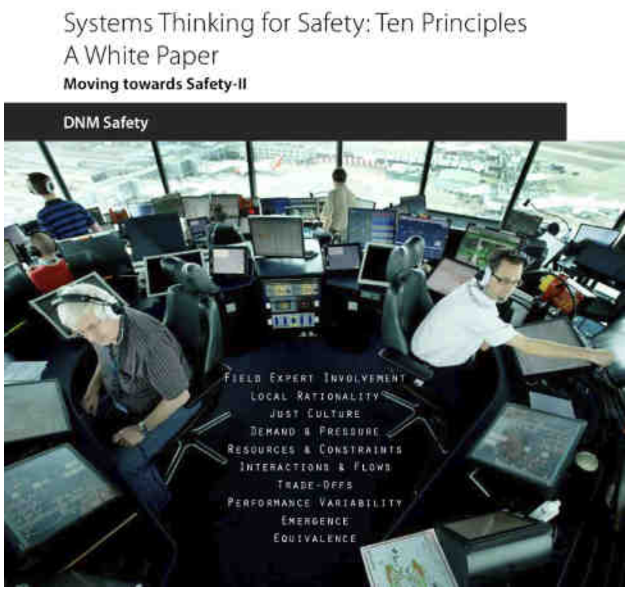
Academic Ethics	Science Ethics	Professional Ethics
Mission: educate citizens and/or entrants to the profession	**Mission:** develop new technical tools based on emerging information and understanding	**Mission:** use technical tools to contribute to the general welfare in specific situations
Decisions made: content covered and students' grades	**Decisions made:** To publish or not to publish	**Decisions made:** **r**ecommendations to clients
Values: doing your own work while demonstrating theory	**Values:** avoid scientific misconduct (identified by the NSF as fabrication, falsification, and plagiarism)	**Values:** autonomy of others; non-maleficence; beneficence; justice; truth-telling; promise-keeping
Response to Problems: described in syllabus	**Response to Problems:** peer review of specific cases	**Response to Problems:** professional codes of ethics

What is the Safety Connection?

Systems Thinking for Safety:
Ten Principles

A White Paper
Moving towards Safety-II

August 2014 – European Organisation for the Safety of Air Navigation



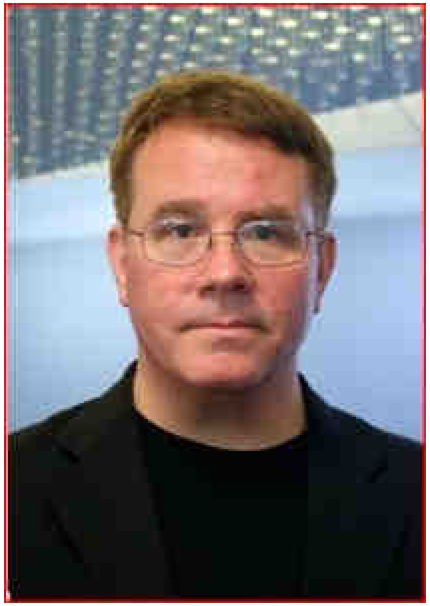
21st Century Safety Culture Education

John Warner’s parallel puzzle

- When his young son died of cancer, John asked himself if he knew whether his work could have led to the disease.

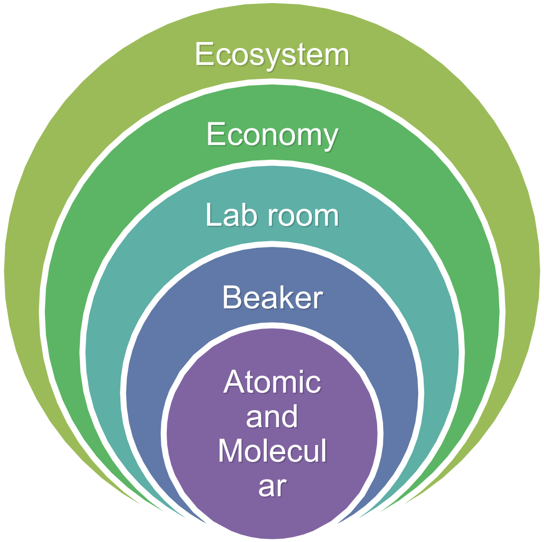
- or -

- Asking the question in reverse: “Given a PhD in chemistry, how do I make a carcinogenic dye?”
- Out of that rose his work on Green Chemistry



Key themes from the SAP Green Chemistry discussion

- A *systems approach* to address these chemical concerns in the environment includes many *scales*, *stakeholders* and *sciences*
  - *Stakeholders* need to think at the molecular, beaker, lab, community and global *scales* in an iterative fashion
  - This *system* model encompasses both lab safety and sustainability
- *Collaboration* skills apply to both Green Chemistry and Lab Safety



e Impact of a Change in Perspective: The Green Duality

Bench Level Aspects

Institutional Aspects

Dr. Christopher Weber, Clemson EHS

Green Duality: perspective and scale

Bench

Institution

Flammable Storage

Chemical Storage

Compliance

OSHA Compliance

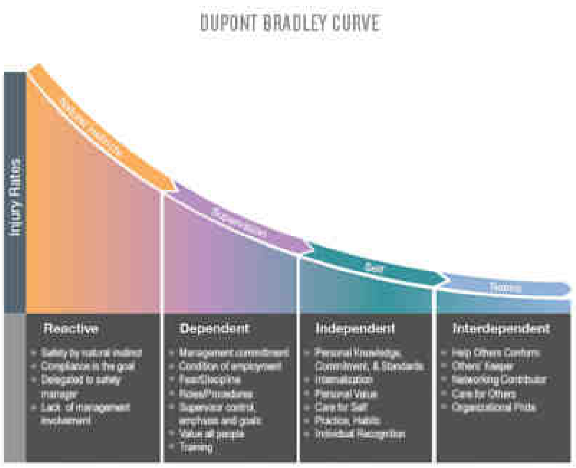
dhec

NFPA

Why Do Ethical Challenges Arise? Organizational Responses to Surprises

My Experiences:

1) **Bully culture:** deny the event and repress questions
2) **Bureaucratic culture:** blame the individual and train everyone else
3) **Resilient culture:** repent and throw (a few) new resources at the problem
4) **Generative culture:** review the event and incorporate changes from Lessons Learned



An organization can house all of these cultures at the same time.

Recognizing Safety Partnerships that Support Just, Generative Cultures

1. Texas Tech University and the Chemical Safety Board

2. The University of Minnesota Departments of Chemistry, Chemical Engineering and Environmental Health and Safety

3. The University of Bristol College of Chemistry and Environmental Health and Safety


CSB

Case Study

Texas Tech University

Laboratory Explosion


UNIVERSITY HEALTH & SAFETY

UNIVERSITY OF MINNESOTA Driven to Discover

Dangers of Peroxide Formers—Explosion at UMN

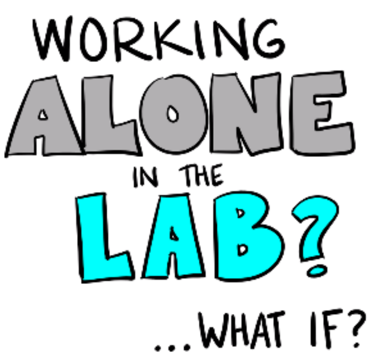
Figure 1: Damaged cart and glass fragmentation from the detonation.

Incident:

A large explosion occurred while a UHS Environmental Health and Safety Technician was processing organic waste from a laboratory cleanout. The technician was in the process of combining flammable solvent waste into a "bulking drum", which is a standard practice at our facility. Upon disposal of an emptied glass bottle into a tip cart for recycling, a large detonation occurred in the cart. The shockwave from the detonation was large enough to rip the cart in half (Figure 1), blow open the doors in the room, cause damage to adjacent rooms, and shake the windows in the facility. The technician survived the blast without major injuries.

University of BRISTOL

bristol.ac.uk/chemistry



Remember We're in This Together