American Chemical Society

ACS Chemistry for Life™

Safety in the Context of the ACS Strategic Plan

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The 2018 ACS Safety Summit: Bringing *Professionalism, Safety and Ethics* to *Chemistry for Life*™

It's exciting to see ACS's strategic values being lived:

1. **Passion for chemistry:** We're here on a Sunday morning!
2. **Focus on Members:** The summit and this symposium is about connecting ACS staff, governance, and members to organize chemical safety opportunities for ACS
3. **Professionalism, safety and ethics:** Strategic thinking such as this is a professional commitment to personal and organizational development
4. **Diversity:** safety cuts across the chemistry enterprise and is a public as well as an academic concern

Thank you to everyone who has engaged in ACS's safety work over months / years / decades. This work exemplifies the "*generative culture*" described in *Safe Science: Promoting a Culture of Safety in Academic Chemical Research*

Dr. Dorhout's Goals for the ACS Safety Culture Summit

1. Coordinate *ACS efforts and expertise* in the area of chemical safety, with a focus on **safety culture** in academic laboratories.
2. Formulate *future ACS strategy* to demonstrate the Society's leadership in advancing a **culture of safety** in the chemical enterprise.
3. Engage ACS *stakeholders and external experts* in the chemical safety conversation to promote an **ethos of safety.**
4. Identify *tools, opportunities, and partnerships* that ACS can leverage to support **safety cultures**.

The Summit's Starting Point:

ACS Chemistry for Life™

ACS Chemistry for Life™

STRATEGIC PLAN for 2018 and Beyond

Why?

Vision

Improving people's lives through the transforming power of chemistry

Mission

Advancing the broader chemistry enterprise and its practitioners for the benefit of Earth and its people

How?

Core Values

Passion for Chemistry and the Global Chemistry Enterprise

Focus On Members

Professionalism, Safety, and Ethics

Diversity and Inclusion

What?

ACS Strategic Goals

1. Provide Information Solutions
2. Empower Members and Member Communities
3. Support Excellence in Education
4. Communicate Chemistry's Value

Cultures are historically bound, so let's take a quick look back at chemical safety strategies of the 20th Century.

Chemical Safety in the 20th Century

In 1964, the Journal of Chemical Education published an article by Dr. Livingston, entitled ***Safety Considerations in Research Proposals,***

- The article is a good summary of the research safety challenges that still apply today.
- However he 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."***
- When events of the 1980's pushed ***Chemical Safety and Hygiene*** to become ***Environmental Health and Safety***, this "gentleman's club" approach to lab safety culture became outdated

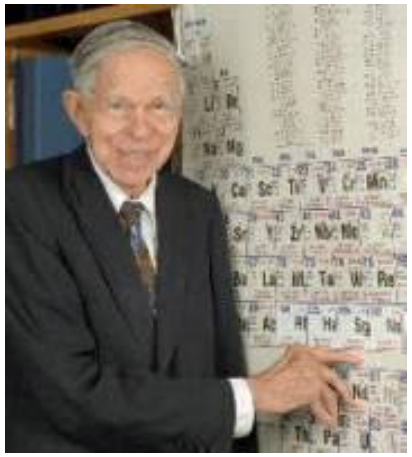
H.K. Livingston, first CCS chair in 1963, newly moved to Wayne State University after 13 years at DuPont

"Working Safely at the Frontiers of Science"

In a 1999 JCHAS interview with Dr. Seaborg remembered:

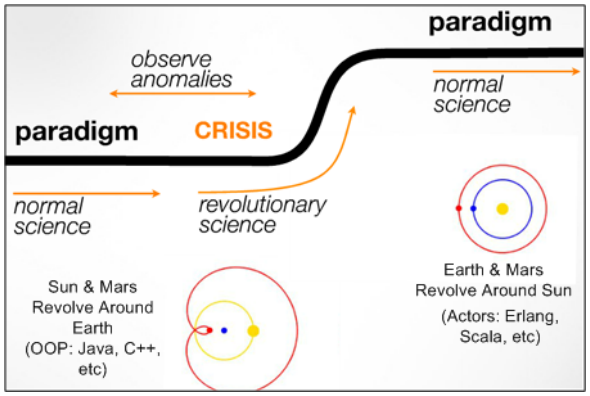
- …it suddenly occurred to me that the … ***health physicists hadn't given any attention to the danger from alpha-particle emitters like plutonium.*** All of the precautions… were for gamma radiation.
- "In view of the problems that had occurred in the late 1910's… with the ***radium dial painters***, I realized that the ingestion of just a little bit of plutonium would be a greater danger than radiation from gamma emitters.
- ***"So I got in touch with the medical authorities and called the danger to their attention.*** This led to a recognition of the problem and a renovation of the entire laboratory to include additional hood space and air monitoring."

Dr. Seaborg's experience with the changing nature of "safety" as science advanced led to him supporting establishing DCHAS in 1979 before the ACS Council, despite DAC opposition. The motion to approve the Division carried.



Glenn Seaborg, ACS President, 1976; patent holder on americium and curium

The Paradigm Shift:
21st Century Safety Culture includes *Community Safety* as well as *Personal Safety*



Paradigm 1:
20th Century rules-based safety to protect individuals
Crisis: *CSB report and Safe Science*
Paradigm 2: risk based approach to chemical safety to protect communities and ecosystems

- **Community safety** adds ***transparency***, ***transferability***, ***scalability*** and ***sustainability*** to rules-based safety. (These values are the basis of science as well.)
- The cultural stress resulting from this change is seen in the 2018 ACS Strategic Plan: *"Despite increasing awareness of the importance of having an active safety culture in the workplace,* ***some practitioners see safety as interfering with success****."*

Johnny was here: From airmanship to airlineship

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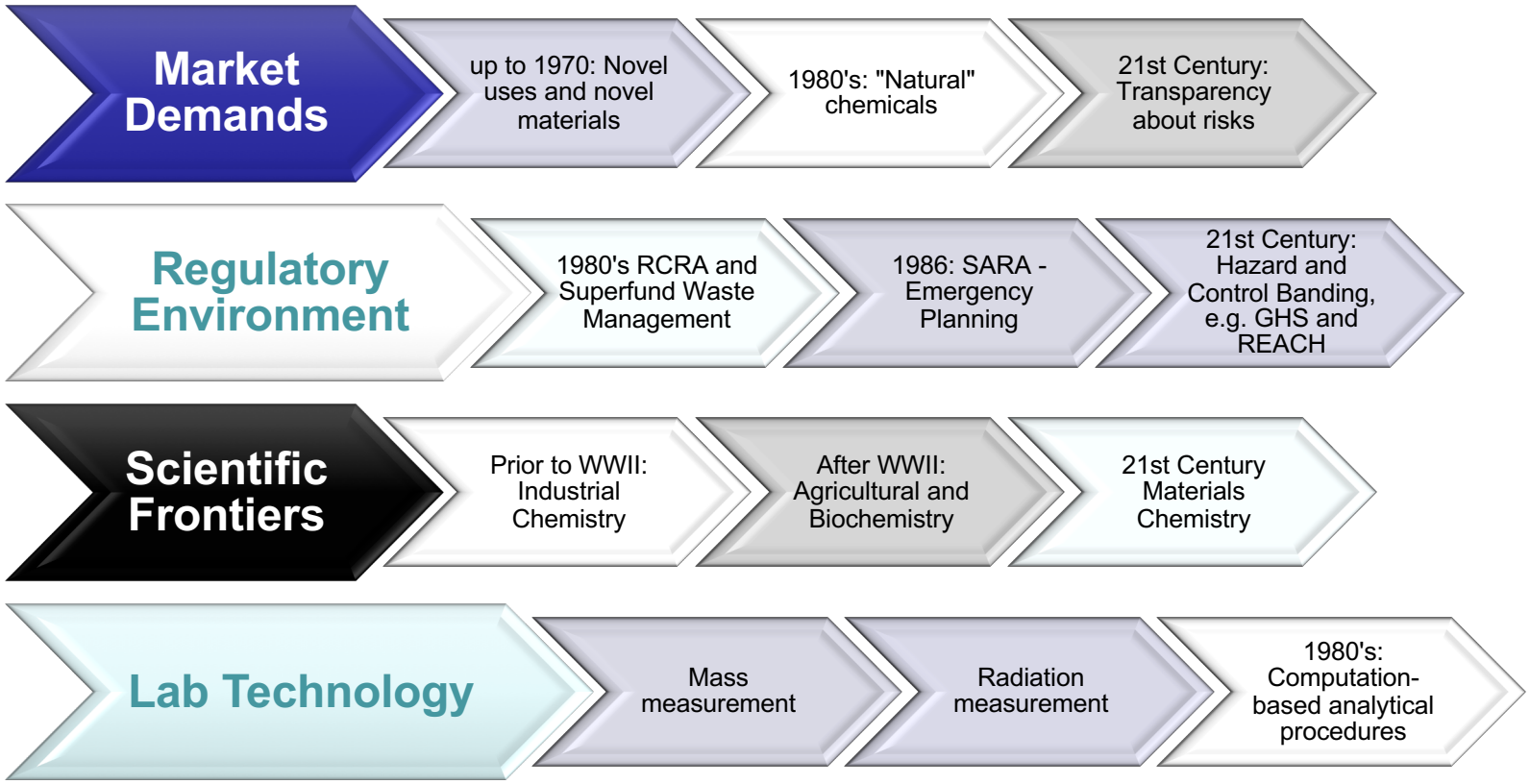
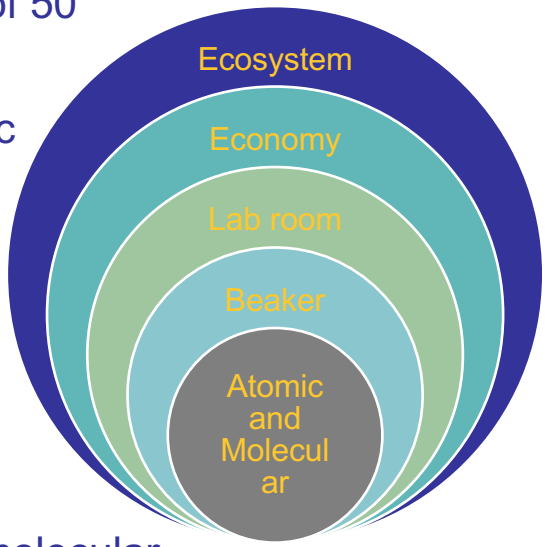
Environmental Forces impacting Chemistry over the 20th Century



The Green Chemistry Connection

- 20th Century Chemistry is unsustainable in the 21st Century
  - Supplies of Natural Resources (e.g. Phosphorus supply of 50 years; Helium supply of 20 years)
  - Ecosystem services are overtaxed (e.g. CO_2, BOD, plastic adsorption)
  - Chemical Contamination is being circulated globally
- Addressing these concerns requires a **systems approach** which includes a variety of *scales*, *stakeholders* and *sciences*
  - The stakeholder groups need to collectively 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



The Good News:
Safety Tools for the 21st Century

- The **Globally Harmonized System** addresses the *"Right to Understand"*
- The **RAMP** Paradigm ("*Preparing / Protecting*" is where the community enters the picture)
- **Process Safety Management** standards and CSB reports support *transparency*
- Market-Driven "**Green Screen**" Tools requires establishing *exposure scenarios to rank risks*

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GHS
The Global Harmonization System of Classification and Labeling

R Recognize the hazards
A Assess the risks of the hazards
M Minimize the risks of the hazards
P Prepare for emergencies from uncontrolled hazards

CSB Case Study
U.S. Chemical Safety and Hazard Investigation Board

Texas Tech University
Laboratory Explosion

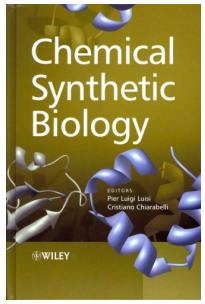
GREENSCREEN CERTIFIED™

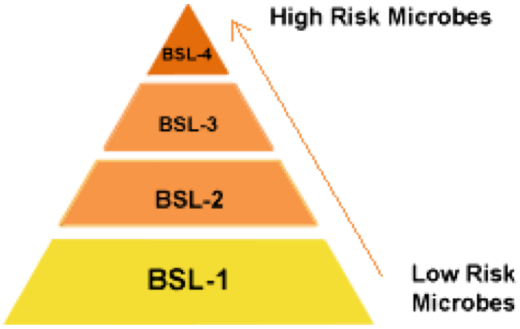
The Other News: 21st Century Safety Hurdles

- Public perception of “chemical safety”
- Shifting legal expectations
- Work on scientific frontiers (nano- and synbio- tech) create novel risks
- Interdisciplinary sciences lead to conflicting safety paradigms

Fisher Hexane Can Warning *”Stop: Dangerous Material if Used Incorrectly”*

NanoSafety Cluster
A Resource for Stakeholders
Visit our website
www.nanosafetycluster.eu



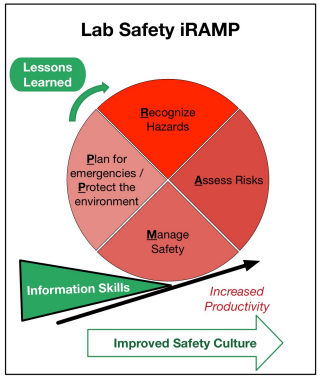


Reminder: non-chemists, including biologists, engineers, and OSHA, look to chemists (and, by extension, ACS) for leadership in laboratory safety

Strategic Opportunities in Chemical Safety for ACS

1. Develop Safety Information Solutions

Develop specific use cases for RAMP



2. Empower Members with Safety Skills

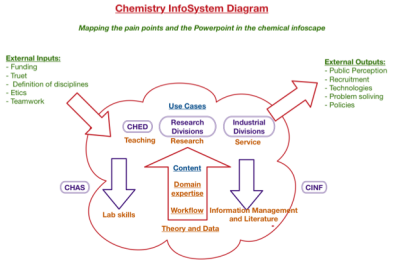
Stakeholder Workshops

3. Support Safety Education

RAMP outreach

4. Communicate Chemical Safety as a Core Value

Support the ecosystem of professional safety resources



ACS Safety Programs

Division of Chemical Health and Safety

- National and Regional Meeting technical programs
- *J of Chemical Health and Safety* and DCHAS-L e-mail list
- Professional Development Workshops
- Innovative Project Grants
- Technical division partnerships .particularly CHED and CINF
- Connections to other professional networks

Committee on Chemical Safety

- Education Subcommittee
- Communication Subcommittee
- Safe Practices Subcommittee
- Safety Advisory Panel

ACS Safety Program Office Coordination

- NSTA outreach
- CPSC support on flame-jetting education
- ACS Regional meeting workshops
- Document library maintenance
- Support for ACS outreach staff on safety issues

Empowering Members to Meet These Challenges

Technical Skills

- Understanding GHS
- Using the RAMP paradigm
- Maintaining situational awareness during chemical processes
- Participating in peers' safety efforts

Cultural Skills

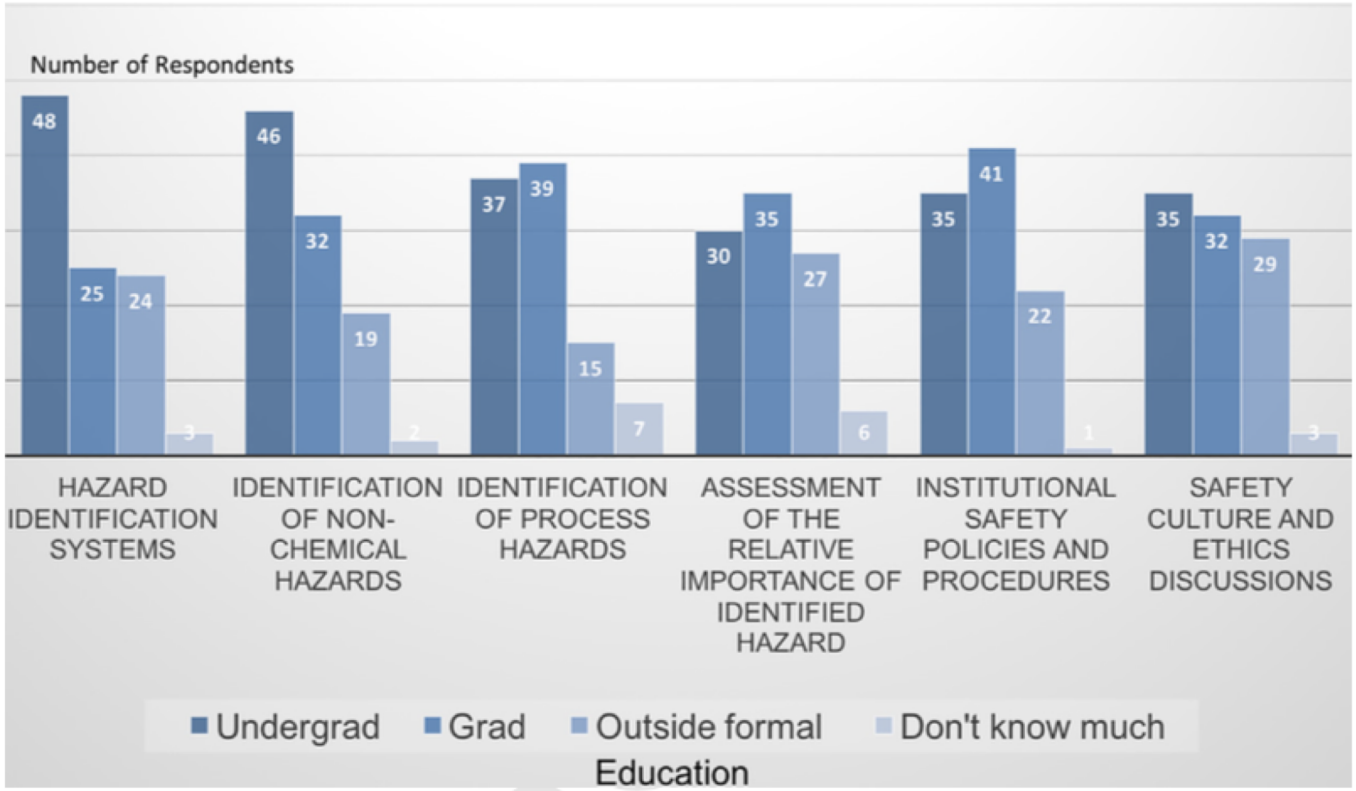
Within the project team:
Asking Effective Questions *(empowerment)* and
Anticipating Others' Challenges and Sharing Lessons Learned *(leadership)*

Outside the team:
Understanding Legal Expectations and participating in two-way Risk Communication

Personal: Recognizing professional opportunities related to EHS

RESEARCH ARTICLE

Baseline survey of academic chemical safety information practices



Summary:
ACS Advantages in Safety Leadership

- Safety supports chemists' scientific goals as well as ACS's strategic objectives
- Diverse efforts are being piloted within the ACS
  - Many are ready for development
  - Some will Win Big, others will Fail Early
- ACS has a strategic advantage in the chemical safety field due to its well-established (55 years) expertise, resource library and outreach channels.