Promoting safety culture: Chemical safety information initiatives

Carmen Nitsche, Pistoia Alliance

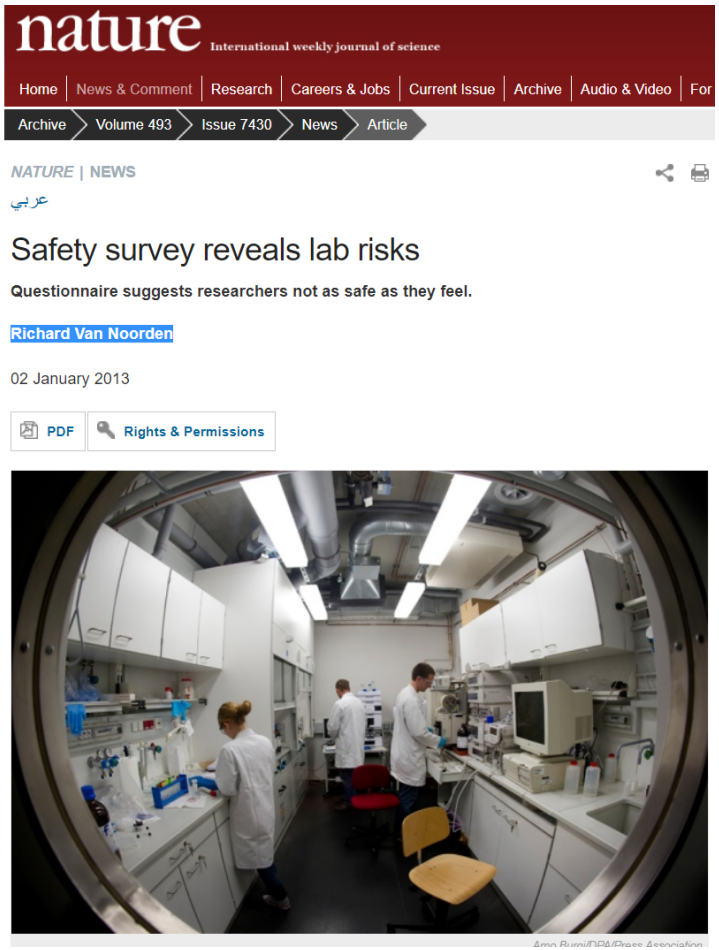
Presented at the 256th ACS National Meeting and Exposition, August 19, 2018 PRES Symposium: "Moving the Safety Values of the ACS Forward"

Safety culture is a critical component of good science

……."any injuries they sustained were just part of the job"……..

In a lab safety survey by *Nature Publishing Group* and *Bioraft*

- ~2400 scientists responded
- Major finding: **Big gap** between **how people felt** about the safety of their work environment vs **how safe it actually was**
  - **86%** said they believed their lab is a **safe place to work**
  - **46%** had experienced some sort of **injury,** of which **21%** said **more than once.**
  - >**25%** had had an injury they **did not report**
  - **30%** had **witnessed** at least one **major incident** that required **medical attention.**



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NATURE | NEWS

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Safety survey reveals lab risks

Questionnaire suggests researchers not as safe as they feel.

Richard Van Noorden

02 January 2013

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Richard Van Noorden, "Safety survey reveals lab risks: Questionnaire suggests researchers not as safe as they feel." **Nature** V 492, Iss 7430, Jan 2, 2013 *https://www.nature.com/news/safety-survey-reveals-lab-risks-1.12121*

…….“over a third [of respondents] have never included safety information in research publications and less than a quarter consistently provide the information. ”……..

Finding from the 2017 CINF/CHAS baseline survey of academic chemical safety information practices.

Survey results published in Journal of Chemical health and safety

https://doi.org/10.1016/j.jchas.2017.10.009

ELSEVIER

Journal of Chemical Health and Safety

Volume 25, Issue 3, May–June 2018, Pages 6-10

Research article

Baseline survey of academic chemical safety information p

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Volume 94 Issue 48 | p. 7 | News of The Week

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Email

ACS journals enact new safety policy

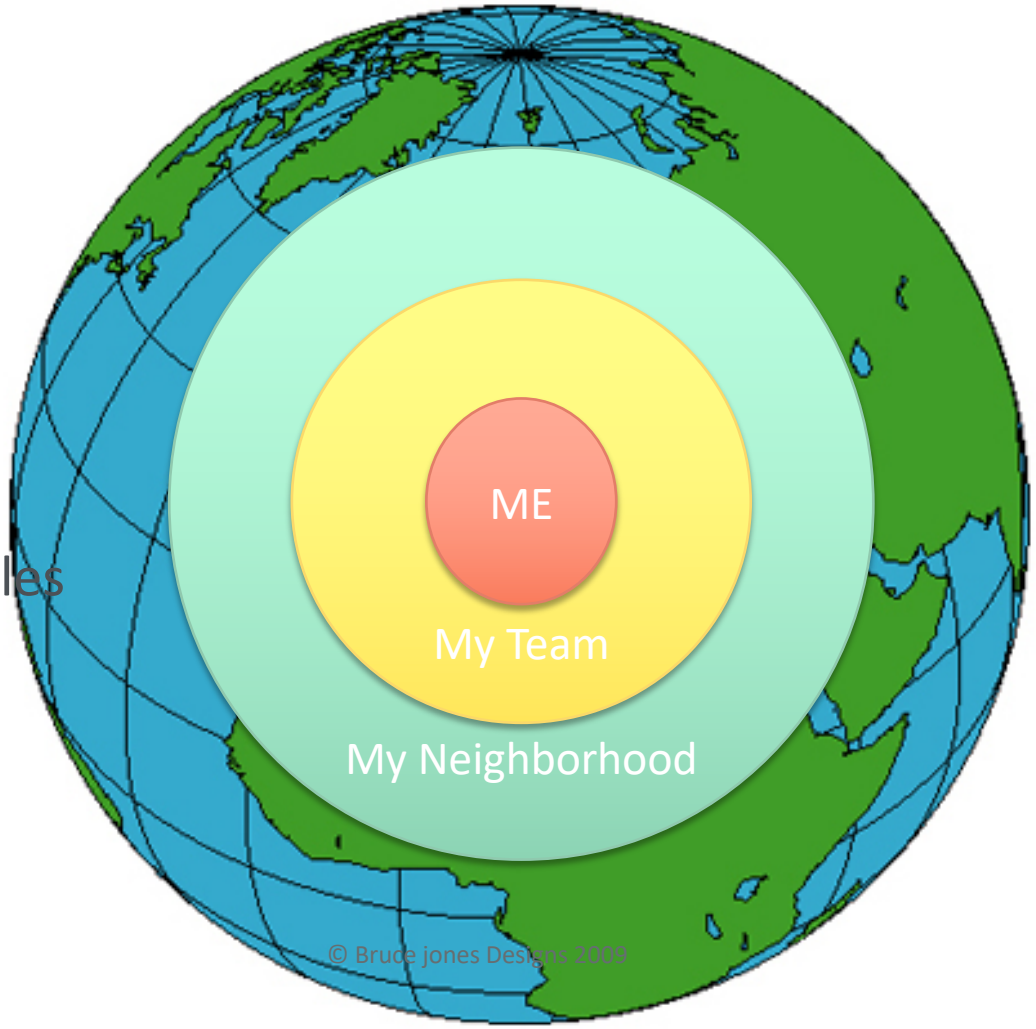
Authors to be required to address novel or significant hazards

*By **Jyllian Kemsley***

American Chemical Society journals will have a new safety reporting requirement startin 2017: Authors must “address and emphasize any unexpected, new, and/or significant h risks associated with the reported work,” says an *ACS Central Science* editorial describi change (2016, DOI: **10.1021/acscentsci.6b00341**).

Holistic approach to safety

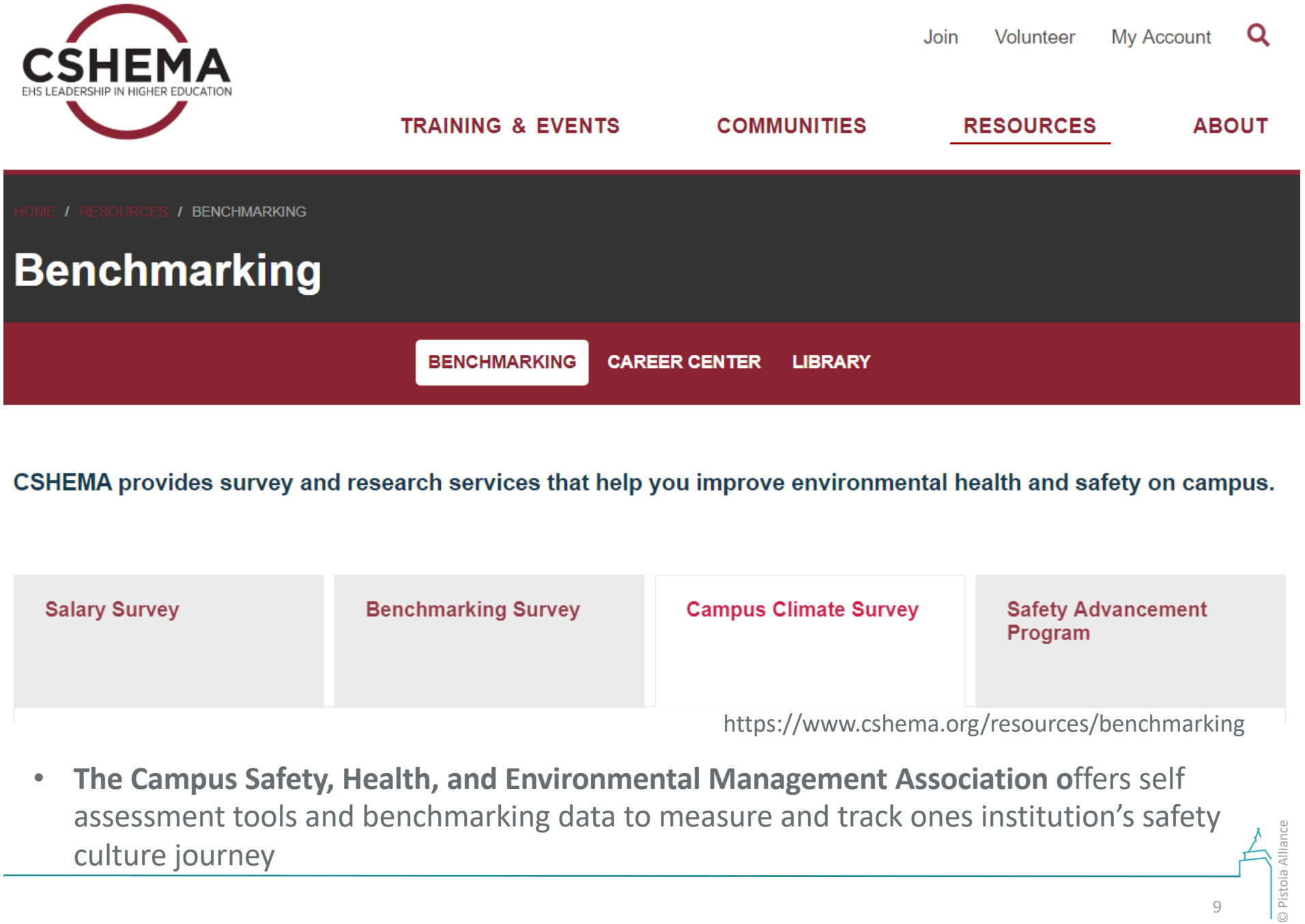
- Expanding realm
  - Individual
  - Colleagues
  - Community
  - Planet
- Cradle-to-grave
  - Green chemistry principles
- Situational aspects
  - Beyond toxicity
  - Protect →Avoid
  - Compliance→ Culture



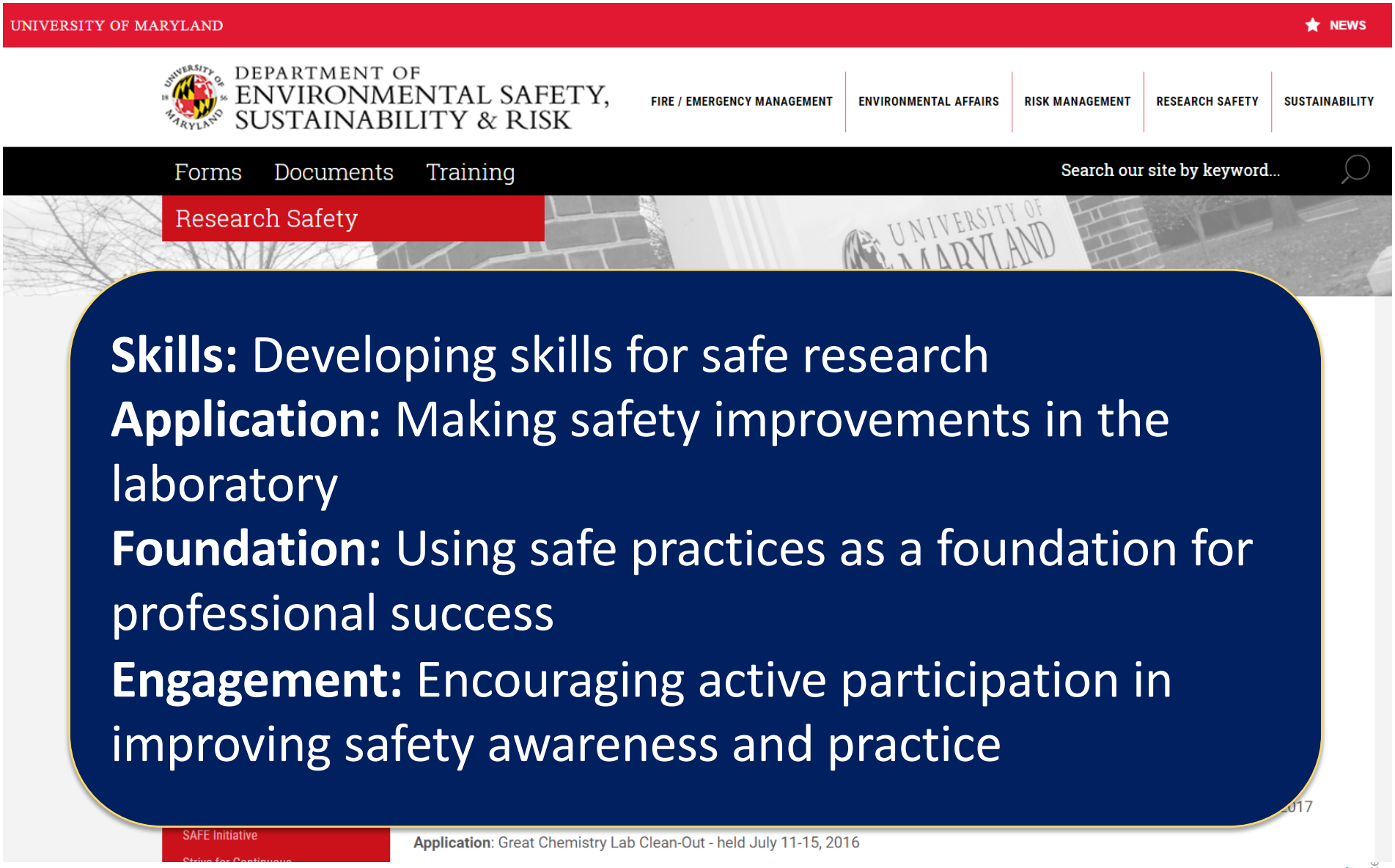
Elements to cultivate a positive safety culture

- Focus on **prevention**
  - risk assessment
    - **R**ecognize the hazard
    - **A**ssess the risk
    - **M**inimize the risk
    - **P**repare for emergencies
- Examine **systems** and processes
  - Systemic issues overlooked
  - No accident ǂ safety
- Understand **everyone** is responsible for safety
  - Need both top-down and bottom–up efforts
- Promote institutional **knowledge retention**
- Reward **sharing**

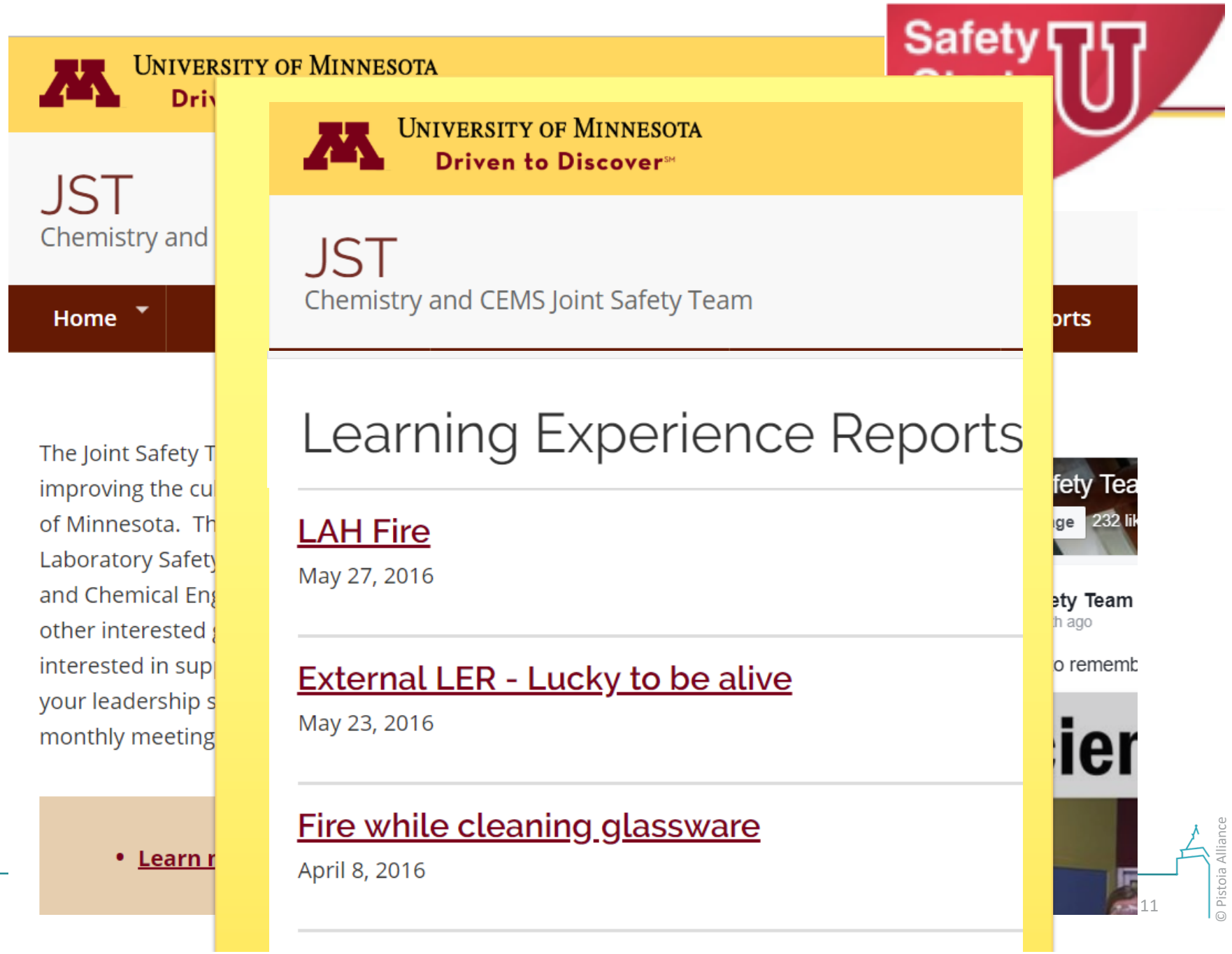
Sharing & collaboration have to be a part of our safety culture



- **The Campus Safety, Health, and Environmental Management Association o**ffers self assessment tools and benchmarking data to measure and track ones institution's safety culture journey



https://essr.umd.edu/research-safety/safety-culture/safe-initiative



Not Voodoo X.4

Pyrophoric Reagents

Add Your Own

Many lab fires and explosions are caused by the same few common reagents. The list below is provided to emphasize the dangers associated with working with these reagents. However, even if your reagent is not on this list, It could still cause a fire or explosion.

NEW: UCSD Instructional Videos - Working with Pyrophoric Reagents

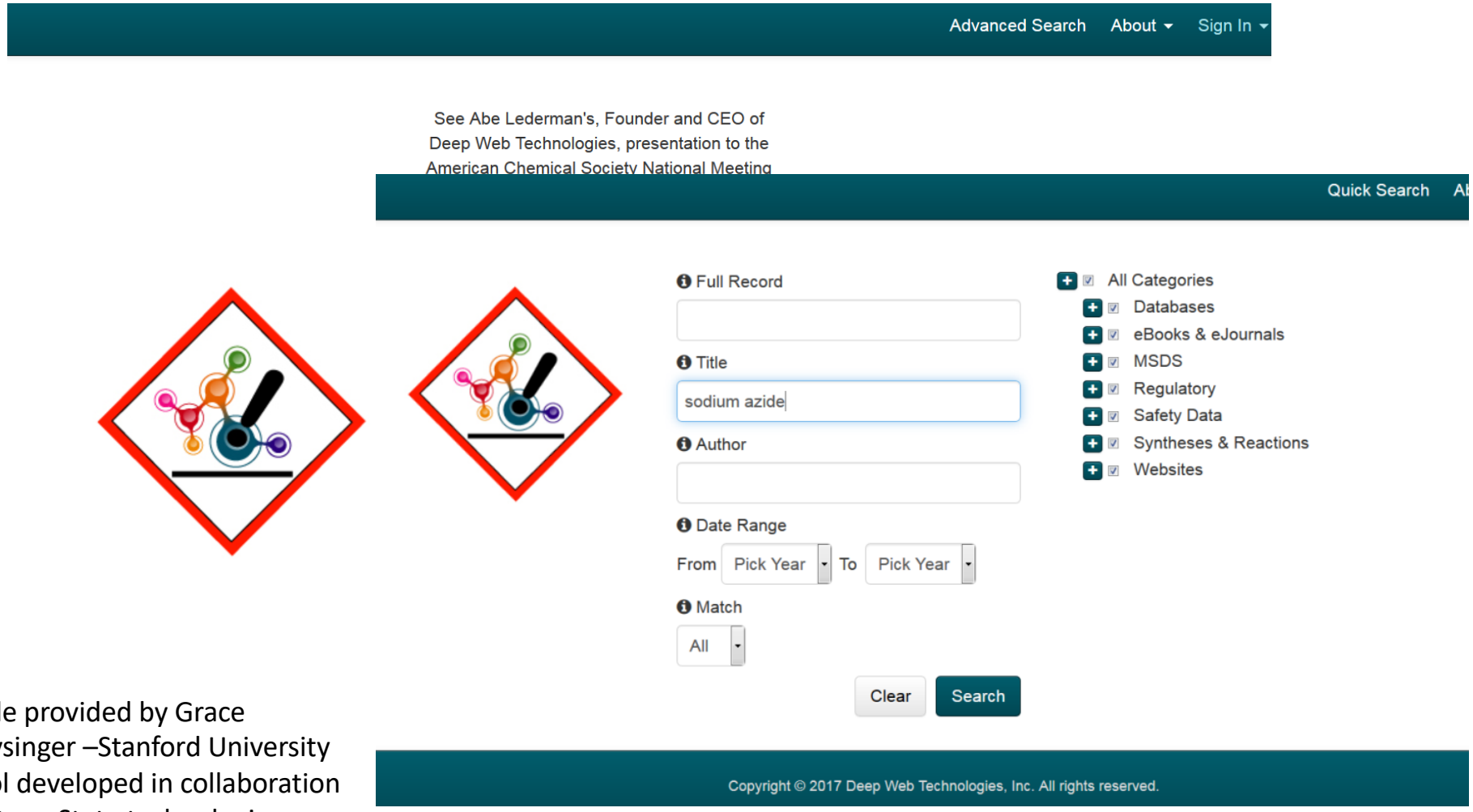
Check out this pyrophorics bulletin.

To keep accurate data, please come back and record each fire/explosion you witness.

Name	Fires	Explosions
Sodium metal	366	107
Lithium aluminum hydride (LAH, LiAlH4)	360	75
Palladium on carbon (Pd/C)	367	39
tert-Butyllithium (t-BuLi)	286	6
Sodium hydride (NaH)	259	19
Diethyl ether (Et2O)	162	23
n-Butyllithium	159	7
Potassium Metal	121	26
Sodium Hydride (NaH; dry, oil free)	121	4
Raney nickel (dry)	117	7
Potassium hydride (KH)	93	7

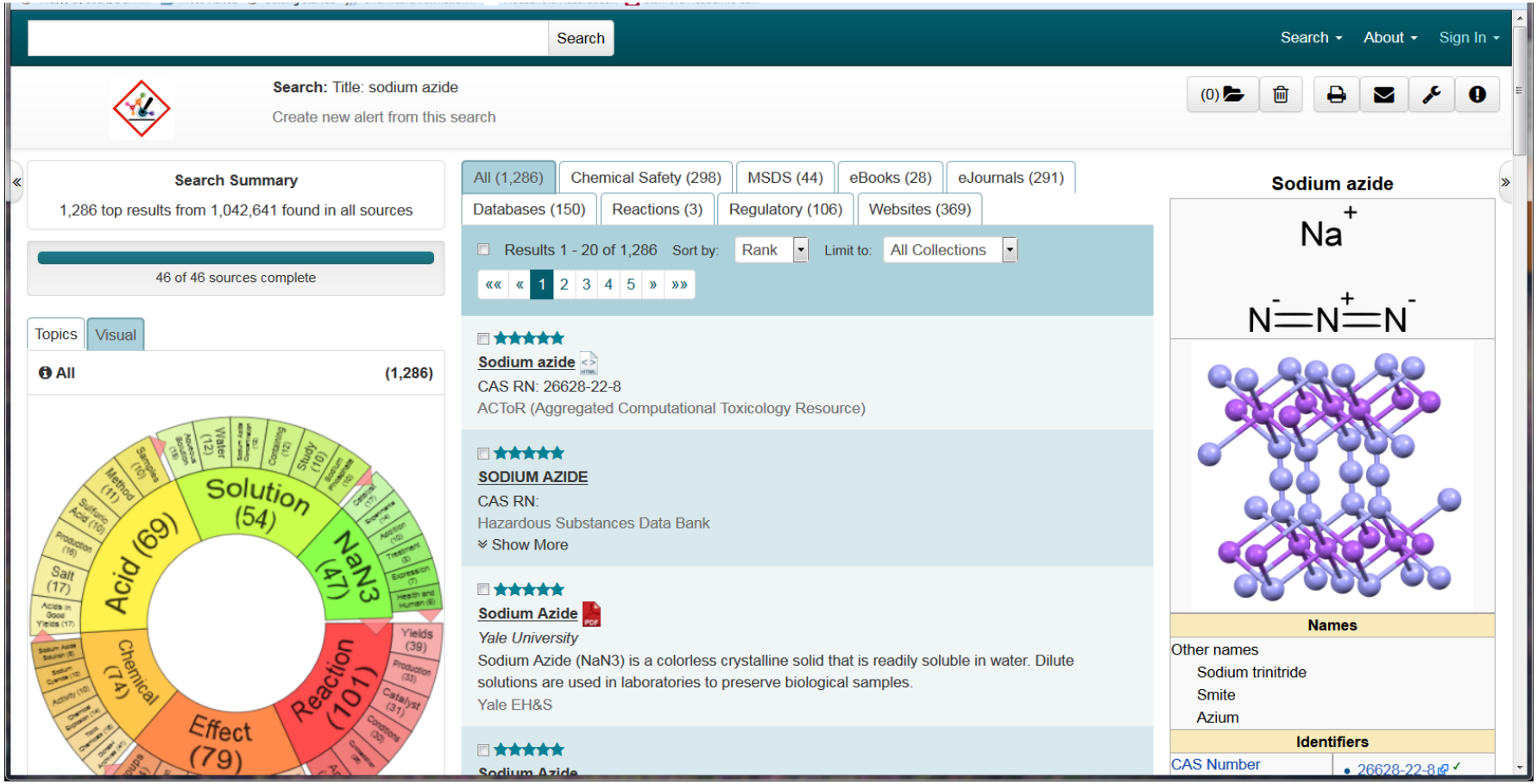
Chem Safety Search Tool

http://chemistrygateway.com/chemsafety/desktop/en/search.html?pane=simple



Slide provided by Grace Baysinger –Stanford University
Tool developed in collaboration w Deep State technologies

ChemSafety Search Results



Slide provided by Grace Baysinger –
Stanford University

Academic/industrial Partnerships – Dow

https://www.dow.com/en-us/science-and-sustainability/safety/safety-courses/sustainable-safety-culture

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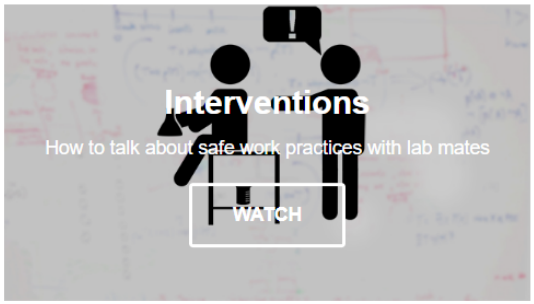
LAB SAFETY MODULES | RESOURCES

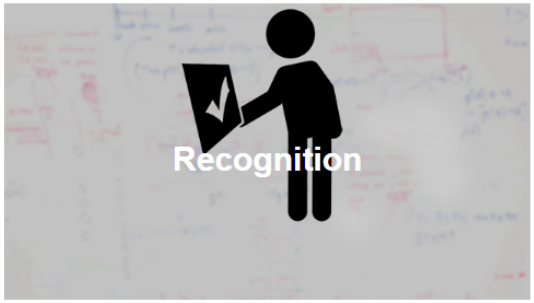
Dow Global > Science & Sustainability > Safety > Safety Courses > Sustainable Safety Culture

Sustainable Safety Culture

The following modules include information on methods for building and sustaining a strong safe culture in the laboratory.

Each of the videos will address a given topic to provide guidance and recommendations. The videos are not meant to be all inclusive, but instead targeted at behaviors which will help enhance a student to be more productive, efficient and safer in the laboratory.





Academic/industrial Partnerships - ExxonMobil

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ExxonMobil PALS - safety network meeting

- Important Contact Info
- Emergencies
- Safety Training
- Safety Procedures

Partnership in Academic Lab Safety: Exxon Mobil Partners will join us at our Fall safety network meeting

Deborah Davis and Tim Afford from ExxonMobil will be joining our Safety Network Meeting on October 4th. They will be offering an overview of the safety culture at ExxonMobil and informa about the PALS initiative, the upcoming opportunities and workshops.

American Chemistry Council:

- All members must participate in Responsible Care
- For continual improvement, started information/practice sharing forums

……[the monthly Beacon] "is dependent upon the input of users like you. By sharing these messages, based upon actual incidents from companies, the content is more meaningful to operation personnel. "

From Background on AIChE Center for Chemical Process Safety Process Safety Beacon – targeted at manufacturing personnel.

All incidents are anonymized

DataCommons

HBN HEALTHY BUILDING NETWORK

https://commons.healthymaterials.net/

- Offer independent hazard database Healthy Building Network's Pharos Chemical and Material Library (APIs access to the data)

- Created a community where building hazards can be discussed

The Chemical Safety Library – the history

- Who
  - **Pistoia Alliance**, a life sciences industry not-for-profit dedicated to **improving life sciences R&D** innovation and effectiveness through **pre-competitive collaborative projects and other activities**
- What
  - **Community sharing** of laboratory chemical **reaction incidents** to promote safety across companies. Experiment begun April 2017 http://www.pistoiaalliance.org/projects/chemical-safety-library/
- How
  - **Crowdsourced** submissions
  - **Curation** from project team
  - Resulting database made **freely** available for use and reuse

Status update

- Collection has **grown 4-fold** since launch, to **138 reactions**.
  - Working with three more pharma to capture their contributions
- Over **1000 individuals** have requested access to the CSL
  - A .csv file of the full database is available on request.
- All collected data now **deposited into PubChem**
  - Section 12.8.3.1 of the compound summaries
- New **simplified submission** process –
  - simply fill out google form (curation team does data entry)
- Pistoia Alliance **experiment** runs through **end of 2018**
  - Seeking a strategic partner to further develop the CSL
- Demonstrating the value of the data
  - Pistoia Alliance 2018 **Hackathon winners** from Southampton University exploited CSL with ALEXA and notebook
  - **Datathon planned** at University College London Sept 21

Lessons learned from CSL experiment

PROS

- Universally welcomed as a needed resource
- Continued interest in accessing the database

CONS

- Data entry system difficult to use
  - Mitigation: Curation team now handles all data entry
- Getting new submissions remains a challenge!

One of the challenges

…..“incidents continue to happen. What are we missing?”

Tom Connelly, ACS CEO

Thomas Connelly, The ACS's role in Safety, C&E news vol 94, iss 26, p. 35 https://cen.acs.org/articles/94/i26/ACSs-Role-Safety.html

Tremendous amounts of good chemical safety information out there

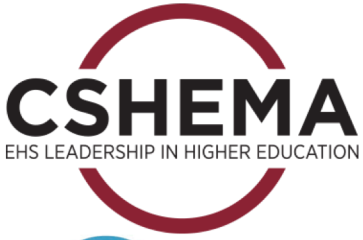
But much of it is “useless”

- Hard to find
- Scattered all over
- Unknown to many
- Not represented in standard way
- Not usable in meaningful ways (e.g. programmatic access)

ACS resources alone are daunting (a sampling)

How to live the ACS core value of safety?

- Where are we well positioned to contribute?
- Whom can we partner with to amplify the impact?



Carving out a role for ACS

ACS Strengths

- Serves the largest number of chemists in the world
- Represented across domains: academia to industry, to government
- Strong educational focus
- Strong presence in academic research
- Strong technical know-how thru CAS
- Safety articulated as a core value

Areas for ACS involvement?

- **Train students** on laboratory safety practices so industry does not bear the full safety training burden
- **Aggregate safety resources** to make them more known and accessible.
- Offer a **social platform** for members to **share, collaborate, and learn** from one another.

Acknowledgements

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- Mark Jones (Dow)

Thank you

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