

Providing laboratory safety education to REU audiences

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Keene
STATE COLLEGE

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My Lab Safety History

- I worked in environmental chemistry labs at **Cornell** and **UVM** for 5 years, then started the lab safety program at **UVM** in 1985
- In 2011, I went back to **Cornell** as Chemical Hygiene Officer for 3 years
- In 2014, I moved to **Keene State** to be the Environmental Safety Manager and Chemical Hygiene Officer



The REU Opportunity

NSF Says:

- “The REU program seeks to expand student participation in all kinds of research...
- “The program seeks to attract a ***diverse pool*** of talented students into careers in science and engineering and to help ensure that they receive the ***best education possible.***”



Academia's Safety Expectations

1. Safety is everyone's responsibility. It operates at an institutional level **(service)**
2. Good science is safe science **(research)**
3. Safety training and education are essential elements of research and education **(teaching)**
4. *An improved culture of safety is necessary* **(continuous improvement)**
5. *Diverse methods and flexible approaches are necessary* **(institutionally-driven)**



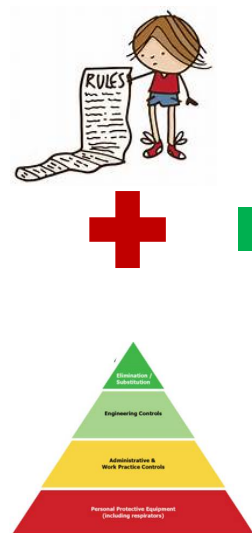
Emerging Safety Challenges of 21st Century Science

- More science
- New interdisciplinary sciences:
nano, r/sNA, big science
- Discovery education

Modern Lab Safety

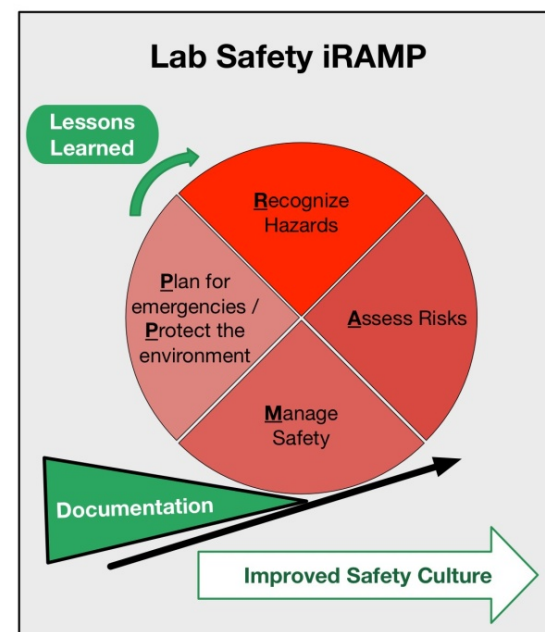
21st Century Lab Safety involves
both Technical and Cultural Challenges

20th Century:
Controls Based on Rules,
guided by Chemical Intuition

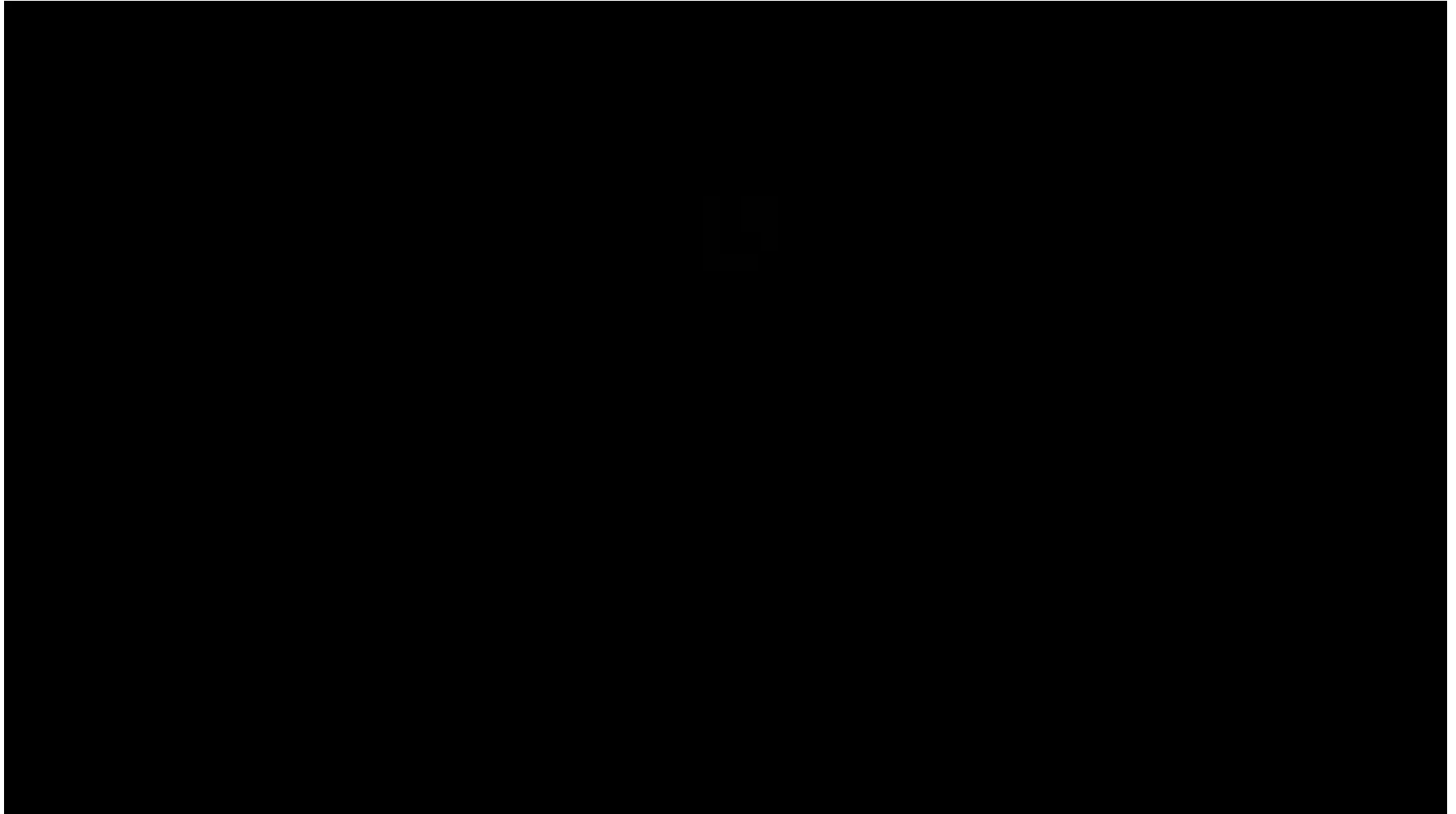


*Culture Change
through Safety
Education*

21st Century:
a Safety System based
On Risk Assessment



The Starting Safety Culture: The Cringe Factor



Other Science Cringe Factors



Biosafety; lasers,
3D printing

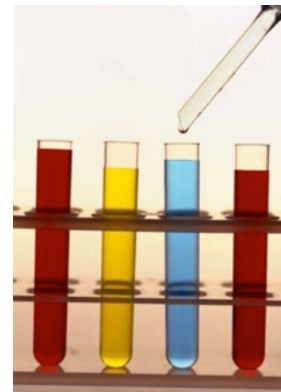
Radiation



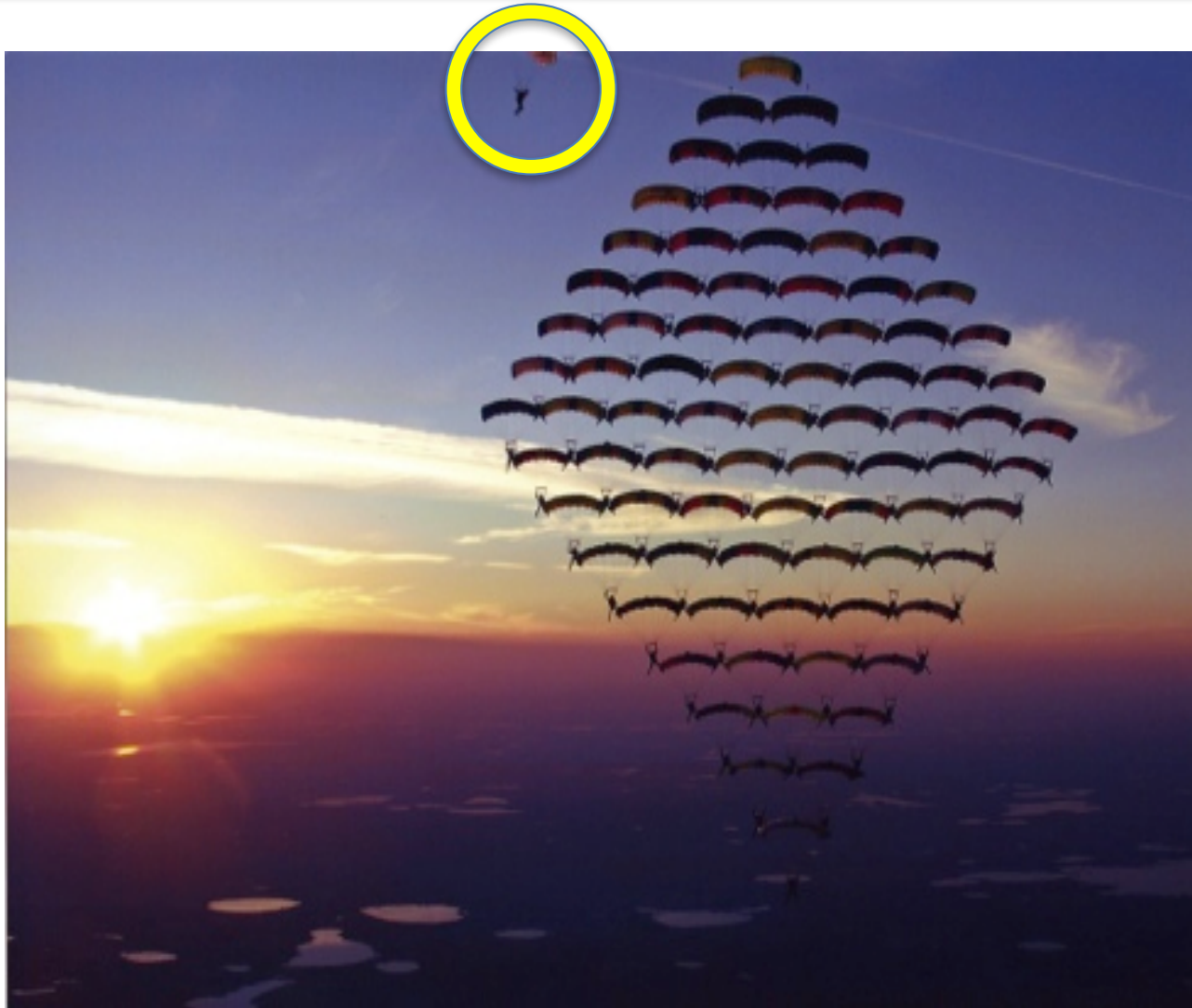
What is a Safety Culture?

Four priorities:

- The physical safety and health of the **campus community**
- Complying with government regulations
- Productive teamwork: *teaching, research, service*
- Safety education



Element 1: Community Safety



One person's problem is everyone's problem.

Element 2: Legal Aspects

Higher Education has a tradition of "*fissured workforces*".

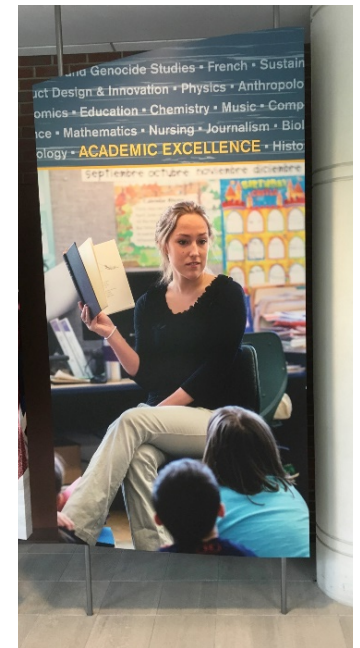
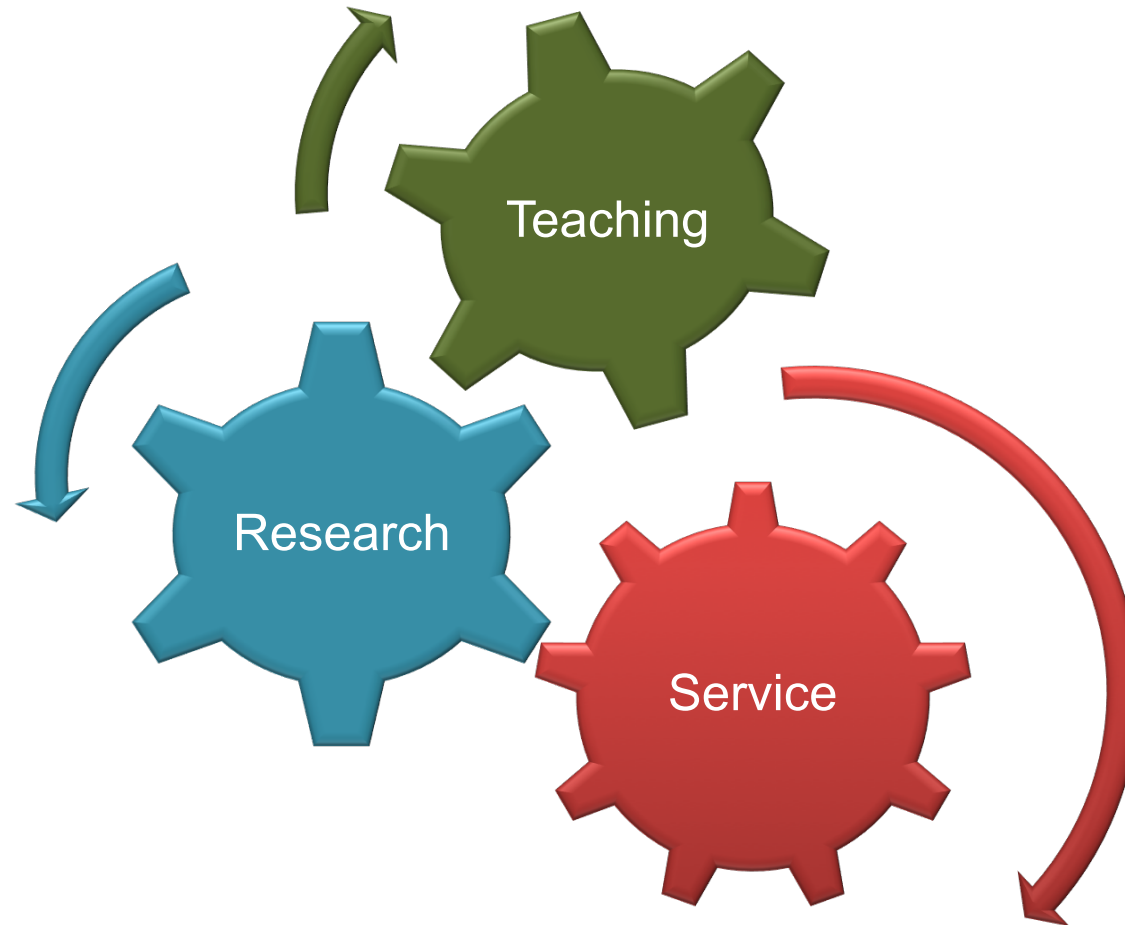
Students and Visitors

- Pay Keene State to work here
- Are not covered by labor or environmental regulations
- Could sue Keene State for harm that KSC should have prevented

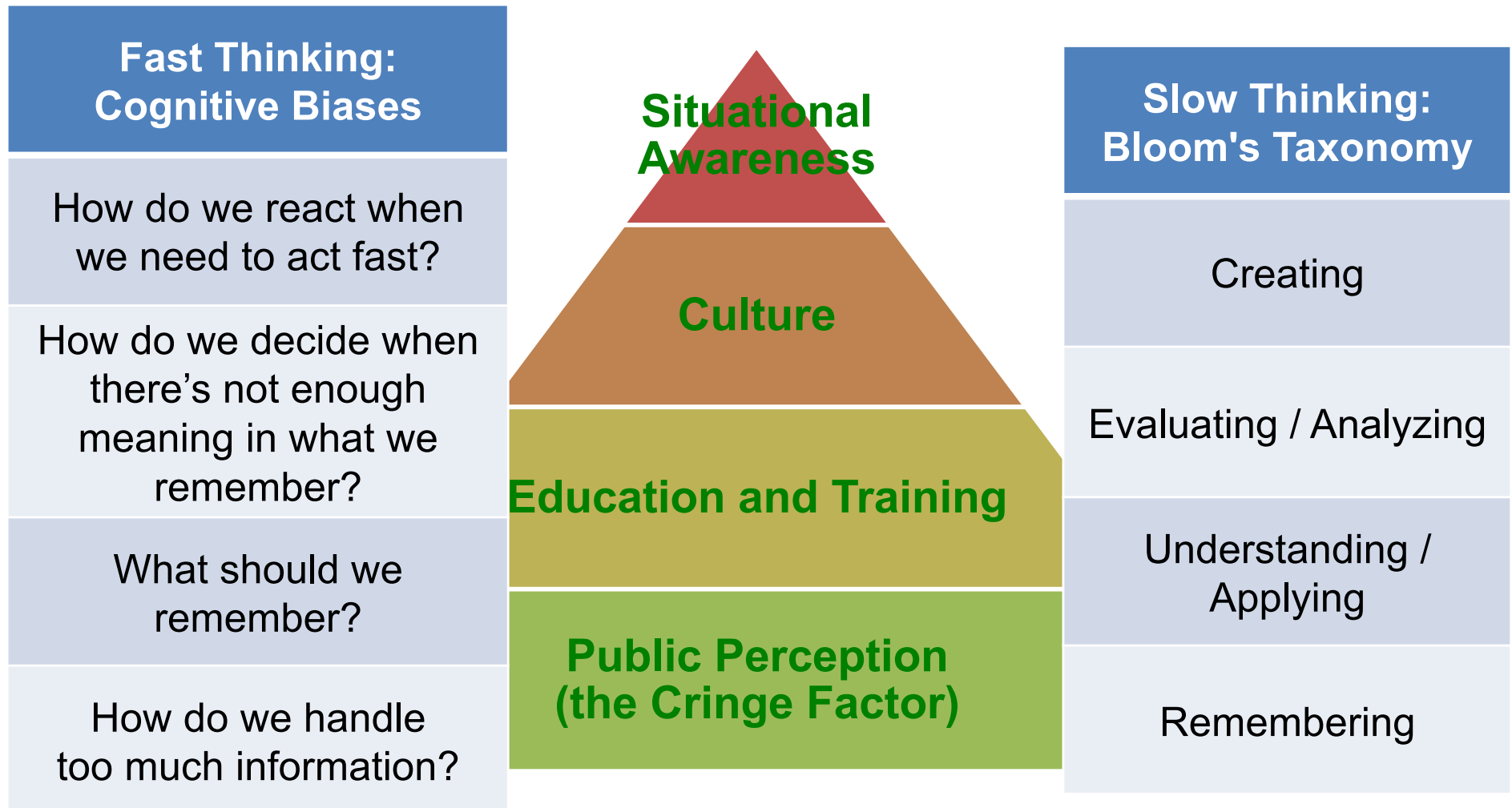
Employees

- Are paid by Keene State to work here
- Are covered by **OSHA**, **Worker's Compensation** and other labor regulations
- Can't sue KSC for workplace injuries; workers' compensation is available for medical costs and time off
- Are part of KSC's environmental programs

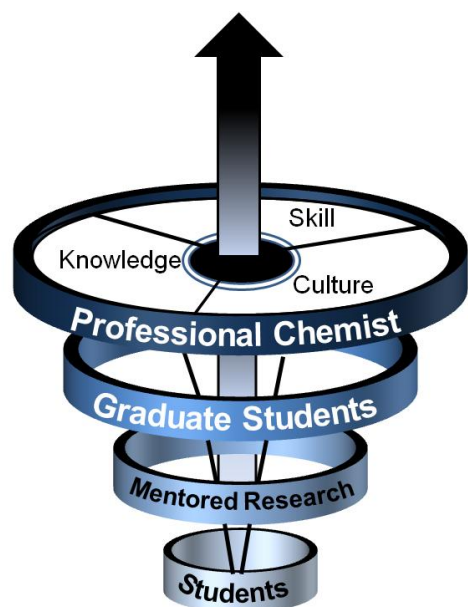
Element 3: The Academic Mission



Element 4: The Safety Education Process



Spiral Learning Model for Lab Safety Competencies

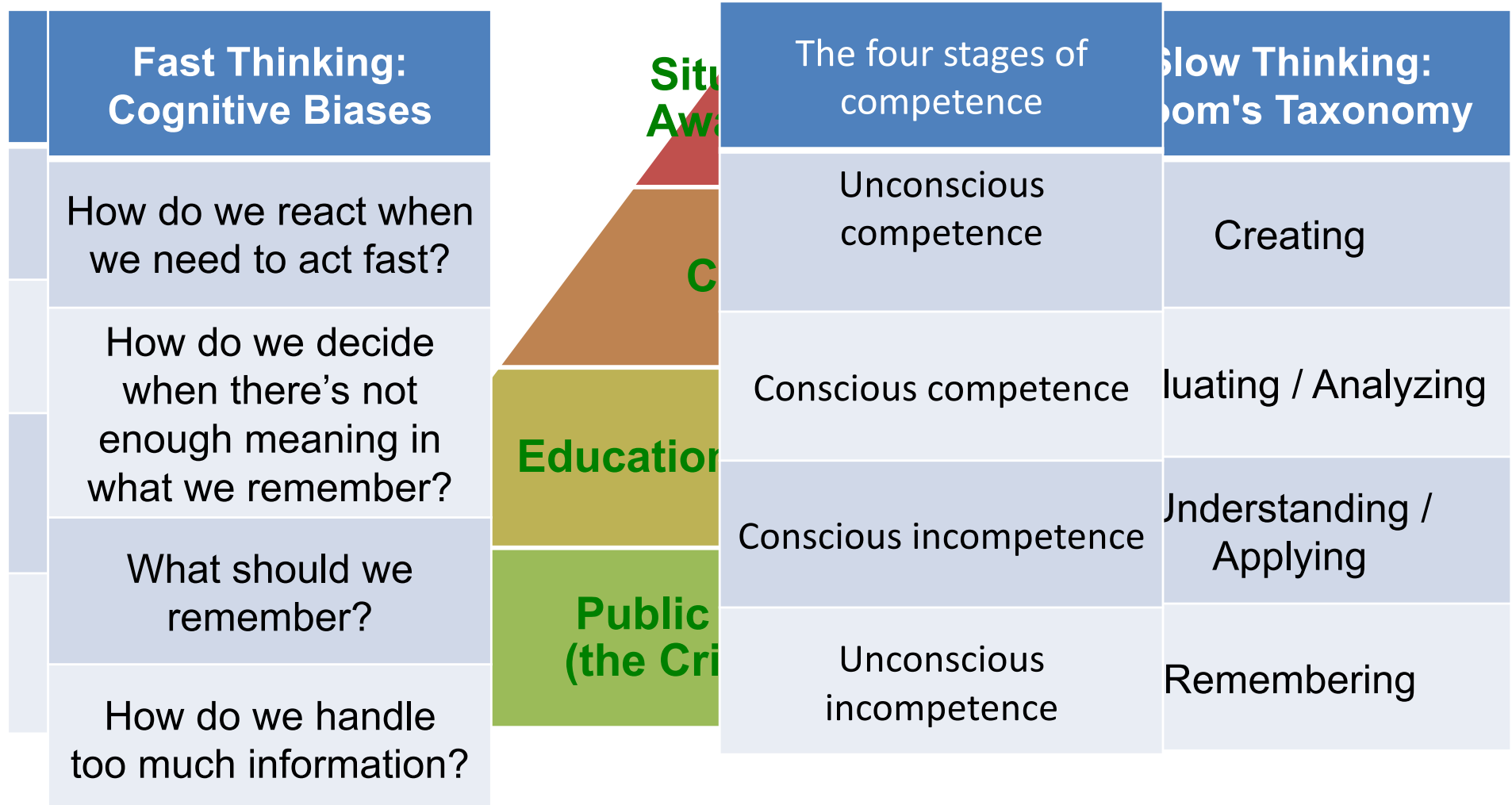


Educational competencies include:

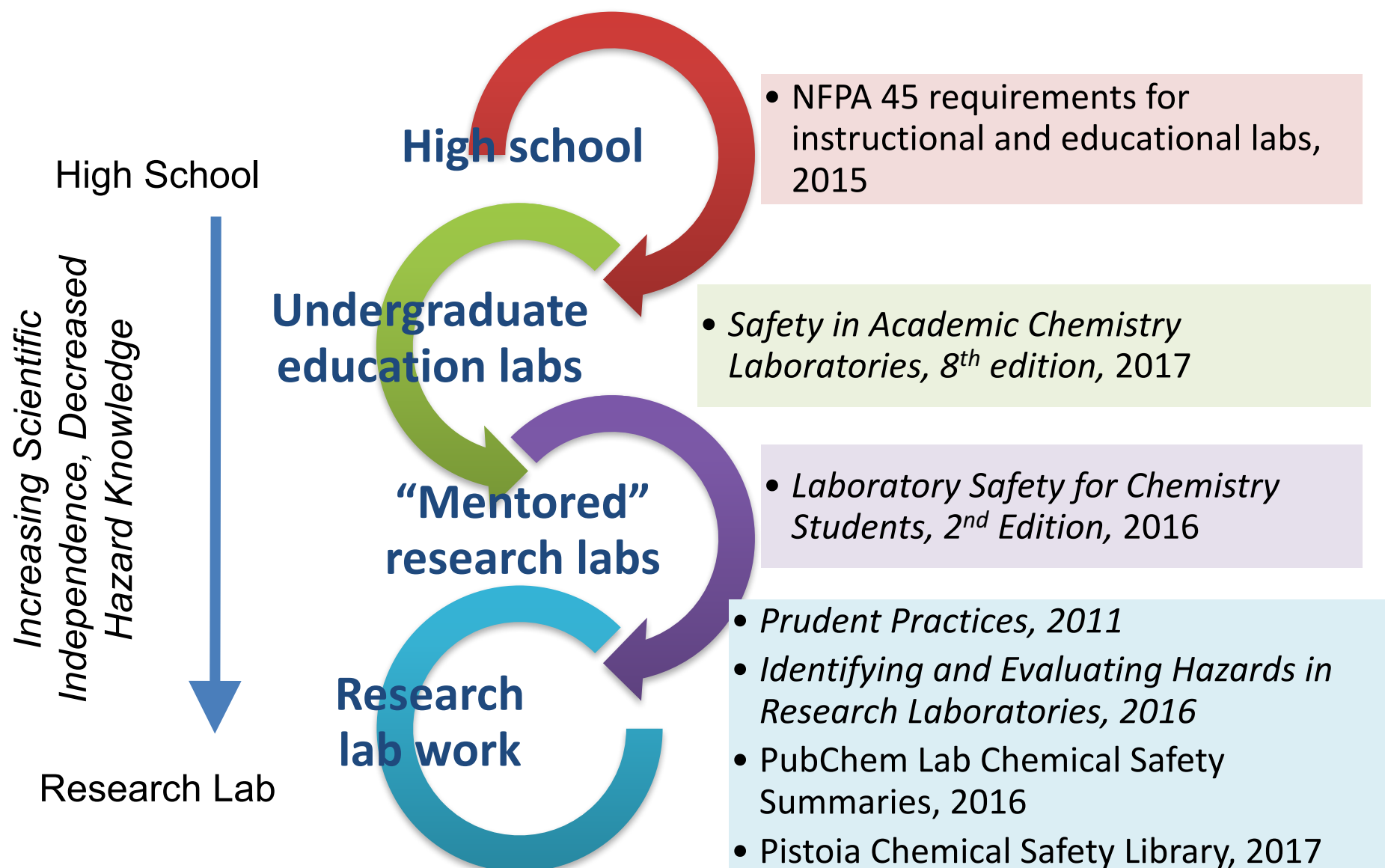
- **Knowledge / Science**
- **Skill / Group performance**
- **Attitude / Culture**

Developmental Stage	Science	Group Performance	Culture
Professional chemist	Identify and estimate significance of emerging risks	Make risk decisions and teach risk assessment	Accountable for group safety performance
Graduate researcher	Develop procedures with risks in mind	Use Risk Assessment tools to propose risk levels for review	Oversee others' safety practices
Mentored researcher (CURE, REU, etc.)	Review procedure and locate information to identify hazards	Learn to use Risk Assessment tools	Raise questions and concerns related to risk
Student	Based on prerequisite requirements	Identify applicable rules	Respect Rules

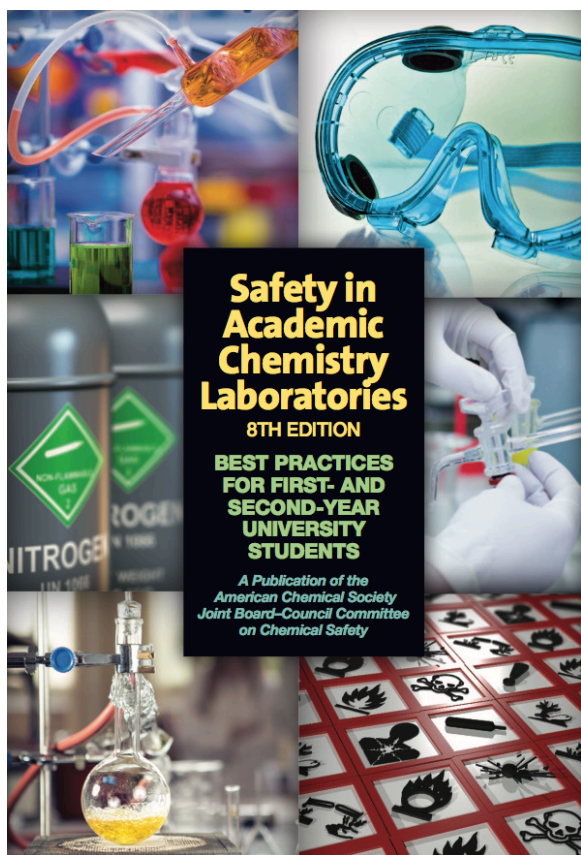
Element 4: The Safety Education Process



Technical Chemical Safety Resources



Key ACS Technical Resources

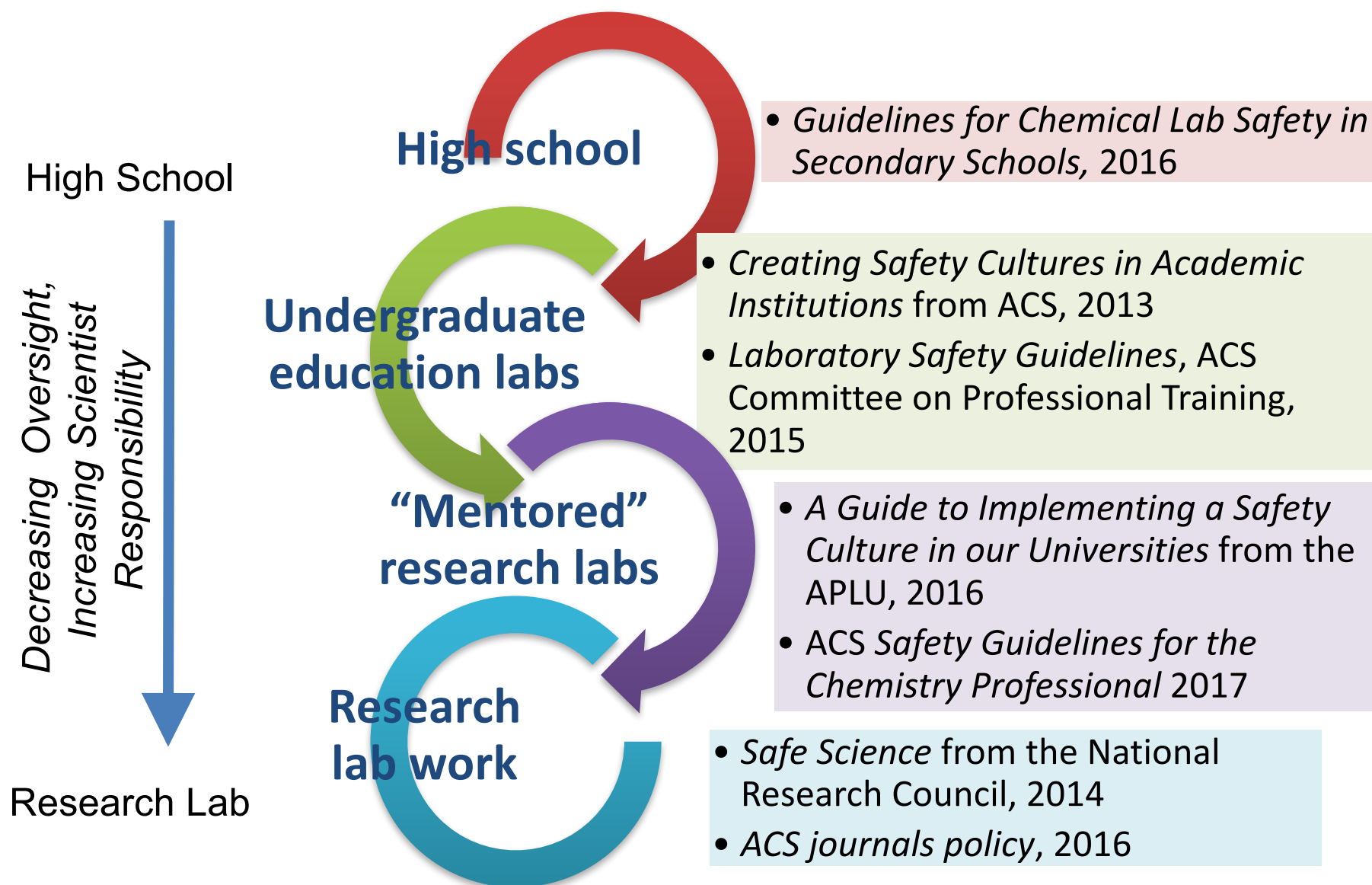


**SACL 8th Edition for First
and Second Year
University Students, 2017**

**Education Guidelines for
Chemical Lab Safety, 2016**
(HS & Academic settings)



Cultural Lab Safety Resources



A 2016 Cultural Initiative: ACS Publications Safety Policy



EDITORIAL

Ingredients for a Positive Safety Culture



[Home](#) > [Volume 94 Issue 48](#) > ACS journals enact new safety policy

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

Issue Date: December 5, 2016 | Web Date: December 1, 2016

ACS journals enact new safety policy

Authors to be required to address novel or significant hazards

By Jyllian Kemsley

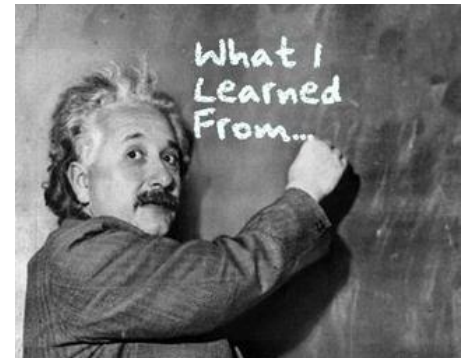
Suggestions for Safety Education in REU's

1. Build safety culture education into the program by developing **interdisciplinary safety programming**
2. Have students use **risk assessment tools** as part of their work
3. **Use safety professionals** while planning the REU program; we need some warning to produce relevant material
4. Recruit outside speakers to **highlight CPT professional skills** such as Information Literacy, Ethics and Risk Assessment
5. Identify **safety role models** for experiential learning: e.g. field trips to corporate labs



The Take Home Messages

1. **Community safety** is a core value in academic laboratories; *academic freedom* does not mean *free agent*.
2. **Risk Assessment** is how we move from the *Cringe Reflex* to a *Safety Culture*; teach risk assessment rather than rule based safety
3. Safety professionals are **here to support** the academic mission
4. Safety **planning helps get things done**: serendipity benefits from being organized



Questions?

Frazz by Jef Mallett

