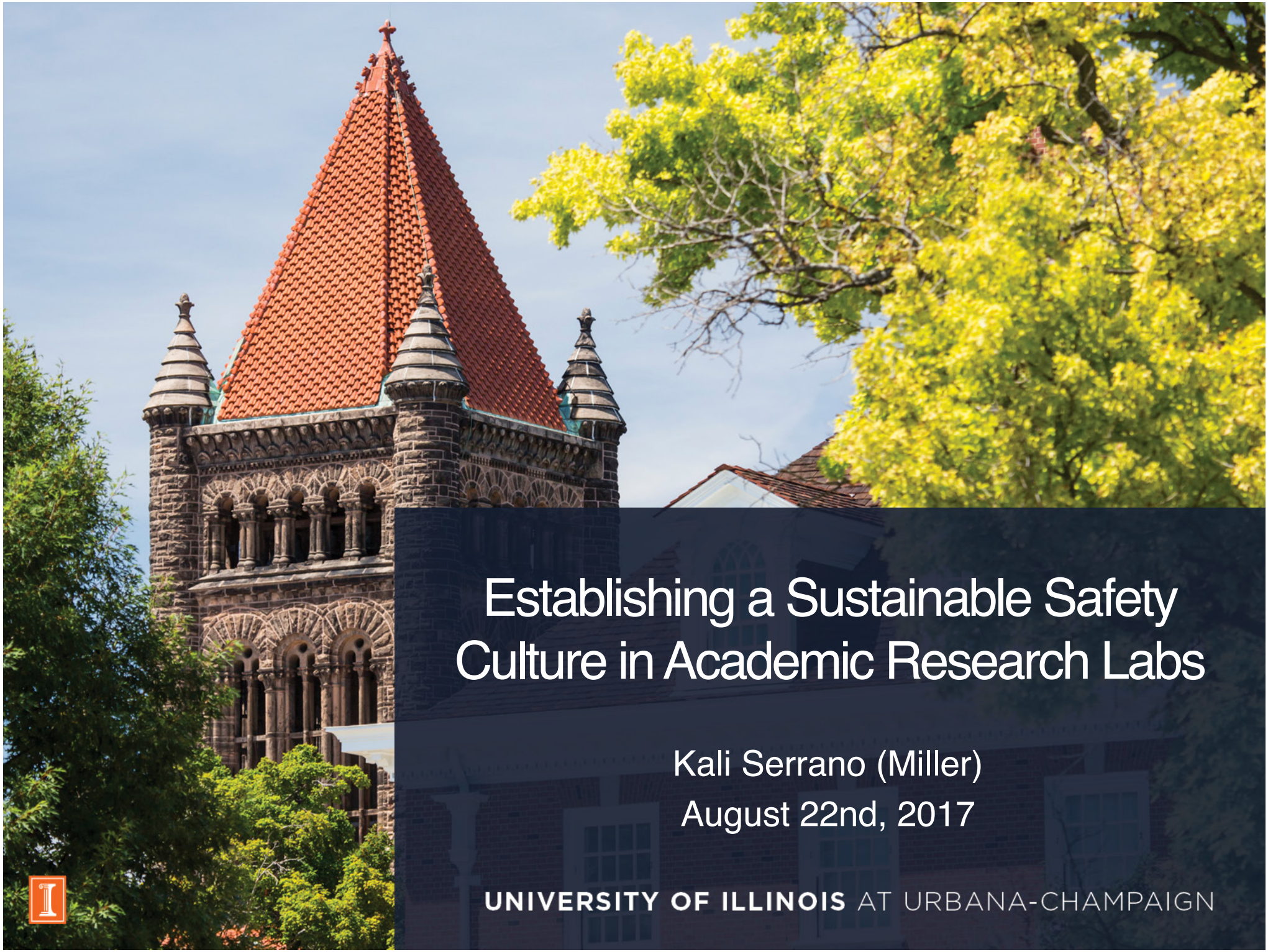


Establishing a Sustainable Safety Culture in Academic Research Labs

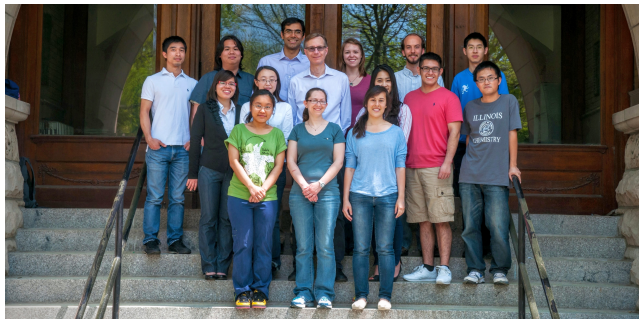
Kali Serrano (Miller)

August 22nd, 2017

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Background

- Undergraduate research in chemical biology (2009 - 2014)
  - Internships at Dow Corning
  - Startup in the Urbana-Champaign Research Park
- Graduate research in polymer chemistry (2014 - present)
  - Lab manager of my research group
  - Member of the chemistry department joint safety team
  - Associate member of CCS and member of DCHAS



How do we train undergraduate and graduate students so that they enter the workforce with a good intuition for chemical safety?

Outline

1. Contributing factors to unsustainable practices
2. Motivation for peer-enforced safety groups
3. Safety group program structures
4. Future directions

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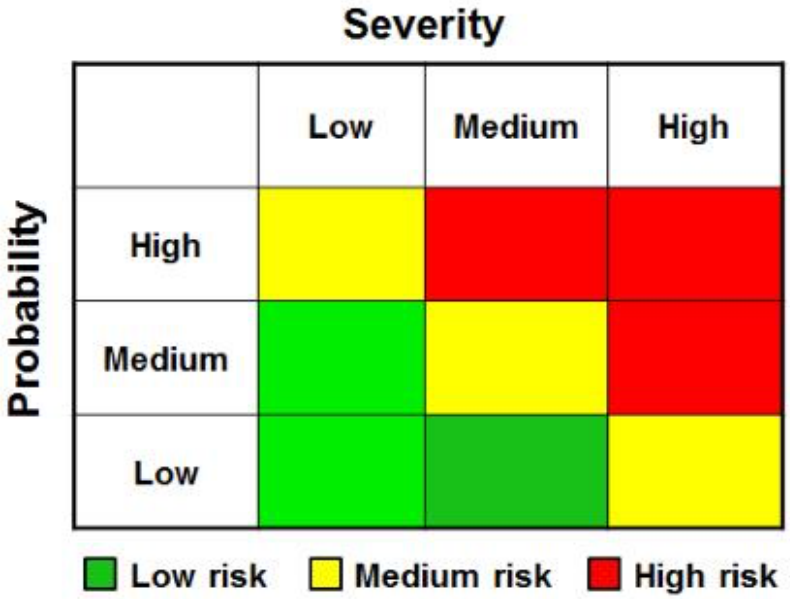
Developing an intuition for risk management

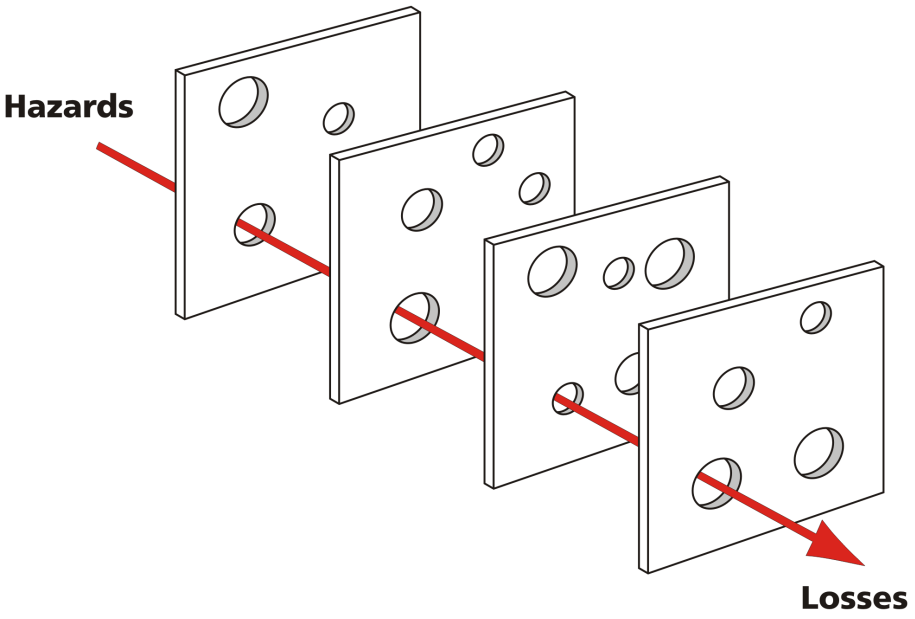
- Most violations are caused by inadvertent carelessness
- Non-hazardous materials may pose a large risk if handled improperly
- Similarly, hazardous materials may be relatively safe if handled carefully



What happens when students underestimate the importance of low and medium risk hazards?

Cumulative Act Effect (Swiss Cheese Model)

- Likens human systems to multiple slices of Swiss Cheese
- Risk of a threat becoming a reality is mitigated by the differing layers and types of defenses



We need to find a way for students to be vigilant and self-motivated to prevent potential laboratory accidents

Opening the conversation

- Academic environment doesn't currently encourage open reflection of accidents and near misses
- Many students don't have the habit to stop to think about safety

Largest challenge in many academic institutions is opening the dialogue about chemical safety and making it a relevant part of every day thinking and conversation

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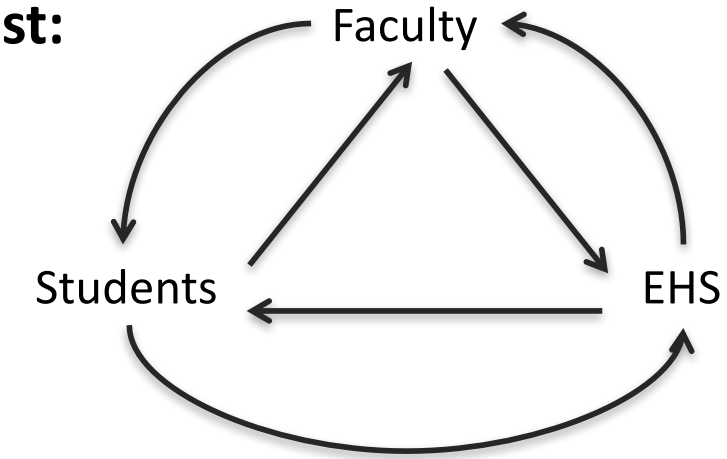
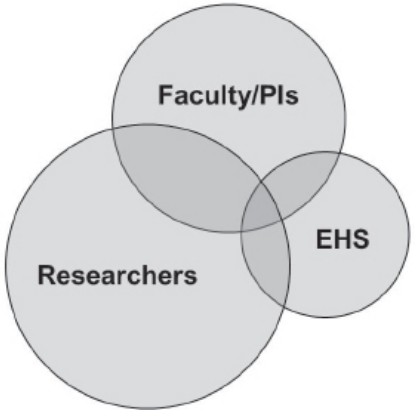
Motivation for peer-enforced safety teams

- There are many different approaches to opening the conversation
- How do you break this cycle and establish a safety culture, especially where legally enforced programs are not yet present?

Past:



Future:



When top-down enforcement of safe practices isn't established or feasible, a supplementary approach is peer-enforced safety

National Research Council, 2014, Safe Science: Promoting a Culture of Safety in Academic Chemical Research

What does peer-enforced safety look like?

- Many universities are now adopting single or multi-lab safety groups that are organized by students
- Can be lab-specific, department-wide, or even multi-department
- They need widespread participation to be effective
- Usually they have a hierarchical nature but students need freedom to design their own leadership structure to create ownership

Student organized programs serve as career training as well as enforcement of safe lab practices

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Department-wide safety programs

Typical safety program structure is the “Joint Safety Team”

- Committees and officers
- Safety moments, safety posters, announcements
- Lab walkthroughs
- Safety workshops
- Monthly meetings of representatives from all labs
- Evaluation of university-required trainings
- Collaborations between different expert groups

Department-wide and multi-department programs open a conversation about safety between research groups

Department-wide safety programs

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DATE: 17 January 2017

TO: Joint Safety Team: S. Dubowsky (Chair), M. Burke, G. Girolami, M.-J. Han, M. Philip, J. Turner, M. Drummond (DCGSAC contact), S. Desmond (ex officio), B. McCall (*ex officio*), C. Stevens (*ex officio*), group safety officers

FROM: Martin Gruebele and Gregory S. Girolami

ABOUT: Charge for this year

First, both the past Head and current Head wish to express our appreciation for your willingness to serve on the new Joint Safety Team! Your team will play a key role in increasing our efforts to make Chemistry at Illinois a national leader in laboratory safety. Our vision is that the JST will improve the safety culture and practices of our Department. One guiding principle must be that safety is a shared responsibility: any person who sees another doing something that is unsafe has a responsibility to question the practice. Note that there is no such thing as "potentially unsafe": if there is the potential for an accident to occur, it is unsafe by definition.

The UIUC Joint Safety Team was established in 2017 and one safety officer from each was appointed to the team

Department-wide safety programs

President

Communication
Lectures, flyers, safety moments, social media, website, meetings, etc.

Inspection
Implement safety guidelines in each lab, organize internal lab safety inspections

Training & SOP
Maintain SOP's, facilitate hazard-specific trainings, evaluate current training programs

Teaching Labs
Improve training for graduate students that teach undergrad lab courses

The organization of leadership will depend on the needs of the department and each research group

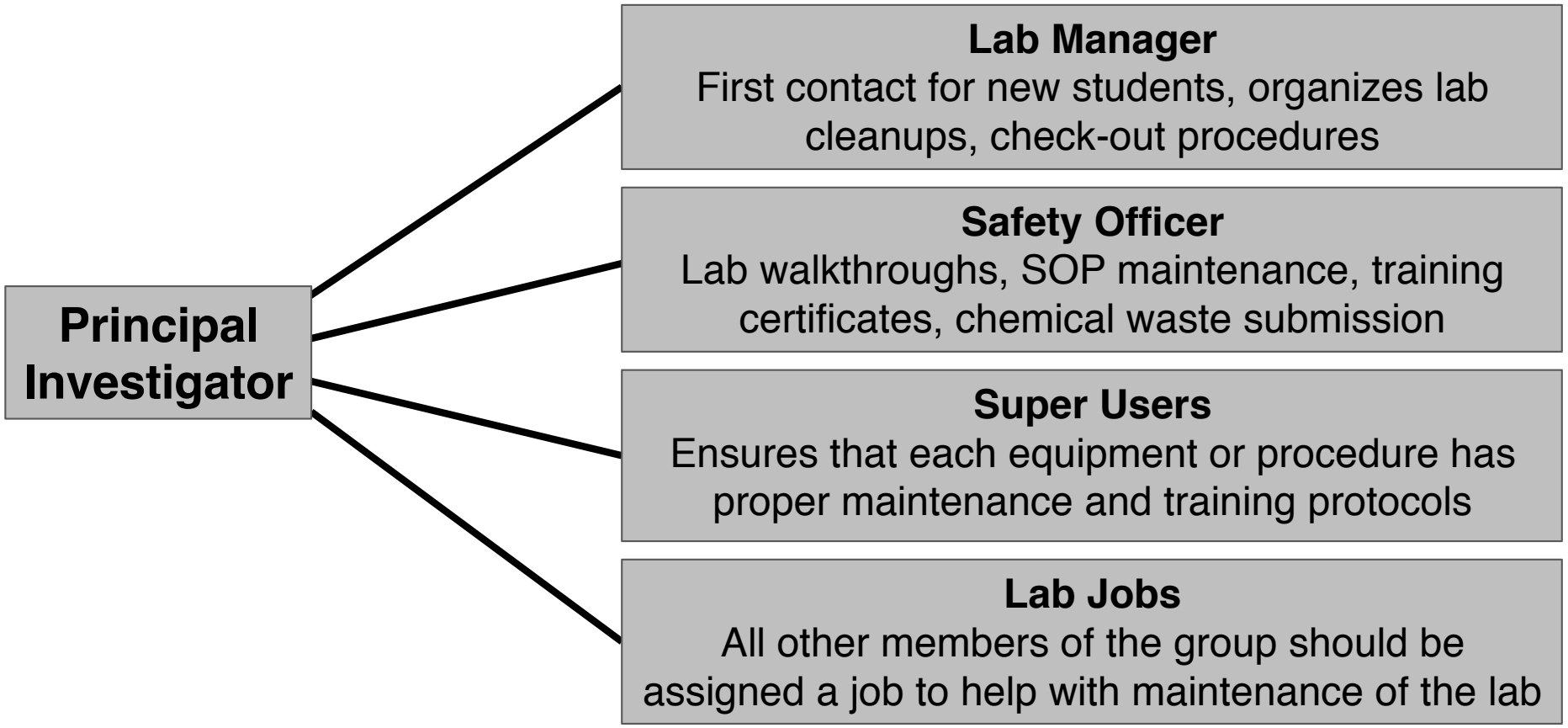
Lab-specific safety programs

If department and university level organization structures for safety aren't feasible yet, focus on:

- Monthly or quarterly meetings in your own group
- Near miss forms and accident reporting
- Anonymous lab feedback that includes both good and bad safety behaviors
- Evaluation of university-required trainings
- Frequent internal lab inspections and cleanups

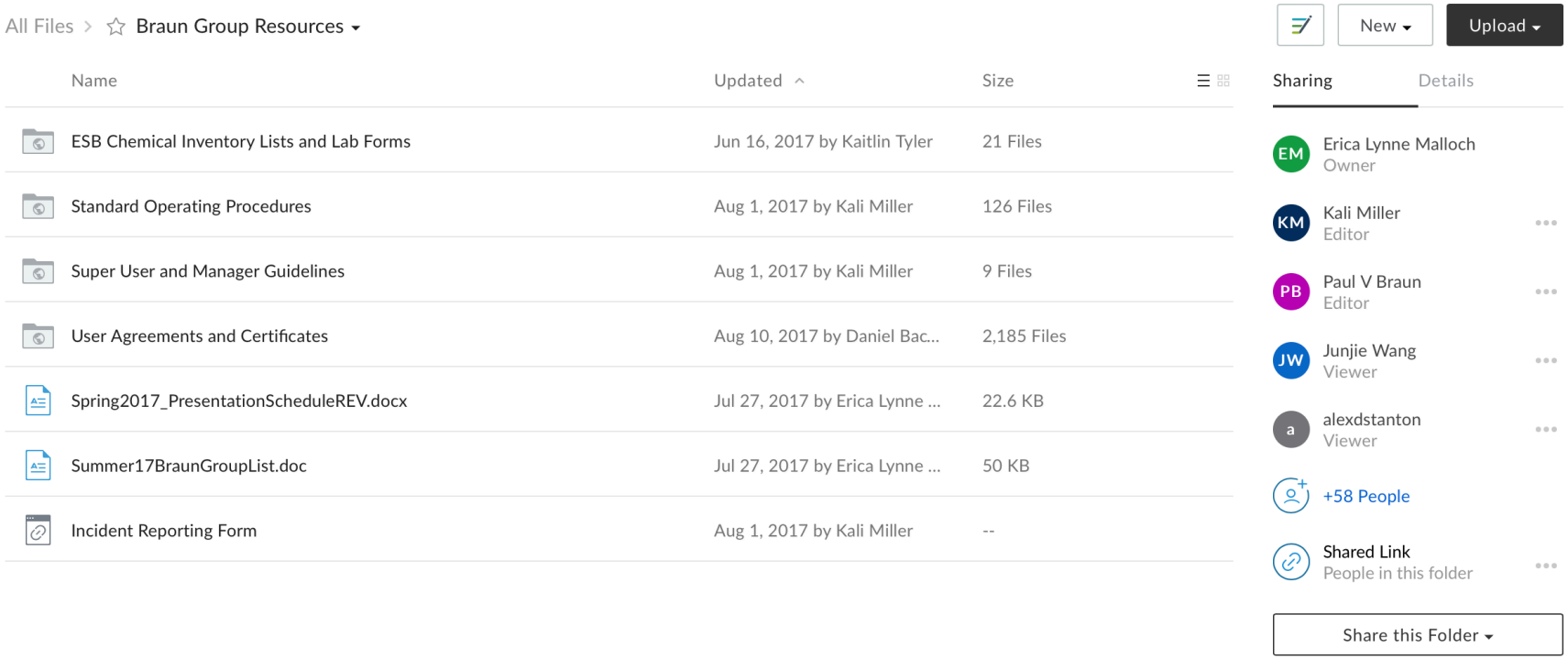
No matter what program, opening a recurring and relatable conversation about safety is key to accident prevention

Lab-specific safety programs



Structure emphasizes individual accountability and important tasks are delegated throughout the lab

Lab-specific safety programs



Transfer of knowledge is critical to the sustainability of safe lab practices via student-run programs

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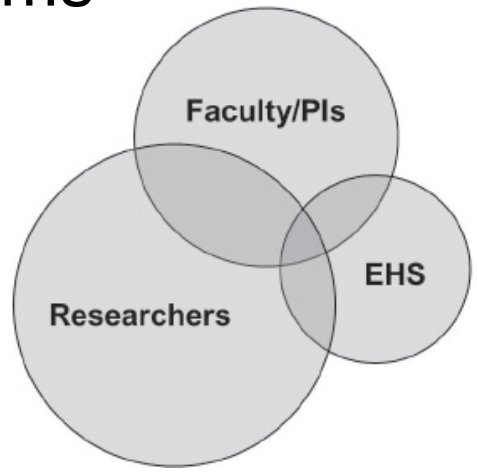
How do we reach all institutions?

- Open conversation is key in each lab and across similar disciplines
- Many people would be surprised by how motivated students can be to create these programs
- Universities with established safety programs should make their materials available online to facilitate collaboration!



The tipping point in academic research labs: when enough people think it's important then everyone will

Questions?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Division of
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