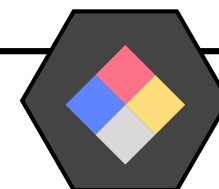
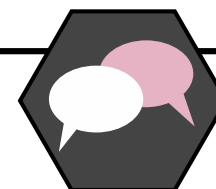
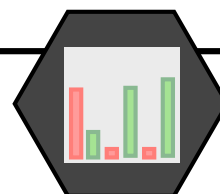


Building a Stronger, Sustainable Safety Culture at the University of Chicago



Jeffrey M. Ting
NIST-CHiMaD Postdoctoral Fellow

ACS National Meeting and Exposition
April 2, 2019

 @J_Ting1 @UChicago_JRSI





Safety Moment (throwback): handling pyrophoric liquids



Pyrophoric liquids: a paradigm shift in academic lab safety, risk management, and responsibility

Presented by Jeffrey M. Ting

March 19, 2012

University of Minnesota

Chemical Engineering and Material Science Department



CEMS Chemical Engineering
and Materials Science



Images courtesy of U.S. Chemistry Safety Board, 2011.



Safety Moment (throwback): handling pyrophoric liquids

Summary & Acknowledgement



- ✓ Syringe size: ~2 times the needed volume
- ✓ Small quantities --> syringe; large quantities --> cannula
- ✓ Never overload the syringe (keep the plunger under control)
- ✓ Do not assume positive or negative pressure in reagent bottles
- ✓ Check all lines, regulators, etc.
- ✓ Ask questions if anything is unclear or amiss!

"If you want to become a chemist... you have to ruin your health. Who does not ruin his health by his studies, nowadays will not get anywhere in Chemistry."

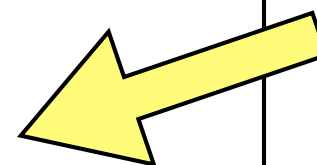
- August Kekulé (1890)



"The 'old days' of easygoing attitudes toward laboratory safety and down-the-sink disposal are over! Laboratories have become safe places to work."

- Prudent Practices in the Laboratory (1995).

Special thanks to Justin Kennemur and the Bates group for your attention!





Joint Research Safety Initiative (JRSI) at the University of Chicago



GATHER DEPARTMENTAL DATA

We develop and implement surveys to measure the effectiveness of our initiative and the culture of our departments.

[LEARN MORE](#)



FACILITATE OPEN DIALOGUES

We put on events, safety demos, vendor fairs, and safety programs to encourage open dialogue and participation.

[LEARN MORE](#)



TRAIN LAB SAFETY CONTACTS

We are working to improve the quality and availability of training resources for current and future LSCs.

[LEARN MORE](#)

JRSI Leadership



Ryan Menssen
President



Jeffrey Ting
Vice President



Sarah Zinn
Outreach & Publicity



James Lettow
Financial Officer



Ben Slaw
Educational Officer



Jon Keim
Educational Officer



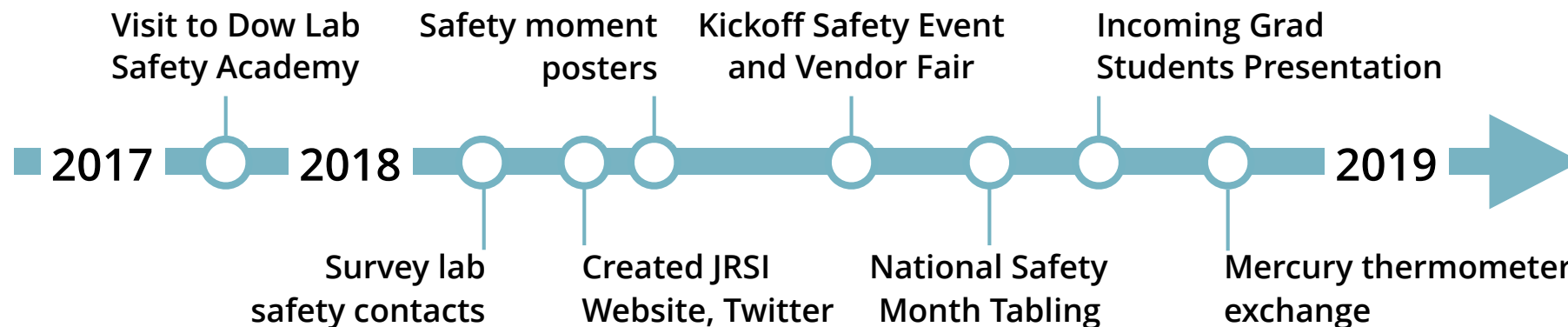
Kimberly Mormann
Laboratory Safety Specialist



James Wright
Chemical Safety Officer



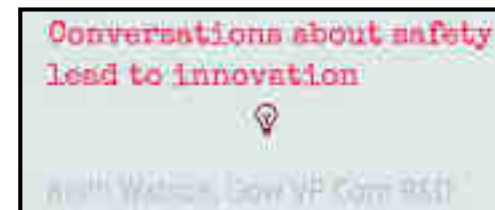
Over the past year, we launched safety events and new initiatives



Event organization, achievements, and obstacles will be discussed along the way.



In fall 2017, we attended the Dow Lab Safety Academy



- focused on integrated culture of safety at the industry level by highlighting best practices
- shared ideas and plans on improving lab safety standards in academia
- attended the event with the University of Minnesota and Northwestern University



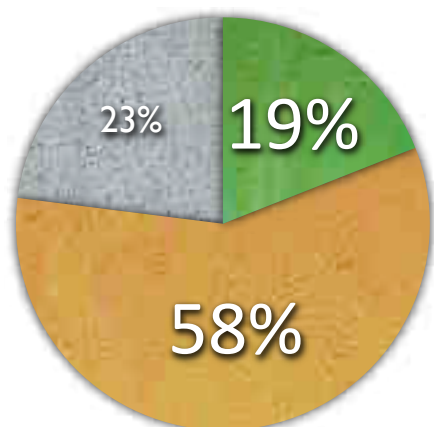


Who are lab safety contacts (LSCs)? Are they well prepared?

We surveyed the Chemistry Department and Institute for Molecular Engineering LSCs. Goals:

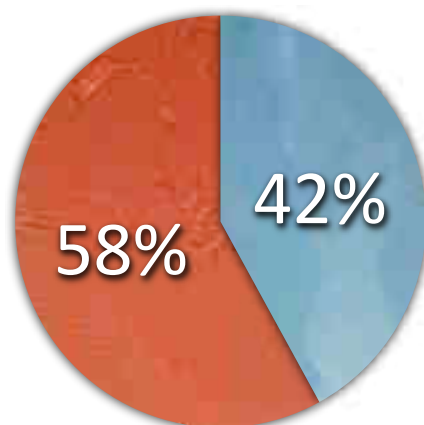
- to track changes to pinpoint improvements to the program over time and evaluate progress
- to educate LSCs and encourage a more informed safety culture
- to boost two-way communication for researchers and administrative personnel on safety needs

When did you start as LSC?



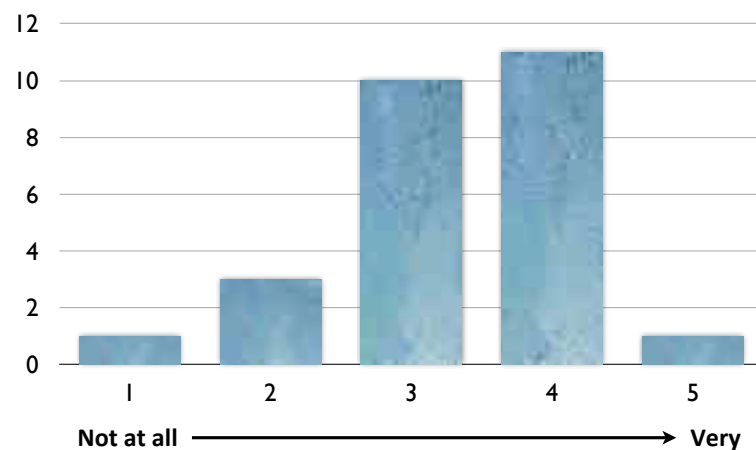
- First Year
- Second Year
- All else

Were you assigned the role of LSC or did you volunteer?



- Volunteered
- Assigned

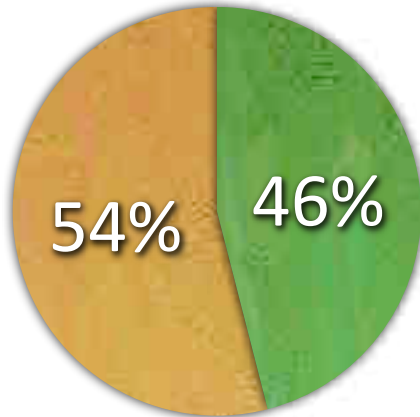
How prepared and comfortable did you feel in taking on the role of LSC?





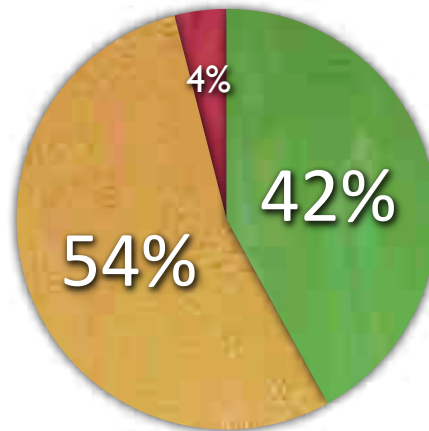
Responses to specific questions were positive but can be improved

Do you know how to access UChicago resources?



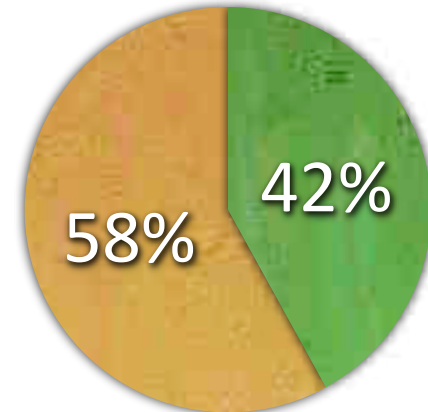
- Yes
- Some of Them
- No

Is your lab training adequate for the hazards?



- Yes
- For the Most Part
- No

Could your lab mates respond accordingly in an emergency?



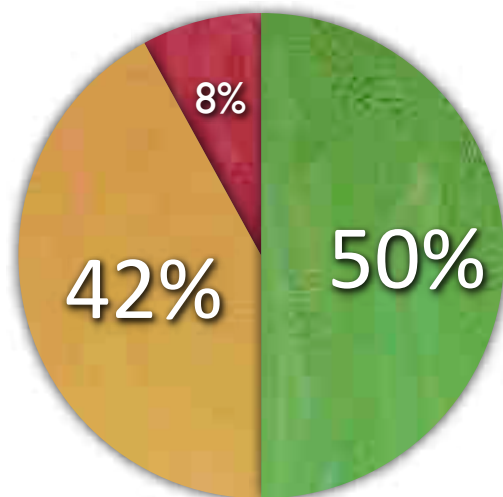
- Yes
- For the Most Part
- No

Additional educational efforts will encourage a more informed and active safety culture



We are launching a biannual training program for the LSCs

Do you want more training?



- Yes
- I received adequate instruction
- No

Broad topics for a LSC training program include:

- official requirements of a LSC from the University of Chicago Office of Research Safety
- common misconceptions about the LSC role (no direct liability, enforcement versus education)
- resources: UCAIR (submit incident reports, near-miss) and EHSA (chemical waste handling/pickup)
- tactics for approaching labmates and professors on safety issues: short breakout sessions
- general goals for building an integrated safety culture (safety responsibility document, safety moments, open discussions of safety)



This aims to centralize the LSC roles/responsibilities



Ben

The Lab Safety Contact: A Guide

Produced by the UChicago JRSI

April 2019

Contents

1	Summary of Responsibilities	2
2	Lab Safety Delegation Contract	3
3	Research Personnel Orientation Checklist	4
4	UCAIR FAQ Sheet	5
5	Sample Incident Report – September 2018	7
6	EHSA User Manual – Training	8
7	EHSA User Manual – Worker Registration	17
8	EHSA User Manual – Laboratory Placards	27



Lab safety delegation contracts aim to improve our safety culture



Ben

2 Lab Safety Delegation Contract

Lab: _____ Year: _____

The purpose of this contract is to ensure that lab safety tasks are delegated efficiently and that all lab members are aware of their responsibilities for maintaining a safe workplace. We recommend that this document be reviewed at the start of Fall quarter annually to ensure that all tasks are accounted for and maintained.

Task	LST Initials	Lab Member Initials
Submittal of waste disposal requests		
Maintenance of chemical inventory		
Flushing of equipment		
Maintenance of lab PPE		
Monitoring sharps/broken glass containers		
Maintenance of high-hazard chemicals (perity below)		
Enforcing proper PPE use		

In addition to the tasks outlined above, all lab members are responsible for:


1. Ensuring chemical waste from personal experiments is properly segregated and stored.
2. Checking chemical against the inventory and confirming hazards before making a purchase.
3. Writing/updating/maintaining Standard Operating Procedures (SOPs) for any specific procedure or equipment in the lab.
4. Ensuring all containers/glassware are properly labeled.
5. Maintaining a clean and safe working space without flammable liquids/biohazard cultures on benches.
6. Reporting accidents and incidents/near-misses through UCAR.

Notes: _____


PI Signature: _____ Date: _____




Safety posters provide safety reminders to the research community

**JRSI** | Joint Research Safety Initiative


What do these famous scientists have in common?
(besides an eye for chemistry)




Pierre Louis Dulong
Nitrogen Trichloride




Joseph-Louis Gay-Lussac
Potassium Metal




Robert Bunsen
*Chlorodimethylarsine
Explosion*



Neil Bartlett
Xenon Difluoride




David Brewster
*Unknown Compound
Explosion*




Humphry Davy
*Hydrogen Fluoride
Nitrogen Trichloride*

They all partially lost their vision from chemistry related accidents!

Are you protecting your eyes? Be sure to wear appropriate safety eyewear at all times.



Questions or comments?
rsi@uchicago.edu


**JRSI** | Joint Research Safety Initiative

When to Wear Gloves

A handy poster for researchers


Do you have a strong connection with Michael Jackson?

↓ No Yes → *Over gloves!*




Are you carrying chemicals or samples on side of lab?

↓ No Yes → *Over gloves!*




Are you currently working in lab?

↓ No Yes → *Then gloves!*




Are you working on computers in a core facility?

↓ No Yes → *Wet gloves!*




Baby, is it cold outside?

↓ No Yes → *Keep it warm!*



You're living, like in Chicago



Questions or comments?
rsi@uchicago.edu



Our website provides a centralized one-stop-shop for safety needs



Sarah

Home | General Resources | Research & Education | Safety Blog | Emergencies, research & industry | Twitter

Joint Research Safety Initiative

Chemistry happens. Don't let it happen to you.

By Researchers, For Researchers

The Joint Research Safety Initiative (JRSI) is a new safety community run by students, post-docs, and research assistants on campus that aims to provide centralized and accessible safety and educational resources for students and faculty. Our safety and efficiency is up to us, and only us.



We are establishing an easy way to submit/compile safety moments




Sarah

A COMMUNITY WIDE EFFORT


Safety Moments

Safety moments are short, pre-prepared power point presentations that students, research assistants, faculty, and staff can download and use during meetings. The goal of these safety moments is to help us encourage conversations about safety in an easy, efficient, and time-friendly manner.


[DOWNLOAD PPT THEME](#) [UPLOAD SAFETY MOMENT](#)

 **JRSI** | Joint Research Safety Initiative


- Check airflow: Don't stand too far from hood
- Flow baffles aren't blocked
- Keep equipment off floor so nothing can pass beneath it
- Keep self, apparatus at least 6 inches back from the face of the hood
- Do not place electrical spark sources inside the hood when flammable liquids or gases are present


Bad Better Best

get out of my mouth!



Questions? Contact: jrsi@uic.edu





We maintain updated links to safety resources at UChicago



Sarah

Emergencies & Injuries

<u>Useful Links</u> UChicago Accidents/Incident Reporting System (UCAIR) homepage Emergency Contact Sheet UCAIR Flow Chart Report an Incident* <small>*Incidents NOT requiring medical attention can be reported anonymously</small>	<u>Environmental Health and Safety</u> (773) 702-9999 Email Phone <u>Office of Research Safety</u> (773) 834-2707 Email Phone <u>Whistleblower Hotline</u> (1(800) 971-4317	<u>Radiation Safety Office</u> (773) 702-6299 Email <u>Facilities Services</u> (773) 834-1414 Email Phone <u>Physical Plant</u> (773) 702-6295
--	--	---

We want to point researchers to where they can find relevant information or be able to contact the right administrative office (especially for emergencies and injuries)



We formally introduced ourselves with a event in spring 2018

**THE UNIVERSITY OF CHICAGO** **Joint Research Safety Initiative**

Kickoff Safety Event -and- Vendor Fair

The Joint Research Safety Initiative (JRSI) is a new safety community run by students, post-docs, and research assistants on campus that aims to provide centralized and accessible safety and educational resources for students and faculty.



Larry Hill

Senior Associate Vice President for Strategic Initiatives, University of Chicago



Irv Potts

R&D EHS Leader, The Dow Chemical Company



Prof. William Tolman

Professor of Chemistry and Associate Dean of Art & Sciences, Washington University in St. Louis



Prof. Craig Merlic

Associate Professor of Chemistry/Biochemistry, University of California Los Angeles



Steve Rupkey

Manager, Worker Safety & Health Programs, Argonne National Laboratory



Dr. Joseph Kanabrocki

Associate Vice-President for Research Safety and Professor of Microbiology, Biological Sciences Division University of Chicago





Researchers attended a panel discussion, poster reception, vendor fair





First year orientation talks were given to both Chemistry, IME classes



Conflict Resolution in the Lab

Produced by the UChicago JRSI

September 2018

Conflicts can take many forms in the lab, and facing them head-on can be difficult. Keep this cheat-sheet handy to provide useful tactics for resolving lab conflicts easily and effectively!

1. When approaching a labmate about a potential safety hazard...

- Ask them about what they're doing; don't assume that they've intentionally made an unsafe decision. Most people don't intentionally want to run the risk of losing an eye, hand, etc.
- Make sure your questions are open-ended. Open-ended questions allow for you to have a conversation with your labmate as opposed to simple yes/no questions that don't get to the point. For example, "why did you do X?" instead of "did you check X?"
- Focus on the issue, not on the person. "What are you, stupid? Your condenser tube is on upside-down!" isn't nearly as effective as "Hey, are you sure your glassware is set up correctly?"

2. If a labmate gets defensive when a potential safety hazard is brought up...

- Don't start an insult war; things can escalate very quickly to a hostile situation that would affect the entire lab. Remember, regardless of the outcome, you need to continue working together in the same space, and the average PhD is 6 years.
- Remind them that it's not a personal attack, you're just concerned for their safety and the safety of your labmates. Accidents have the potential to affect many people (i.e. explosions, floods, gas leaks, fires), not just the person running a reaction or performing a technique.

3. If someone approaches you about a potential safety hazard...

- Have a conversation about it! When you talk through it, you may even figure out a better way to run your experiment.
- Remember, your labmate isn't trying to personally attack you; they're just concerned about a potential hazard. Just like when you approach someone else, focus on the issue and not on hurling insults back and forth.

4. If a labmate continually dismisses your safety concerns and is unwilling to have a conversation about what they're doing...

- Don't hesitate to escalate the issue if the situation demands it. Escalation could mean anything from talking about the issue with another labmate or your LSC to informing your PI or a representative from ORS/EHS. How you choose to escalate is entirely dependent on the situation and what you feel comfortable with – if you're unsure how to proceed, ask a JRSI member for some advice!

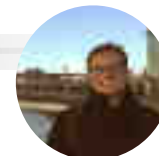
5. Remember your SPACE principles! Speak up, make it personal, ask open-ended questions, create an environment where people can ask questions, and escalate issues when necessary!



First year orientation talks were given to both Chemistry, IME classes




Ben



Jon


Make S.P.A.C.E. for safety!

Speak up!
Make it Personal!
Ask open-ended questions!
Create a space where questions are encouraged!
Escalate issues when necessary!



How does this play out as a TA?


- **Speak up:** Quickly inform students of unsafe behavior
- **Make it personal:** Utilize a story about safety to emphasize the importance of safety
- **Ask open ended questions:** Help them spot errors in their own logic. Chastising them doesn't help!
- **Create a safe space for questions:** They're here to learn and you're here to teach!
- **Escalate issues:** If necessary, send them to Vol (Ochem) or Misham (Gen Chem)



How does this play out as a researcher?

- **Speak up:** Bring issues to the attention of the researcher involved
- **Make it personal:** Have you seen this issue before? What happened? What could happen?
- **Ask open ended questions:** Directly confronting laboratories can have poor results; focus on the issue, not the person
- **Create a safe space for questions:** If safety comes up, treat it seriously and listen to others concerns
- **Escalate issues:** If the issue isn't resolved, consider taking it to the USC, PL, EHS, OHS, or even us!

What if someone approaches you?



The SPACE principle was practiced in small break-out sessions for new graduate students, for both roles as a TA and a researcher



Engagement with local and broader scientific community

Raising Awareness of Chemical Safety Resources



Promoting University of Chicago Safety Events



Online Events Participation: #RealTimeChem Week






Initiative highlight: mercury thermometer exchange program




~260 thermometers were swapped with safer counterparts free of charge



**JRIS** Joint Research Safety Initiative


GOT MERCURY?



Participate in the Joint Research Safety Initiative Mercury Thermometer Exchange Program!

- One-to-one exchange of mercury thermometers for non-mercury thermometers.
- Non-mercury thermometers are suitable for temperatures between -10°C to 225°C.


Bring up your mercury thermometers and bring them to the JRIS exchange table at GCIS 3rd Floor Atrium on Tuesday, December 11th from 12:00-12:30 PM.



Last year, UChicago had 5 "reported" mercury spills. One of these incidents cost over \$1000 because of improper disposal. Any contaminated clothing (such as shoes, pants, etc.) must also be disposed of as well in such an event.

Be proactive and safe! Help swap any mercury thermometers with us. See you Tuesday!

Questions? Contact:
info@uchicago.edu



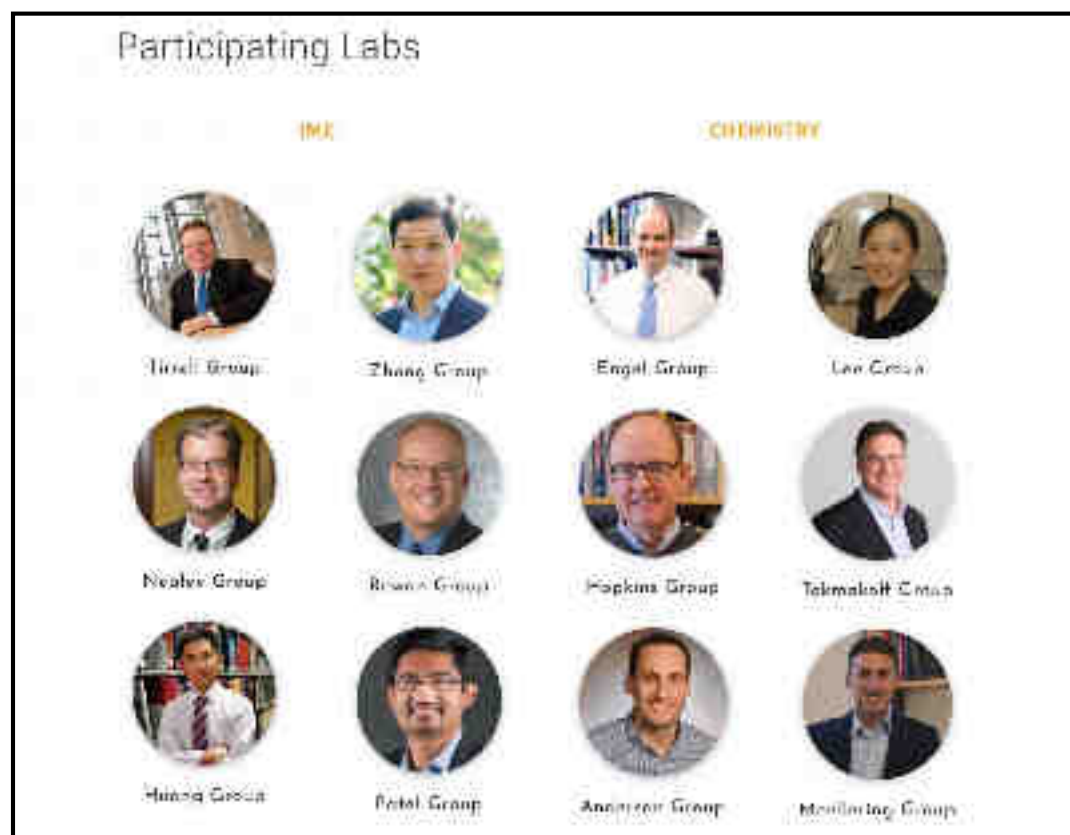


We are currently organizing our first Peer Lab Walkthrough event

This competition is a collaborative educational opportunity for labs to share:

✓ safety knowledge ✓ creative fixes ✓ learned lessons

- no regulatory authority
- Scoring will be normalized; this process will reward innovative, proactive solutions, and alert groups to areas that need improvement
- Walkthroughs on April 8-12; Award Ceremony on April 19





For scoring, we will review the rubric guidelines for student volunteers

The walkthrough focuses on 5 broad categories:

1. General: signage, PPE, SOPs, organization, etc.
2. Waste: labeling, storage, age, sharps, etc.
3. Chemical Storage: chemical segregation, secondary containment
4. Equipment: hoods, gas cylinders, lasers, etc.
5. Bonus: positive or negative safety items not on the rubric

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

needs
improvement

exceptional

Equipment Safety

Hoods, Gas Cylinders, Lasers, etc.

Hood sashes	1	Nearly all or all hood sashes open even when no one is working in the hood.	Required for 1,5
	2	Some hood sashes open even when no one is working in the hood.	
	3	Most hood sashes closed or below noted level when not in use, as low as practical when in use	
	4	One or two hood sashes as low/closed as practical when in use, lowered/closed when not in use. Back panels or airflow is free from obstructions.	
	5	No hood sashes open more than recommended level. Back panels or airflow is free from obstructions. Blast shields have been added appropriately.	



We are proud of advocating safety as a core value and integral part of academic life

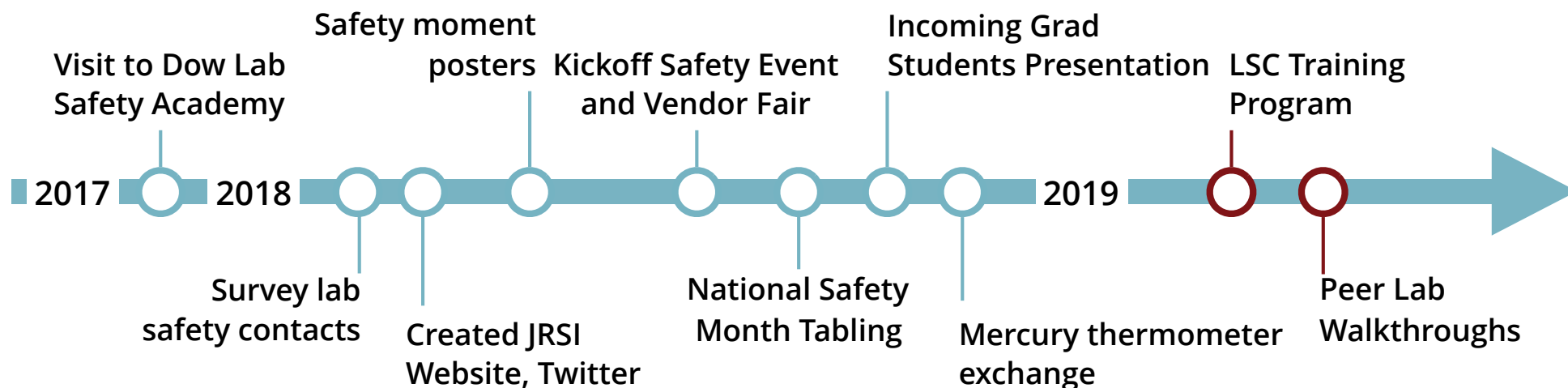


Table 1. Summary of First-Year Activities of the JST

Action	Description	CARE Category	Time Frame for Implementation
Identify 10 guidelines for a safer lab	Document summarizing most important aspects of lab safety	Awareness	First six months of initiative
Kick-off event	Highly attended event introduced the JST and goals to constituents	Awareness	First six months of initiative
Standard lab signage	Templates designed and distributed to display hazards and contact information for each lab space	Awareness, compliance	First six months of initiative
JST Web site (www.jst.uminn.edu)	Web site designed with links, information, and JST content	Resources, education	First nine months of initiative
Lab tours	Tours led to examine lab housekeeping and raise safety concerns to laboratory safety officers	Compliance	First nine months of initiative
Safety moments, posters, notes	Communication about safety issues implemented at seminars, in posters, and in newsletters	Awareness	First six months of initiative
Cleanup week	Event organized to deal with hazardous waste and to clean laboratories	Resources	First nine months of initiative
LSC training	Workshop run to teach LSOs about responsibilities and provide resources	Education	First nine months of initiative



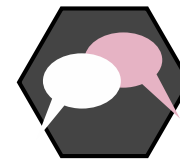
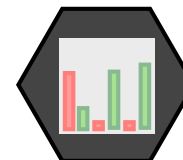
Top 3 challenges that we have encountered as a new organization

1. **Engagement:** fostering enthusiasm in safety and acceptance of safer practices takes time. We initially relied on a top-down approach from the department heads to launch major initiatives; over time, we hope that continued involvement will become bottom-up.
2. **Balance:** all of us individually are busy researchers. We meet on average once a week over lunch, but this ramps up as big events approach. Managing time and involvement are at times challenging given the size of the JRSI.
3. **Cultural Barriers:** the Department of Chemistry is well-established and reputable while the Institute for Molecular Engineering is fairly new and upcoming. Differences between the students and faculty need to be considered for implementing lasting change.





Acknowledgements



JRSI Leadership and Support



Kimberly Mormann

James Wright

Please reach out to us with any questions!



jrsi@uchicago.edu



[@UCHicago_JRSI](https://twitter.com/UCHicago_JRSI)

Events Sponsors



Our friends at other student safety groups:



[@NU_RSSI](https://twitter.com/@NU_RSSI)

[@UiucJ](https://twitter.com/@UiucJ)

[@JstYale](https://twitter.com/@JstYale)

[@UNClabsafety](https://twitter.com/@UNClabsafety)



Contact:



jting1@uchicago.edu



[@J_Ting1](https://twitter.com/@J_Ting1)



sites.google.com/view/jting1