Surveying the academic laboratory population: Project updates from the iRAMP collaboration

Leah McEwen, Ralph Stuart

11:30am - 11:45am Wed, Aug 24
Room 112A - Pennsylvania Convention Center
Connecting to the Educational Mission

The RAMP model of Chemical Safety

<table>
<thead>
<tr>
<th>Safety culture</th>
<th>Association of College and Research Libraries Information Literacy Skills</th>
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<tbody>
<tr>
<td><strong>Plan, Protect</strong></td>
<td><strong>Scope the Inquiry</strong></td>
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<tr>
<td><strong>Share Lessons Learned</strong></td>
<td><strong>Collect Data</strong></td>
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<tr>
<td><strong>Recognize Hazards</strong></td>
<td><strong>Evaluate the Information</strong></td>
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<tr>
<td><strong>Collect Data</strong></td>
<td><strong>Apply Data to Make Decisions</strong></td>
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<tr>
<td><strong>Assess Risks</strong></td>
<td><strong>Document the Process and Outcome</strong></td>
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<tr>
<td><strong>Manage Safety</strong></td>
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<tr>
<td><strong>Plan for emergencies / Protect the environment</strong></td>
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<tr>
<td><strong>Improved Safety Culture</strong></td>
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RB S
Lab Safety Education supports Critical Thinking

Prudent Practices involve 4 elements:

- Creative Reflection (Lessons Learned)
- Cultural Awareness (modeling behavior)
- Education and Training (developing local Risk Assessments)
- Common Sense (using GHS and Wiki-wisdom)

Bloom's Taxonomy:
- Creating
- Evaluating / Analyzing
- Understanding / Applying
- Remembering
Usability Study 1: Comparing SDSs, Wikipedia and PubChem

Which of these sources would you go to first?
Usability Study 2: Investigating Public Chemical Safety Information

**Scientific Audiences (Principle Investigators)**
- Flashpoint
- LD50's
- Odor threshold

**Bench Chemists (lab staff)**
- Flinn's List of the “40 Devils”
- Not Voodoo “Rookie Mistakes”
- Word of Mouth

**Lab Lore and Lessons Learned**

**PubChem data collection and data views**

**Wikipedia ChemBoxes**

**Institutional Policy Statements and Procedures**
- Emergency Response Plans
- Waste Disposal Programs
- Ventilation Support
- General training Support

**The General Public (Students)**
- GHS statements
- NFPA diamonds
- Miscellaneous notes in the wiki article

**External Audiences (Funders and Regulators)**

**Process Oriented**

**Chemical Based**
Looking for Structure in the Electronic Data

- How large is the PubChem chem safety information universe?
- How high quality is it (including consistency & provenance information)?

Key safety information fields:
- GHS class designation(s) and signal word
- NFPA diamond information

PubChem data collection and data views

Millions of chemicals; 3500 with GHS info

How much overlap is there between the two?

Wikipedia ChemBoxes

10,000 Chemboxes

- How large is the Wikipedia chem safety information universe?
- How high quality is it?
The Results

- PubChem has an LCSS view for about 5000 chemicals; Wikipedia has Chemboxes for about 10,000 chemicals
- Of those in the PubChem LCSS collection, about 30% have a ChemBox entry in Wikipedia
- 4% of the Wikipedia collection has GHS information; 12% of the Wikipedia collection has NFPA diamond information

<table>
<thead>
<tr>
<th></th>
<th>Not in Wikipedia</th>
<th>In Wikipedia</th>
<th>GHS Hazard Statement</th>
<th>NFPA 704</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>2441</td>
<td>1038</td>
<td>157</td>
<td>431</td>
<td>3486</td>
</tr>
<tr>
<td>%</td>
<td>70.02%</td>
<td>29.78%</td>
<td>4.50%</td>
<td>12.36%</td>
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Users Study 1: Chemist's Safety Information Needs

Q9 What chemical hazard information do you need to plan and conduct your experiments safely?

Answered: 640  Skipped: 5

- Hazard symbol (e.g., GHS): 70%
- National Fire Protection... 45%
- Common properties... 60%
- Handling procedures; 80%
- Emergency procedures; 55%
- Other information ... 65%
- Other (please specify) 5%
Users Study 1: Chemist's Safety Information Sources

**Q10 Where do you usually find this information?**

- Safety Data Sheets (SDS): 90%
- Lab or department: 40%
- Inventory system: 20%
- Web search: 30%
- Other (please specify): 5%

Answered: 641   Skipped: 4
Users Study 1: Chemist's Value of ACS Info

Q15 What is the value of safety/hazard information that comes from the American Chemical Society?

Answered: 637  Skipped: 8
Q6 What types of resources provide the most useful chemical hazard information for those using chemicals?

Answered: 115  Skipped: 1

- Official regulation...
- Safety Data Sheets or... (59%)
- Chemical property...
- Operating procedures:...
- Institutional resources...
- Peer institution...
- Textbooks (eg. SAC, LCSS);...
- Books (such as Prudent... (45%)
- Other (please specify)
Users Study 2:
Safety Community's Missing Information

Q8 What kind of chemical health and safety information is needed that isn’t currently readily available to you?

Answered: 111   Skipped: 5

- Lab inventories;
- Incompatibilities;
- Properties of mixtures;
- Process hazards and...
- Risk assessment...
- Near miss database;
- "Lessons Learned"...
- Regulatory requirements;
- Other (please specify)
Moving Forward

- Focus groups this fall with a focus on high school teachers and new chemists
- Formal survey in the spring of the larger chemistry community
iRAMP Goals

- **iRAMP vision**: Capture the imagination of the academic chemistry community by presenting an inspirational vision of the chemical safety and chemical informatics.
- **iRAMP mission**: Support a flexibly structured ecosystem of data, workflow tools and domain expertise mapped to the essential commonalities of the use case and content, connected by good information management practices.
iRAMP System Diagram

Chemistry InfoSystem Diagram

Mapping the pain points and the Powerpoint in the chemical infoscape

External Inputs:
- Funding
- True
- Definition of disciplines
- Etics
- Teamwork

External Outputs:
- Public Perception
- Recruitment
- Technologies
- Problem solving
- Policies

Use Cases
- Research Divisions
  - Research
- Industrial Divisions
  - Service

Content
- Domain expertise
- Workflow

Lab skills

Theory and Data

Information Management and Literature