MIT's Pilot Project to Perform Laboratory Hazard Assessments

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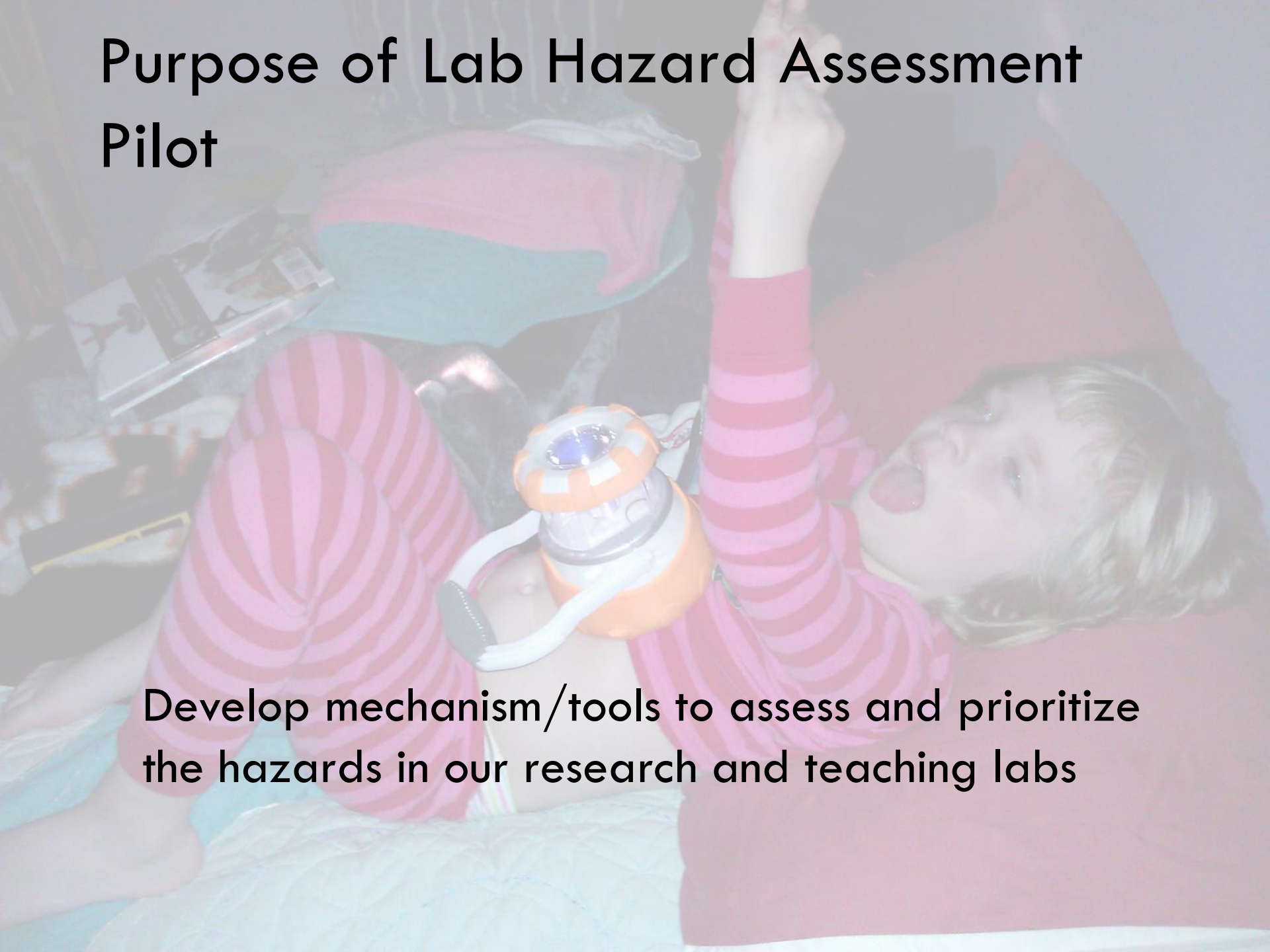
Agenda

- Overview of the MIT Lab Hazard Assessment (LHA) Pilot Project
- Why - purpose
- What - process
- Who
- Outcomes
- Next steps

Pilot supported and assisted by Pam Greenley, Lou Diberardinis, Bill V and others in MIT EHS

Purpose of Lab Hazard Assessment Pilot



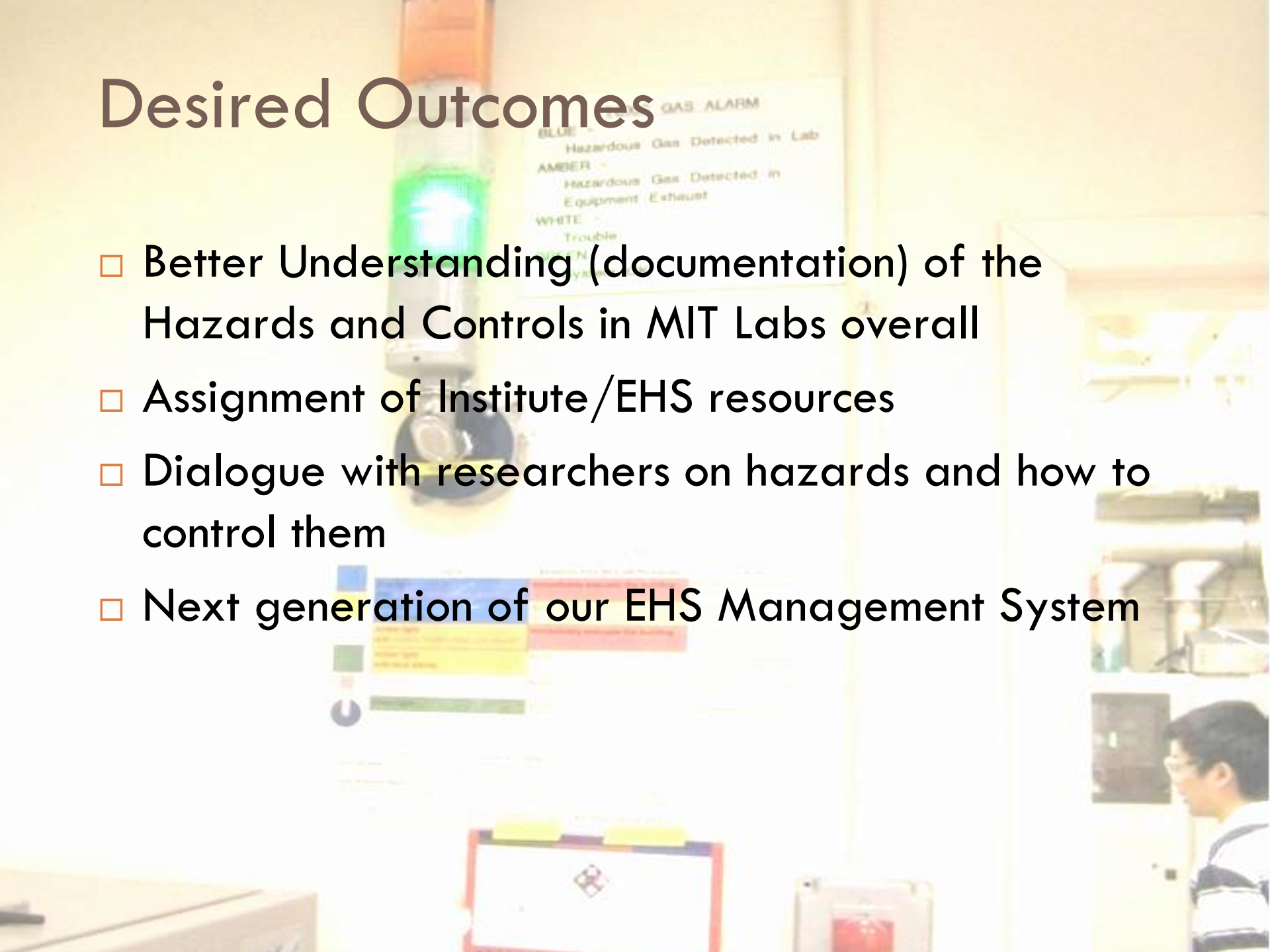
Develop mechanism/tools to assess and prioritize the hazards in our research and teaching labs

Why?

- MIT EMS is mature
- The next level
- Assist in managing scale, scope and change
- Allocation of EHS resources
  - The higher the hazard or the larger the gap
- Audience - Institute Admin, Faculty, EHS Managers, Department Labs and Centers (DLC) Coordinators, EHS Lead Contacts, EHS Staff
- How are we doing at managing risk in our labs?

Desired Outcomes

- Better Understanding (documentation) of the Hazards and Controls in MIT Labs overall
- Assignment of Institute/EHS resources
- Dialogue with researchers on hazards and how to control them
- Next generation of our EHS Management System



Pilot To Date

- LHAs conducted in over 30 Groups/Labs and 6 undergraduate courses
- In 10 different Depts/Labs/Centers
- 6 EHS Coordinators, 10 EHS staff

- Outreach done at several DLC EHS Rep meetings, Safety Committee meetings and EHS Working Committee
- EHS group mtgs, staff mtgs, managers mtgs

Researchers

- Is this exercise Helpful?
- Is it better than an inspection?
- Can it start the process of answering the question – How is my Lab doing with regard to Safety?

- LHA could add to their experimental process
  - Hazard Assessment should be part of what they regularly do.
  - Hazard Assessment is part of what they regularly do.
  - Could have a direct acute safety benefit.
  - Could help on continuity of research (operations).

My Initial Review

- Review existing efforts and work
- Review of existing tools
- Gain understanding of how EMS works
- Dialogue with EHS staff
  - Staff are knowledgeable and engaged
  - Review what tools they use and do not use
  - Lead Contact role for DLC
- Benchmark with a few Peer Institutions

Process

- Volunteers, requests, renovation, problem, …
- Get PI approval
- Coordinate schedule, 60 - 90 min. goal
- Participants – EHS Lab Rep, EHS Coordinator, EHS staff (Lead, member - DLC team), others
- Request for some information
- Dialogue/discussion
- Walk through of space
- Write-up of findings and recommendations

Communication

- A Dialogue with researchers on hazards
  - Focus has been primarily chemical and physical hazards
- Open Ended Questions
- Intended to be different from an inspection

Overall Lab Hazard Assessment (LHA)
Findings Report

Assessment Date:
DLC:
Principal Investigator:
Building:
Room/Room Set:
LHA Completed by:
Lab Contact:

Summary: This section is a summary of the PI Group research with regard to Chemical and Physical hazards. It is best if the lab or researcher can summarize their work and the associated hazards for this section. It is preferred to have this summary prior to conducting the assessment, it can inform the process and the follow-ups questions asked during the LHA.

Chemical Hazards – A description of the main chemical hazards identified, for example reactives including specific materials, flammables, corrosives, highly toxic materials or gases. Conditions of use and controls associated with the main chemicals hazards can also be included such as material used in fume hood, material weighed in enclosure or on bench.

Physical Hazards -
Focused Assessments Completed –
Focused Assessments Recommended –
Is a Chemical Inventory available -
Is PPE selected and worn for specific hazards/tasks/operations -
Is a specific PPE assessment form or document used in this lab/Dept. –
Does the lab have safety related SOPs in the following hazard areas – Chemical, Physical or Process related. Please list SOPs by hazard area and can they be shared broadly within MIT community?

Required Actions w/responsible party -
Recommended Actions -
Critical Utilities –
Specialty hazardous waste streams/handling/disposal
Incidents or near misses:
Recommended revisits:
Overall Rating:
Alarms present (note local or centrally reported):
Lab Secured (standard key, card access, unique key, other)
Are there items or materials that should/must be secured:
Time to complete assessment:

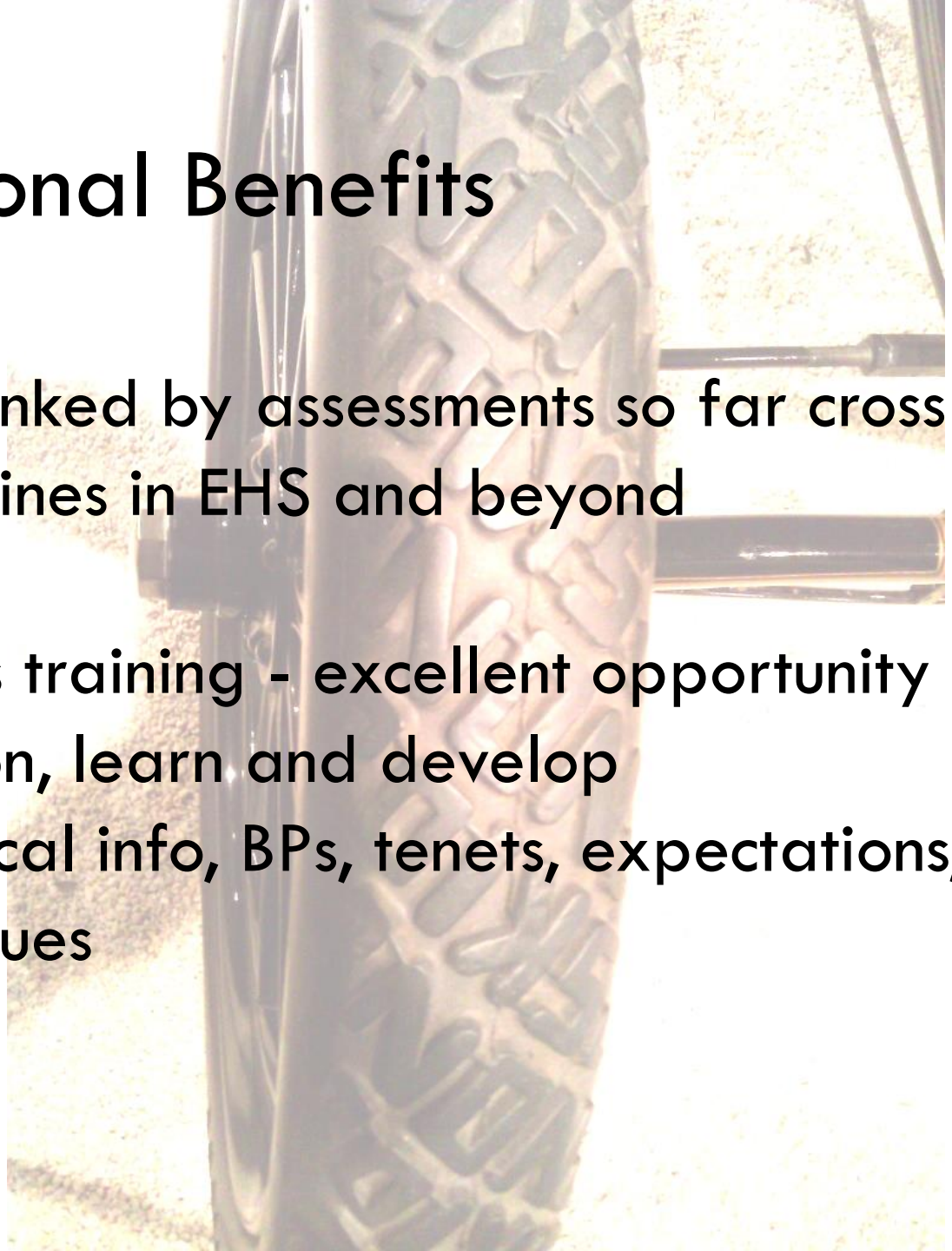
Excellent Practices Found

- Dialogue with EHS Lab Reps and researchers about hazards in labs
- Hallway handout for CVD Lab – Gradecak Lab
- All group members invited by PI and participated – LHA conducted w/6 group members
- Chemical Engineering Faculty member participated
- Write-up of research and hazards by all group members plus participation in LHA.
- Biology Teaching labs safety review of new materials for student labs
- Lab 'rules' document
- SOPs such as Sharp Lab – Chemo use

Findings

- A few opportunities have popped up in LHAs done
  - Not the specific reason for performing LHAs
  - Findings divided into Required Actions and Recommended Actions
  - More robust IT solutions would be helpful

Additional Benefits



- Groups linked by assessments so far cross many of the disciplines in EHS and beyond

- EHS cross training - excellent opportunity to share information, learn and develop
  - Technical info, BPs, tenets, expectations, techniques

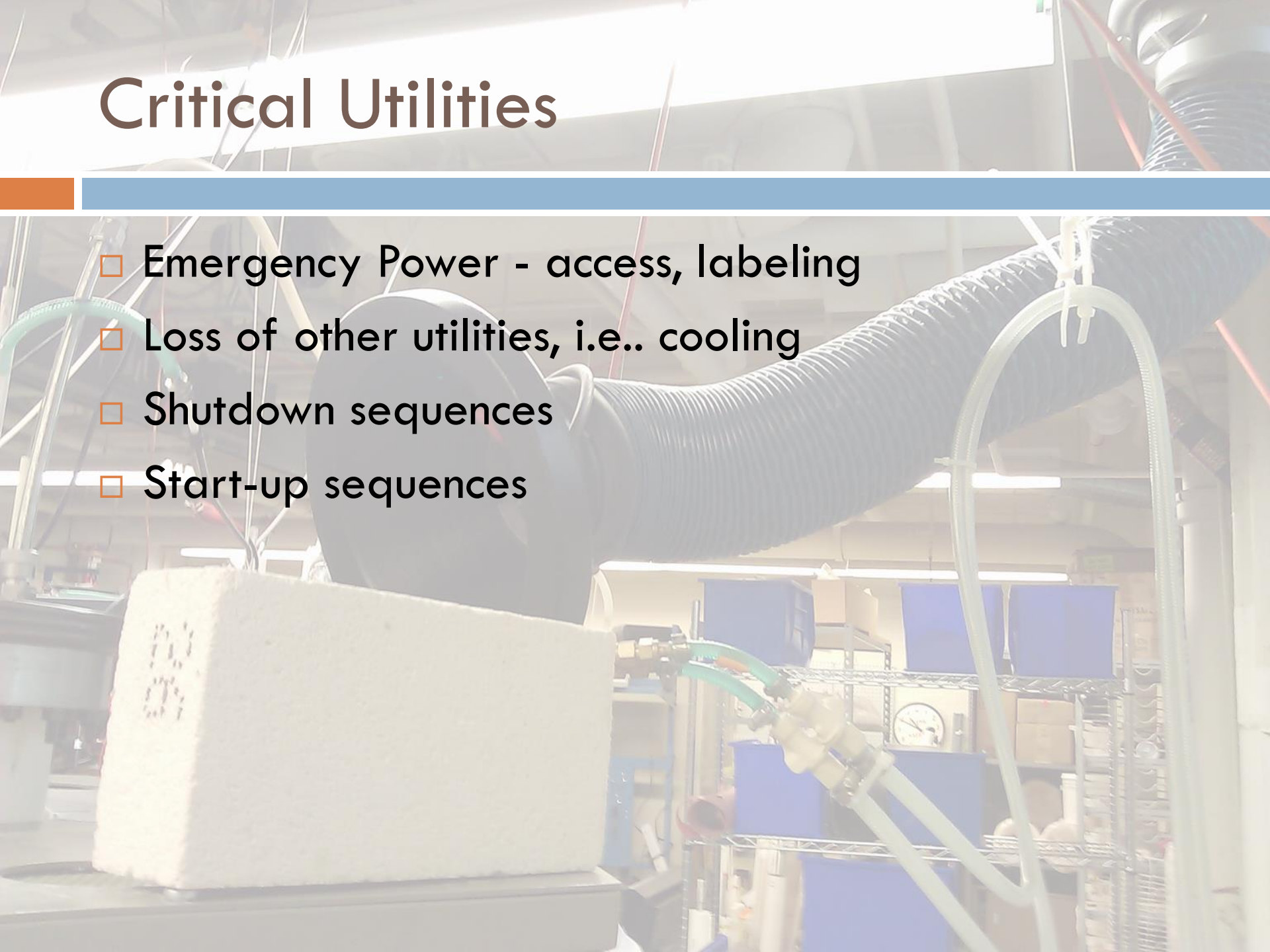
Risk Assessment (RA)

- Definition – the process of assessing the risks associated with each identified hazard, to make decisions and implement appropriate control measures to prevent the hazard from occurring.

- Dialogue with Researchers on the Hazards of their work.
  - Use RA techniques to inform the dialogue and better understand the hazards of research and whether the appropriate controls are in place
  - Assess ongoing operation of labs and research facilities

Critical Utilities

- Emergency Power - access, labeling
- Loss of other utilities, i.e.. cooling
- Shutdown sequences
- Start-up sequences

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Triggers for more Detailed reviews, Focused Assessments, SOP, …

- Idea of thresholds for focused reviews
- Threshold for SOPs
- Set at Institute level, DLC level, committee?

- No specific Committee for Physical Hazards
- Chemical Toxicity Committee does not look at specific experiments/hazards
  - In some technical areas – a great deal of expertise in the Institute, while not necessarily in EHS.

Additional Ideas

- Utilize Researchers and other Institute resources to evaluate specialty hazards or complex equipment/systems/processes
  - Lab wired experiments
  - Specialized equipment
- Focused assessments – review of nanomaterials use

Review of Undergraduate Lab Courses

- General Biology Labs
- Mechanical Engineering –
  - Underwater submersible powered by aluminum doped with gallium
  - Growing and testing carbon nanotubes
- Chemical Engineering – optimizing oil purification categorizing shading of toast
- Chemistry –
  - Synthesizing quantum dots
  - Testing river water

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RESEARCH SAFETY

Lab Hazard Rank (LHR)

The Lab Hazard Rank (LHR) provides a framework to rank the potential hazards found within each lab. The LHR provides an objective approach to prioritize labs for audit based on: type of hazardous materials present and quantities, hazardous operations and equipment, engineering controls and procedures, and facility history. Our goal is to institute cyclical lab audits based on the LHR. There are five LHR classes ranging from the least hazardous (LHR 0) to the most potentially hazardous (LHR 4). The frequency of audit is noted within each LHR.

LHR 4 High Hazard (6 month inspection program)

LHR4 has the highest potential severity of hazards present. LHR 4 labs typically work with large or production volumes of solvent or corrosives, and/or large quantities of particularly hazardous materials (nanomaterials, chemotherapy agents, highly toxic compounds). Gases in this category include full size cylinders of toxic/pyrophoric gases or over 3 cylinders of flammable gases. Risk Group 3 biological agents, Select Agents, or large quantities of Risk Group 2 agents are included in this rank. Non-traditional use of hazardous materials, lab equipment, or research fabricated equipment will also be classified into LHR4. Labs that have had previous serious accidents, occupational disease, or poor previous audit results will also be placed in this category.

LHR 3 Moderate Hazard (12 month inspection program)

LHR 3 is our standard lab that works with non-production volumes of many toxic and flammable chemicals. Use of carcinogens, pyrophorics, acutely toxic materials, sensitizers, and reproductive toxins is typically in small quantities. Toxic gases are used only in lecture bottle sizes. Flammable gas usage is limited to two full size cylinders. Biological agents include Risk Group 2 infectious agents, recombinant DNA,

THE SEVERITY OF HAZARDS IN A LAB WILL DETERMINE ITS FREQUENCY OF INSPECTION

IN CASE OF EMERGENCY

HAZARD GUIDELINES

CHEMICAL INVENTORY

MATERIAL SAFETY DATA SHEETS

WHERE TO GO IN THE EVENT OF AN INJURY

ng Hazardous Materials
y Ice
TRAINING
FIC DIVE SAFETY
R SAFETY

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LHR 2 Low Hazard (18 month inspection program)

LHR 2 labs are relatively low hazard labs. Typical chemical work involves small volumes of solvents, acids and toxic chemicals. Hazardous materials are used with good engineering controls as necessary. Only low-hazard gases are used. Standard biomedical research involving tissue culture, PCR, and work with BL1 infectious agents are LHR 2. Well managed clinical labs working with larger volumes of solvent, formaldehyde, and tissue preparation procedures with good engineering controls are included in LHR 2. Other low hazard or well controlled labs involving class 3R and lower lasers, electronics labs, machine shops, fabrication labs, analytical labs, MRI, NMR facilities are LHR 2.

LHR 1 Very Low Hazard (24 month inspection program)

Laboratories in this category have minimal quantities of hazardous chemicals perhaps only used for critical surface cleaning. Hazards still exist but are well controlled with standardized equipment and procedures. LHR 1 includes: teaching labs, autoclave and dishwashing rooms, high performing BSL 1 or 2 labs, and those with an excellent safety and health record. Additional LHR 1 space includes lab related storage rooms, support spaces, freezer rooms, linear equipment corridors, and equipment rooms.

HAZARD GUIDELINES
CHEMICAL INVENTORY
MATERIAL SAFETY DATA SHEETS

WHERE TO GO IN THE EVENT OF AN INJURY

Occupational Health Services
(734) 764-8021
Clinic Location

After regular business hours:
U-M Emergency Department

HOW TO REPORT AN INJURY/ILLNESS

U-M Work Connections:
Injury/Illness Form
(734) 615-0643

ACS - Identifying and Evaluating Hazards in Research Laboratories

- Developed by the Hazards Identification and Evaluation Task Force of the American Chemical Society's Committee on Chemical Safety
- Draft document has a great deal of information on identifying and evaluating hazards
- Chemical Safety Levels 1-4

Pilot Next Steps

- Continue the Pilot
  - One DLC to complete all labs in next two lab inspection cycles
  - Working on Undergraduate courses in 3 depts.
- Ask for feedback from participants/researchers
- Develop or adopt rating scheme
- Substitute one of two semi-annual lab inspections with an LHA
- Gain support of Institute Committees - Toxic Chemical Committee, Institute Council

Additional Ideas

- Goal of robust IT solution that can coordinate information available about a lab.
  - Role dependant views
- Development of filters for inventories – hazard, regulatory, …
- Training course for conducting LHAs


GAP