NISE Network Online Workshop

Be Prepared: Safety Tips and Reminders for Museums Running Public Events, Including National Chemistry Week and Earth and Space Events

June 12, 2018

Welcome! **Today's presenters are:**

Irene Cesa, American Chemical Society Committee on Chemical Safety

David Sittenfeld, Museum of Science, ChemAttitudes Co-PI

Keith Ostfeld, Children's Museum of Houston

Darrell Porcello, Children's Creativity Museum, Earth & Space Co-PI

As we wait to get started with today's discussion, please:

- **Update your display name.** Include your first and last names, and institution
- **Introduce yourself**! Type your name and institution into the Chat Box
- **Questions?** Feel free to type your questions into the Chat Box at any time throughout the online workshop or use the raise your hand function in the participants list and we'll unmute your microphone

All workshops are recorded and archived online at http://www.nisenet.org/event-type/online-workshop

RAMP Up Your Safety Habits

NISE Network Safety Webinar
June 2018

Irene G. Cesa

ACS Committee on Chemical Safety

Goals and Objectives

- Improve safety by increasing awareness
- Review the RAMP process for planning safe science activities

  Recognize hazards

  Assess risks

  Minimize risks

  Prepare for emergencies

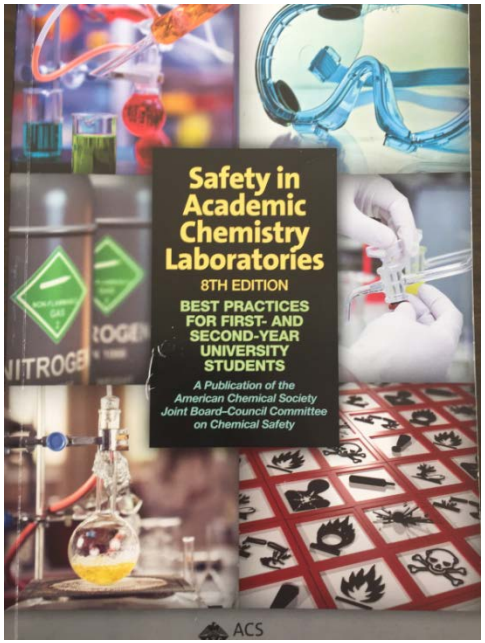
- Highlight ACS resources for chemical safety
- Encourage future outreach to leverage today's efforts

Elements of Safety as a Core Value

Hazards and Risks in Science Activities

- Heat, steam, and flames
- Flammable and reactive chemicals
  - Alcohols, hydrocarbons, alkali metals, oxidizers
- Exothermic reactions
  - Combustion and decomposition
- High or low pressure
  - Gas generation, compressed gases, vacuum
- Radiation – UV lamps, lasers
- Electricity
- Momentum and force

Hazard versus Risk



Hazard – Source of potential injury, damage or harm.
Hazards are intrinsic properties of substances or actions.

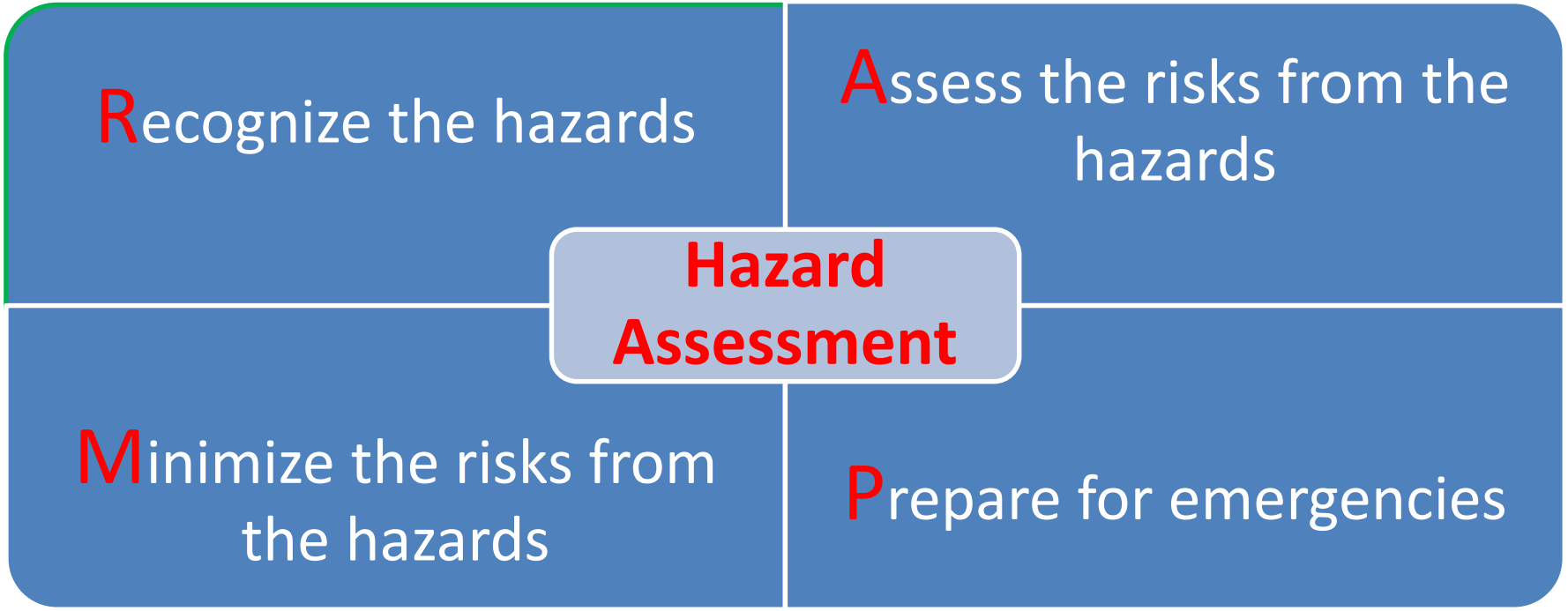
Risk – Probability and severity of injury, damage or harm from a hazard. **Risk is situation-dependent.**

American Chemical Society, 2017
http://www.acs.org/SACL

Lightning – Hazard vs. Risk

- Known hazard
- On a clear day – no risk
- Minimize risk during a thunderstorm
  - Stay inside
  - If you are caught outside unawares
    - Seek shelter in a structure or car
    - Stay away from tall objects
    - Avoid large bodies of water
    - Crouch down as low as possible

Moving Beyond Safety Rules – "RAMP"-ing Up for Safety



Developed by Robert E. Hill and David F. Finster in their textbook, *Laboratory Safety for Chemistry Students*

Recognize the Hazards

- Chemical

  Physical, health, environmental

- Equipment, conditions, procedures, and the setting

  Electrical and mechanical hazards; high or low temperature; pressure differentials; experience, age and maturity of participants

SDS Section Numbers and Headings	
Section 1: Identification	**Section 9:** Physical and chemical properties
Section 2: Hazard(s) identification	**Section 10:** Stability and reactivity
Section 3: Composition/information on ingredients	**Section 11:** Toxicological information
Section 4: First-aid measures	**Section 12:** Ecological information
Section 5: Fire-fighting measures	**Section 13:** Disposal considerations
Section 6: Accidental release measures	**Section 14:** Transport information
Section 7: Handling and storage	**Section 15:** Regulatory information
Section 8: Exposure controls/personal protection	**Section 16:** Other information

Source: OSHA. Hazard Communication Standard: Safety Data Sheets, 2012. www.osha.gov/Publications/OSHA3514.html (accessed June 19, 2015).

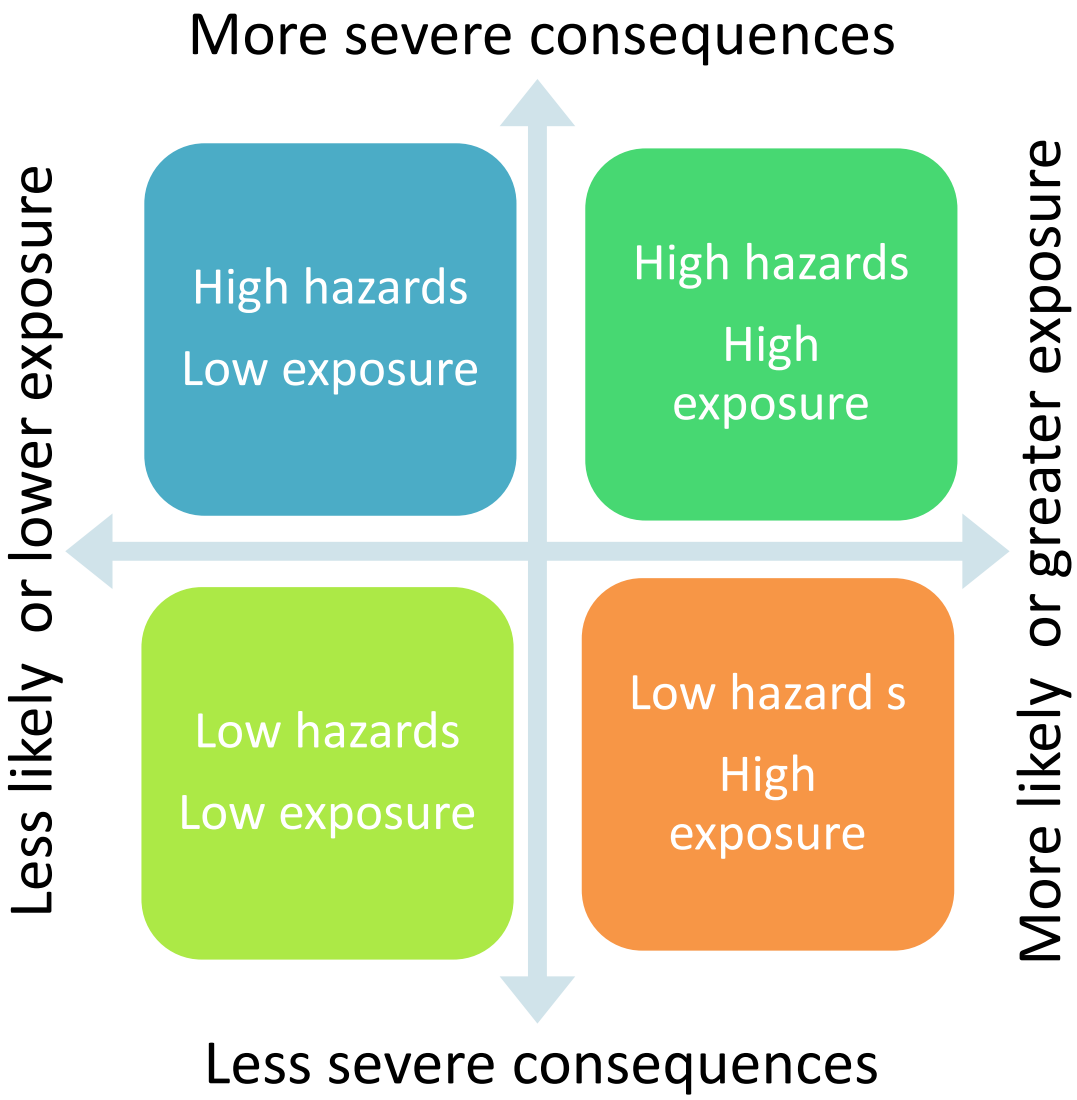
NFPA Hazard Identification System			
BLUE Diamond Health Hazard	**RED Diamond Fire Hazard (Flash Points)**	**YELLOW Diamond Reactivity**	**WHITE Diamond Special Hazard**
4 Deadly	**4** Below 73 °F	**4** May Detonate	**ACID** – Acid
3 Extreme Danger	**3** Below 100 °F	**3** Shock and Heat May Detonate	**ALK** – Alkali
2 Hazardous	**2** Above 100 °F Not Exceeding 200 °F	**2** Violent Chemical Change	**COR** – Corrosive
1 Slightly Hazardous	**1** Above 200 °F	**1** Unstable If Heated	**OXY** – Oxidizer
0 Normal Material	**0** Will Not Burn	**0** Stable	Radioactive
			W Use No Water

Note: Chart is for reference only. Consult the NFPA 704 standard for complete specifications.

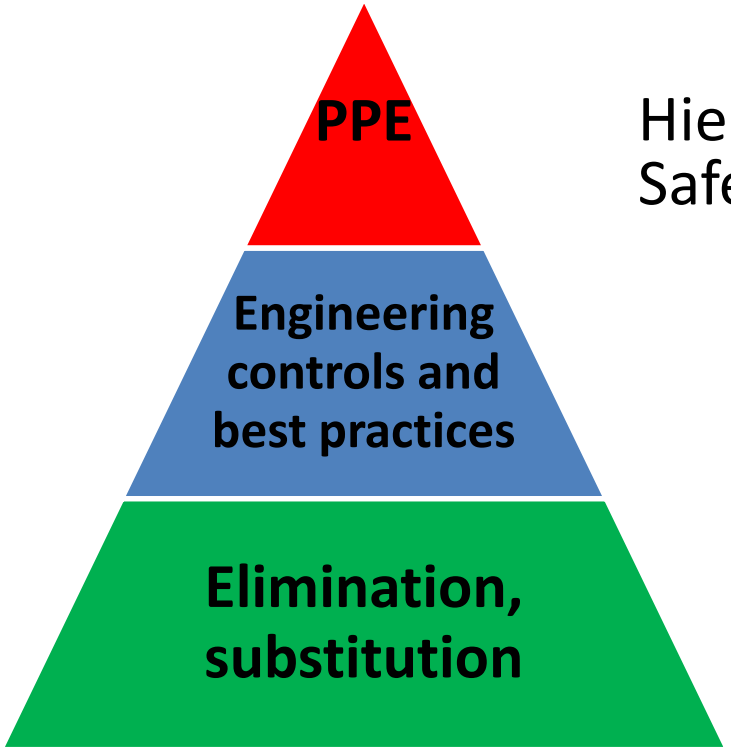
				
Toxic	**Flammable**	**Corrosive**	**Oxidizer**	**Skin and Eye Irritant**
Copper(II) chloride	Acetone	Hydrochloric acid	Hydrogen peroxide	Vinegar Soap
Harmful if swallowed, inhaled, or in contact with skin.	**Liquid and vapor are extremely flammable.**	**Causes severe skin burns and eye damage.**	**May cause fire or explosion.**	**Causes skin and eye irritation.**

Assess the Risks

- Perform a hazard and risk assessment prior to performing any hands-on activity or demonstration.
- Analyze the likelihood and severity of potential risks.
  - What level of danger is posed by the hazards?
  - **Low/medium/high**
- Construct “Risk Matrix”



Minimize the Risks

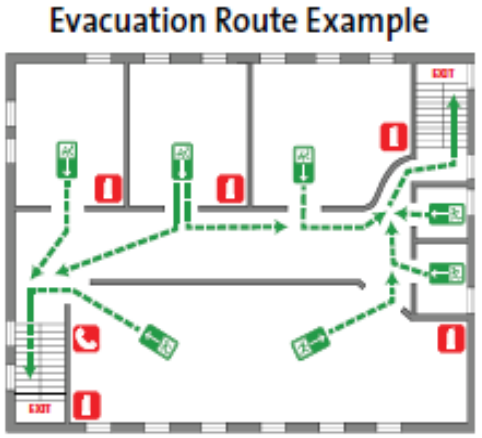


Hierarchy of controls – the Safety Pyramid

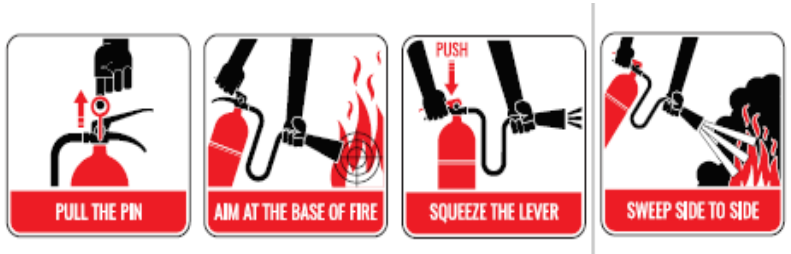
- Elimination, substitution
- Engineering (ventilation, hoods, storage cabinets)
- Prudent practices (standard procedures, safety precautions)
- Personal protective equipment

Eliminate the hazard, change procedure or modify process, use special safety equipment, wear appropriate PPE.

Prepare for Emergencies



- What “emergencies” can occur?
  Anticipate “accidents.”
- Is necessary response equipment present?
  Inspect and maintain safety equipment on a regular basis.
- Review and practice procedures for handling common emergencies.



ACS Resources for Chemical Safety

- **Safety Guidelines for Chemical Demonstrations**

  Published by Division of Chemical Education
  http://www.divched.org/content/safety-guidelines-chemical-demonstrations

  Importance of following written procedures, comprehensive safety precautions, and independent risk assessment.

- **Hazard Assessment in Research Laboratories** (Web Tool)

  https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/hazard-assessment.html

  Introduces basic principles of hazard assessment.

  Offers a number of ways to conduct hazard assessments.

  Provides multiple templates and examples.

Minimizing Risk in Combustions Reactions

- Prepare and follow a safety checklist for all **combustion demonstrations** involving the use of a flammable liquid.
- Dispense only the amount of the liquid required BEFORE beginning the demonstration.
- Cap the solvent bottle and REMOVE it from the demonstration area before applying the ignition source.
- NEVER add more flammable liquid to a combustion demonstration once it is underway.

Excerpted from Safety Guidelines for Chemical Demonstrations

Explore Science:
Let's Do Chemistry Safety

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ACS


SCIENCE


Catching the Wind
RINALYSIS
pH


Catching the Wind


Energized!
Water
Mortar & Pestle

Explore Science: Let's Do Chemistry

- What **hazards** exist?
- What associated **risks** may arise from these hazards?
- How can we **minimize** risks through protocols we have designed into the activities and training materials?
- How should **safe practices and protocols** best be **communicated** with facilitators, visitors, and others?

EXPLORE SCIENCE
Let's Do Chemistry

Explore Science: Let's Do Chemistry

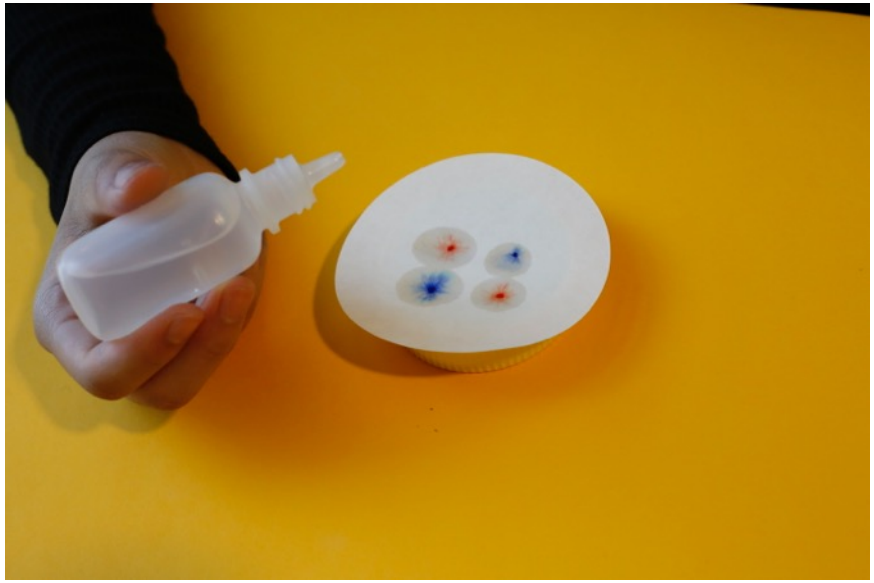
Chemical Safety Resources

- **Chemical Safety Guide**
- **Activity Guides**
- **Training Videos**

Chemical Safety Guide: Basic Objectives

The Guide Is Intended to:

- ***Prepare*** the event organizer for the safety information embedded into each individual activity's training and facilitation materials,
- ***Communicate*** strategies, protocols, and practices that will be important when preparing for, hosting, and cleaning up from the event, and
- ***Assure and instill confidence*** in event organizers about hosting their event from a chemical safety perspective.
- ***Provide resources*** on the topic of chemical safety, if the host/organizer wishes to do more chemistry activities at their institution.



General Chemical Safety: Guidelines, Protocols, Precautions

- **Preparing and Doing the Activities**

- **Engaging in Chemistry Activities with Visitors and Children**

- **Training and Working with Facilitators and Guest Educators**

Orienting Organizers to Safety Information: Rocket Reactions

SAFETY

- All facilitators and participants must **wear safety goggles** during this activity. While baking soda and citric acid are commonly handled household materials, these substances and the products of the chemical reaction can splash into someone's eye and the caps can move quickly through the air.
- Modeling good safety practices is an important learning goal for chemistry activities.
- The kit includes two different sizes of safety goggles (adult and child). Fit the appropriate size goggle to each participant. For very small children, you may need to use a binder clip to make the headband fit more snugly. Fold the band over itself and secure it in place.
- All beakers should be labeled with the correct chemical names.

CLEAN UP

- Rise any dirty tubes and caps.
- Dump out extra water.
- Empty the extra citric acid and baking soda into their respective containers if they are dry and you are certain there has been no cross contamination.
- If the rockets have splashed onto the floor around your location, you can mop up the area or wait for the materials to dry and then sweep or vacuum.

FACILITATION NOTES

- This activity makes a great connection to the 2018 National Chemistry Week theme: Chemistry is Out of This World! If participants are interested, encourage them to explore the information sheet about how real rockets are fueled and launched. (Hint:

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Sublimation Bubbles

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Oil Spills

Principles of Green Chemistry and Additional Resources

- **ACS resources** (provided already by Irene)
- **Flinn Scientific Trainings, Webinars, and courses:** https://www.flinnsci.com/resources/safety-reference/.
- **National Science Teacher Association resources**: can be found at http://www.nsta.org/safety/
- **Emergency protocol resources**

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Thank you!

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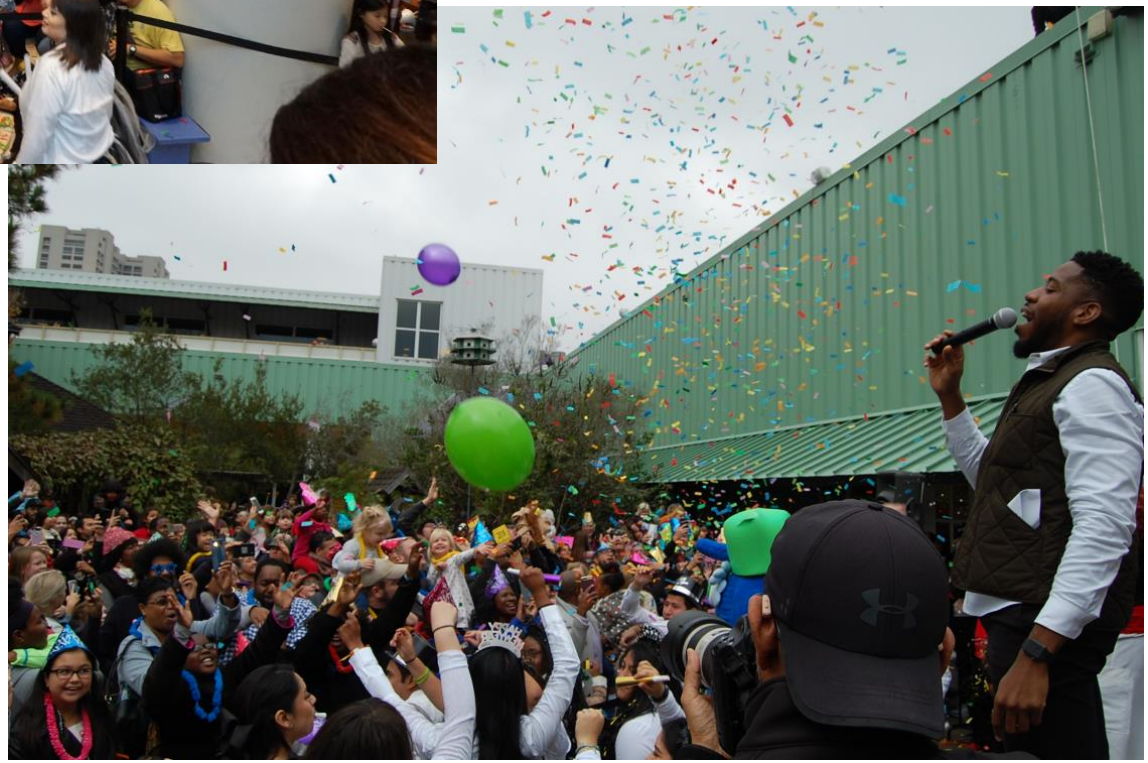
MUSEUM

Safety in Large Events

Chemistry and Beyond


KWANZAA




Sunny99.com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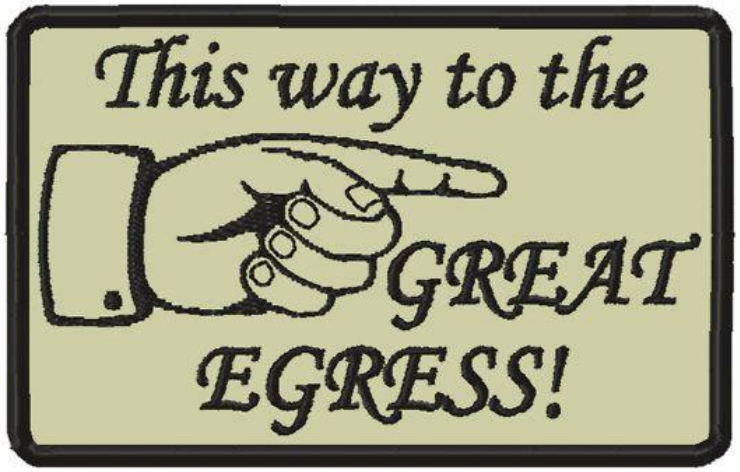
Crowd Movement and Wayfinding



Crowd Movement and Wayfinding

- Have any routes planned and backups in place
- Have signs clearly posted (name of event and time)
- If re-entry is needed, have a plan in place for easy flow
- Have staff/volunteers available to help with crowd motion
- Make overhead announcements, but also have staff make announcements

Crowd Separation

Crowd Separation

- Make sure barriers meet safety requirements
- Make sure any barriers are a safe distance from the event
- Plan for environment factors and adjust as needed BEFORE the event starts
- Do not plan to adjust barriers during the event
- Make sure there is entry and exit for staff/audience participants and a clear path for them to follow entering and exiting
- Have staff/volunteers available to assist

Audience Participation

Audience Participation

- Have specific duties
- Have safety gear for them (clean between shows)
- If needed, recruit in advance, esp. if the show gets messy
  - May need to determine if waivers are needed for participation
- Have a specific entry/exit for them and someone to help them (if needed)

Emergencies

Emergencies

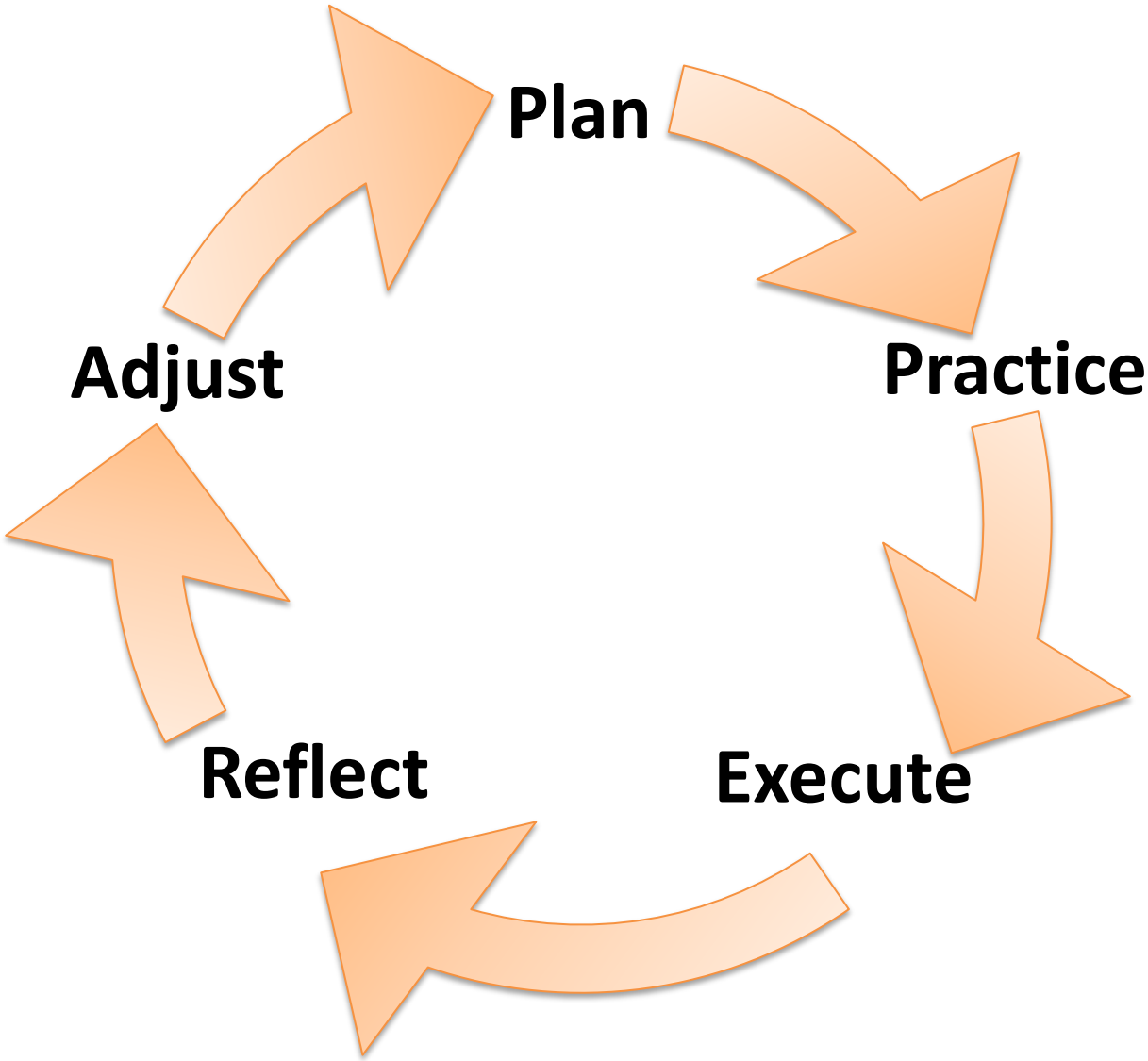
- Have staff strategically placed in crowds
- Have an exit strategy
- Have code phrase(s)
- Have a way to communicate with performer(s)

Performers

Performers

- Make sure they have an entry/exit and clear path (if they are leaving the area)
- Have an easily accessible space for supplies.
- Make sure all safety/first aid equipment is quickly accessible
- Plan time for final practice and discuss any safety concerns
- Plan time to chat with visitors and get breaks
- Make sure they have water/etc. if no access to break area
- Costumed characters have special needs

Event Planning Cycle



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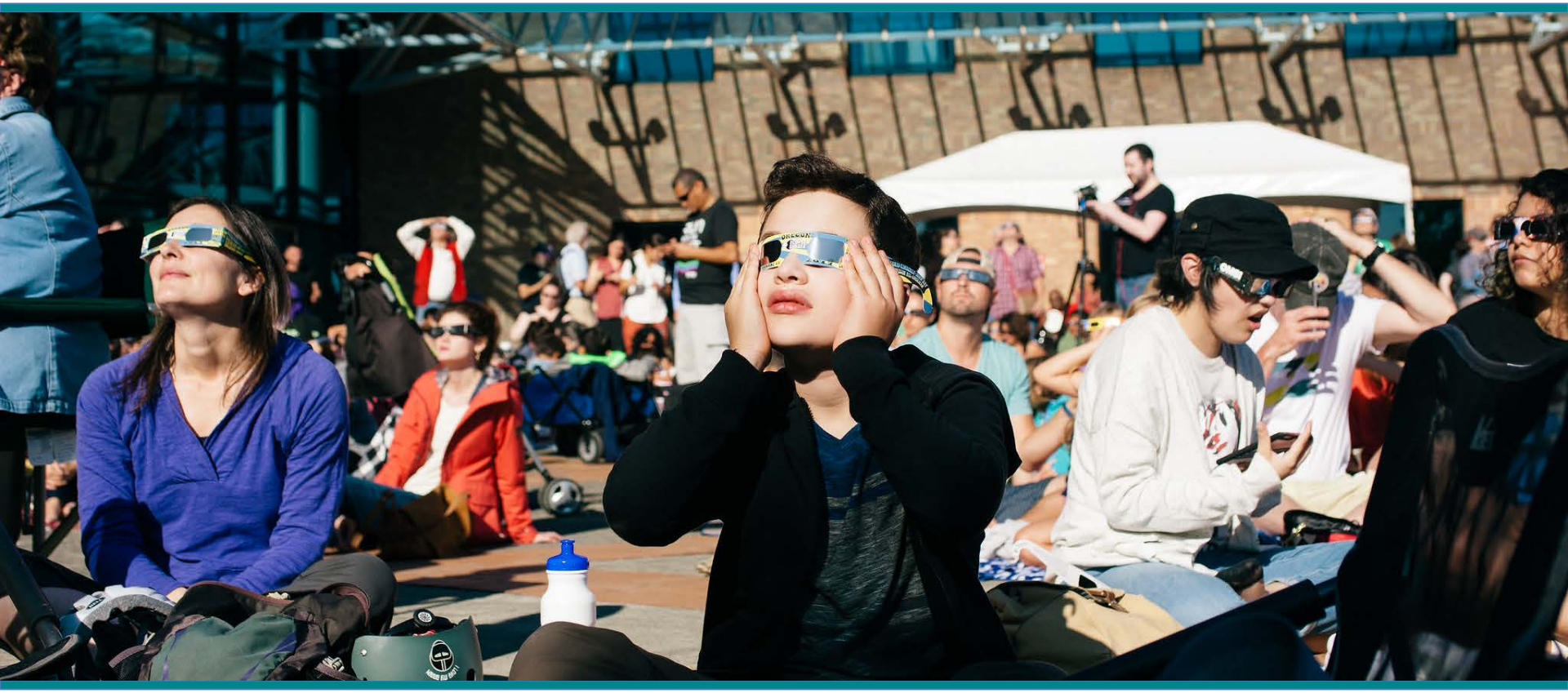
Museum Safety: Getting Started



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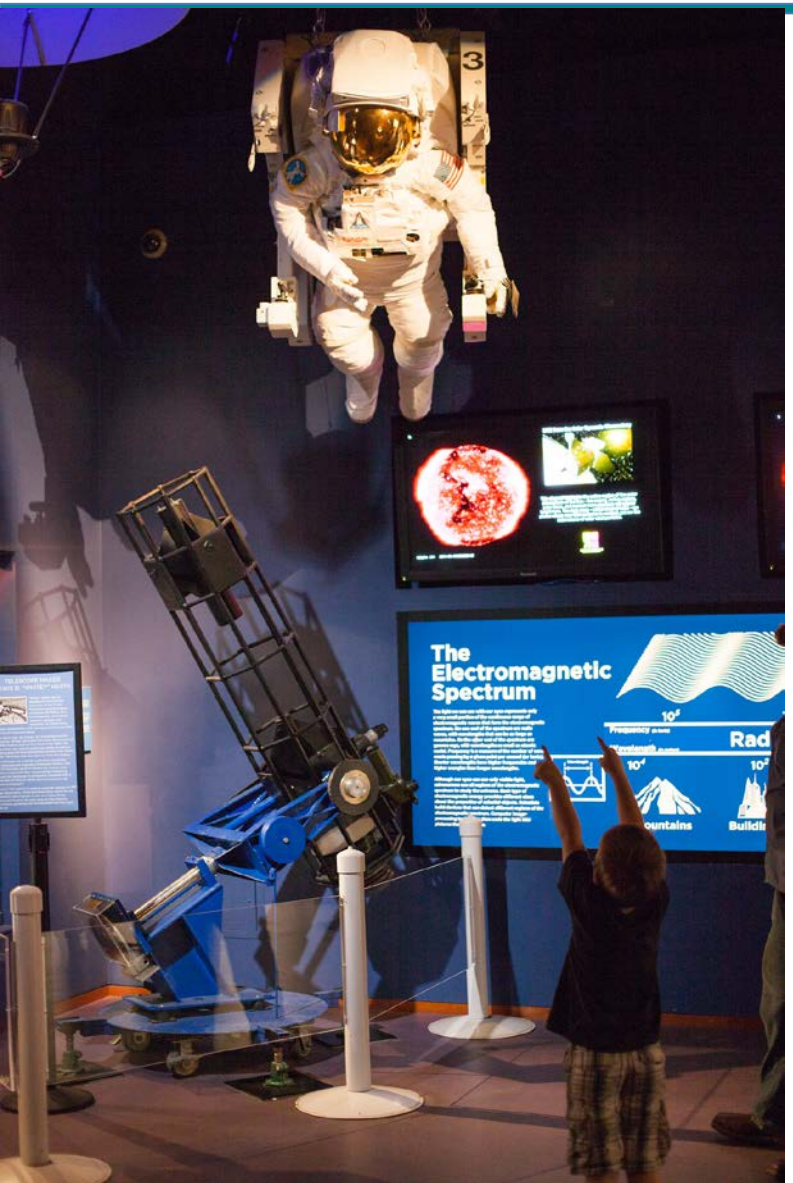
Darrell Porcello
Children's Creativity Museum

www.nisenet.org

Where to start?



- **Safety covers a lot of areas across museum operations including events. It is ok to feel overwhelmed at first!**
- **The most important thing is to not be afraid to talk about these topics regardless of how uncomfortable they make us feel.**
- **<u>Prioritize based on your museums' needs, look for models, connect with partners.</u>**
- **Today's discussion is the beginning of a larger conversation with some basic tips and advice to get us started.**

What's in your binder?

Lost child procedures and training

Natural disaster emergencies

Utility disruption protocols

Evacuations and places of shelter

Medical and emergency contact numbers

Emergency codes for staff communications

Active shooter preparedness

Unaccompanied adult policies

Business continuity planning

- **Good training materials, consider cheat sheets attached to badges and/or walkie-talkies**
- **Shorthand for many types of situations that you don't want visitors to be aware of (e.g. irate customers, custodial messes)**
- **Each emergency code should have specific procedures attached for training. Good place to start your safety assessment.**

Emergency codes for staff communications

Emergency Codes -
Children's Museum of New Hampshire*
100 Personal injury of accident
200 Severe Weather Lockdown
300 Lockdown
400 Child Security
500 Fire Evacuation Call 911
600 Internal Threat

CALL method for Fire:
Miami Children's Museum*
- **Call the Security Desk stating your name, location and type of fire**
- **Alert others in the vicinity**
- **Leave the immediate area**
- **Listen for further instructions**

Source: ACM member resources

Unaccompanied adult policies

- Many different examples out there to follow.
- Good reminders for staff and volunteer, especially during large events.
- Badging help, many museums have a badging and nametag system to help.

**Source: ACM member resources*

Children's Museum of Phoenix Unaccompanied Adult policy*

Adults without a child will be deemed a Lady Bug and must wear a RED wristband only after they have turned in their photo ID.

Kohl Children's Museum of Greater Chicago – Categories of Unaccompanied Adults*

- Adults on the Floor – Solo & Not Meeting A Paying Guest
- Adults Meeting Family or Other Paying Guests in Museum
- Adults in the Museum –Meeting a Staff Member or Attending Arranged Meetings
- Educators
- Volunteers
- Bus Drivers
- Board Members
- Birthday Party Guests – Unaccompanied Adults on Guest List
- Drop off Party Guests
- Delivery Personnel

Partners & asking for help

- **Always consider contacting local police and fire departments to kick off your safety review.**
  - **Looking at safety plans, helping with training, advise on emergency preparedness.**
  - **Active shooter training & drills.**

- **Homeland Security offers free training for government and private sector partners through the Protective Security Advisor (PSA) Program.**
  - **For more information about the PSA Program, e-mail PSCDOperations@hq.dhs.gov**

Support at your museum

- **Consider starting (or joining) a safety committee at your museum**
- **Have representation across the institution, including facilitators, floor staff, and administration.**
- **Set training requirements for staff and volunteers. Consider drills.**
- **Determine a lifecycle for safety and management plans; establish community partnerships to keep these fresh.**
- **Event planning and long term scheduling.**

Safety resources online

- ACM Portal (login required) – Safety & Risk Management sample documents and articles (emergencies, cleaning, accident reports, etc.)
- Interactivity 2018 sessions – Keeping Our Spaces Safe and Secure & Keeping Everybody Safe; presentation slides and materials
- AAM Resource Library (login required) – Facilities and Risk Management Resources standards and documents (disasters, safety, insurances, etc.)
- DHS, Ready.gov – Comprehensive website on preparedness planning for businesses including business continuity planning , IT recovery planning, training , hurricane and earthquake response toolkits, etc.
- DHS, Protective Security Advisors – Experts to help protect critical infrastructure through planning and support
- DHS, Active Shooter: How to Respond Educational Booklet – quick guide book with tips, employee materials
- FEMA Online Training related to Schools – Emergency planning and incident reports
- ICOM Guidelines for Disaster Preparedness in Museums
- Code Adam – Powerful search tool for lost and potentially abducted children from National Center for Missing & Exploited Children

What are you safety issues?

- **What safety issues is your museum dealing with?**
- **What safety topics out there are you most interested in learning more about?**
- **What keeps you up at night? (Museum safety issues only please!)**

Part 2 of this workshop?

Our Next Workshop

Girl Scouts and STEM: New Space Science Badges and Opportunities to Connect with the Earth and Space Toolkits

Tuesday, August 21, 2018
2pm-3pm Eastern /
11am-12pm Pacific

Explore Science: Let's Do Chemistry Kit & Celebrate National Chemistry Week (October 21-27, 2018)!

Tuesday, September 11, 2018
2pm-3pm Eastern /
11am-12pm Pacific

EXPLORE SCIENCE Earth & Space

Explore Science: Earth & Space 2019 toolkits applications are due November 1, 2018.

Applications Now Open!

http://www.nisenet.org/earthspacekit-apply

Thank You

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