



# RISK MITIGATION



**Sandia  
National  
Laboratories**

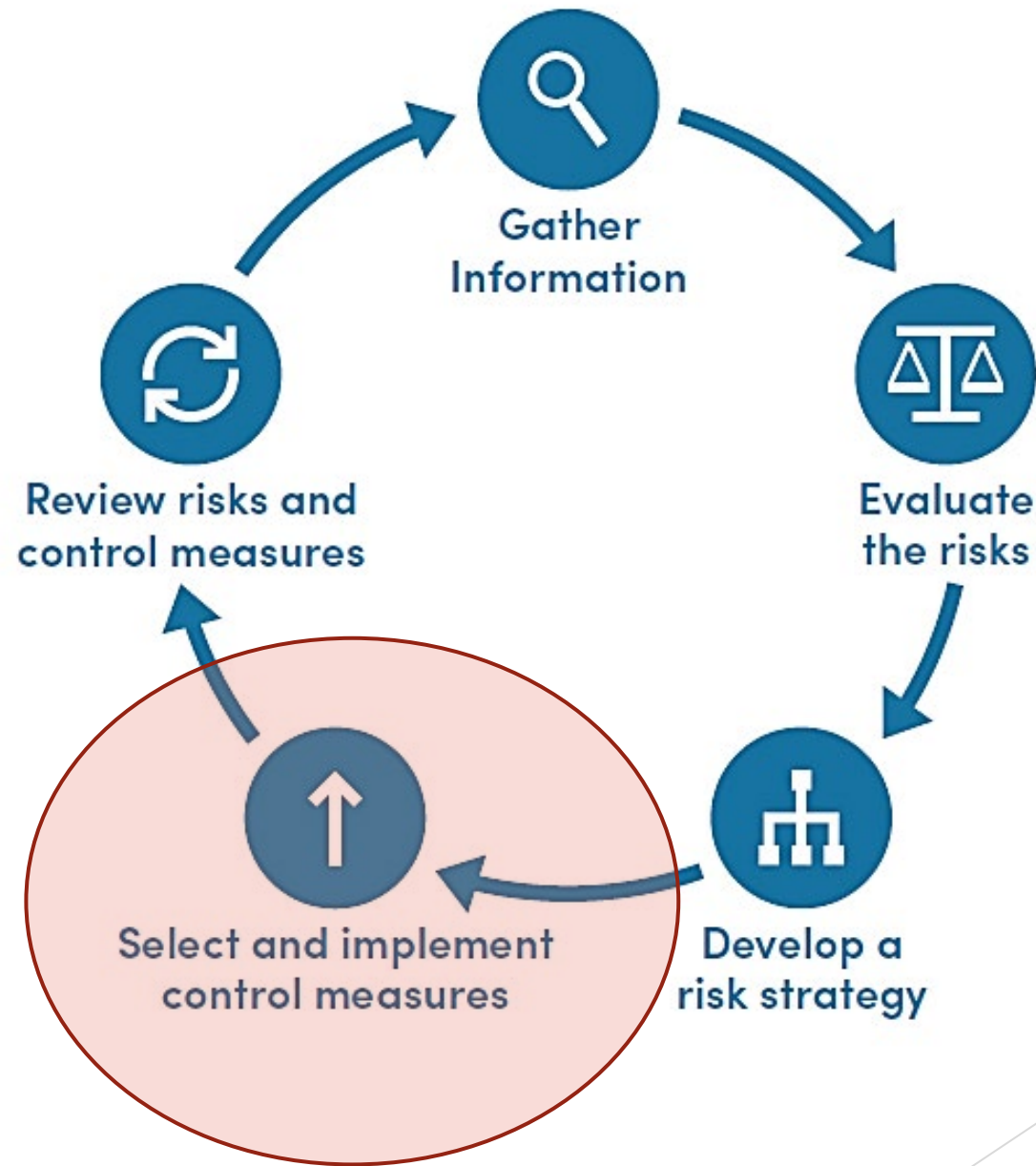
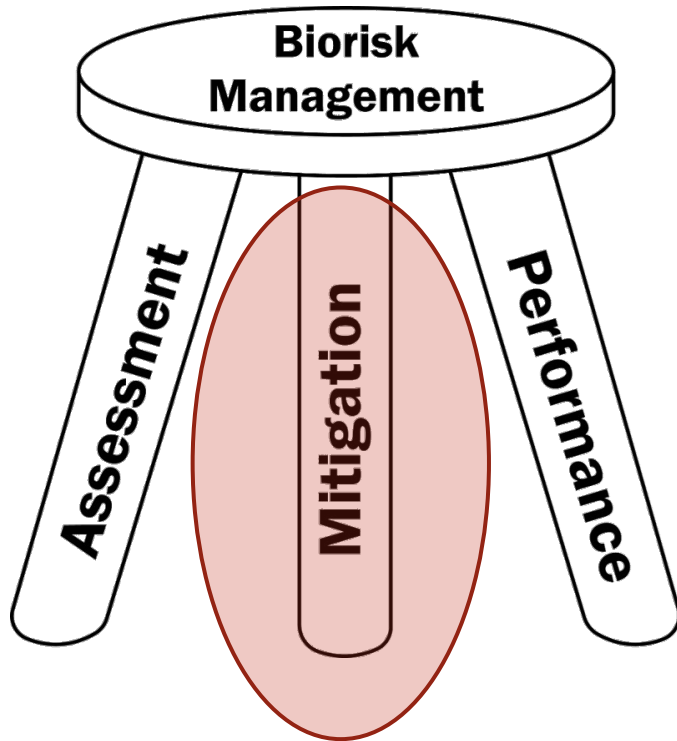


# Learning Outcomes

## Participants will be able to:

- ▶ describe the hierarchy of control
- ▶ apply the hierarchy of control
- ▶ perform the risk mitigation
- ▶ state the performance needs of risk mitigation

# Framework



# Exercise 1

## SCENARIO (Flash Flood)

The state assemblyman of your area asked the community to suggest as many ways as possible to reduce the risk of flash floods

### Task:

Each group is required to list as many mitigation options as possible without taking into consideration the cost or feasibility of the suggestions

**Rewards will be given to the team with the most options and most unique ideas**



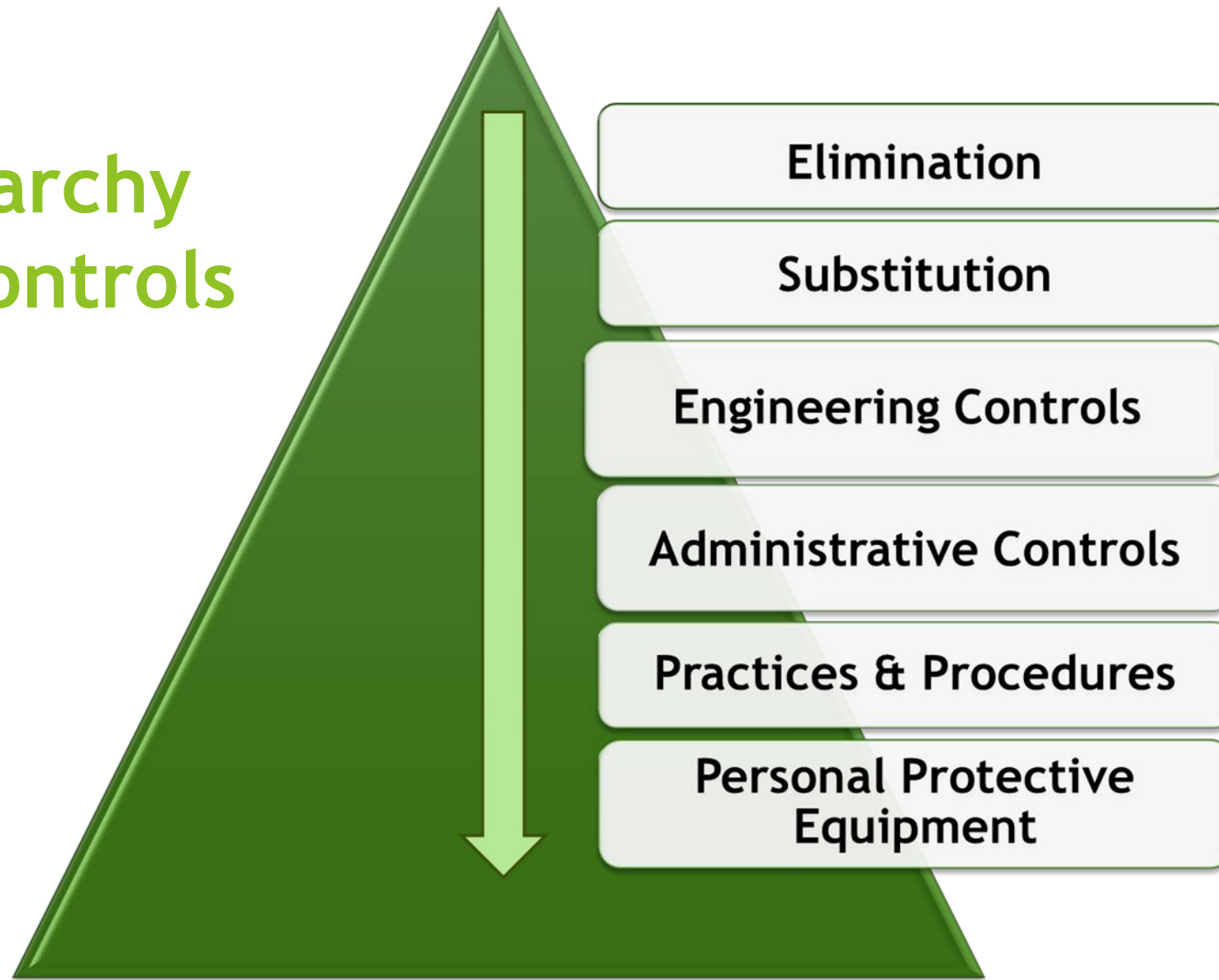
# Biorisk Mitigation

Actions and control measures that are put into place to reduce or eliminate the risks associated with biological agents and toxins

# PURPOSE OF RISK MITIGATION

- ▶ prevent laboratory-acquired infections (occupational health)
- ▶ prevent secondary infections in the general population due to:
  - ❖ transmission from infected laboratory workers to other individuals
  - ❖ direct transmission from agents released (escaping) from the laboratory
- ▶ prevent environmental contamination caused by:
  - ❖ secondary transmission to animals and the environment

# Hierarchy of Controls

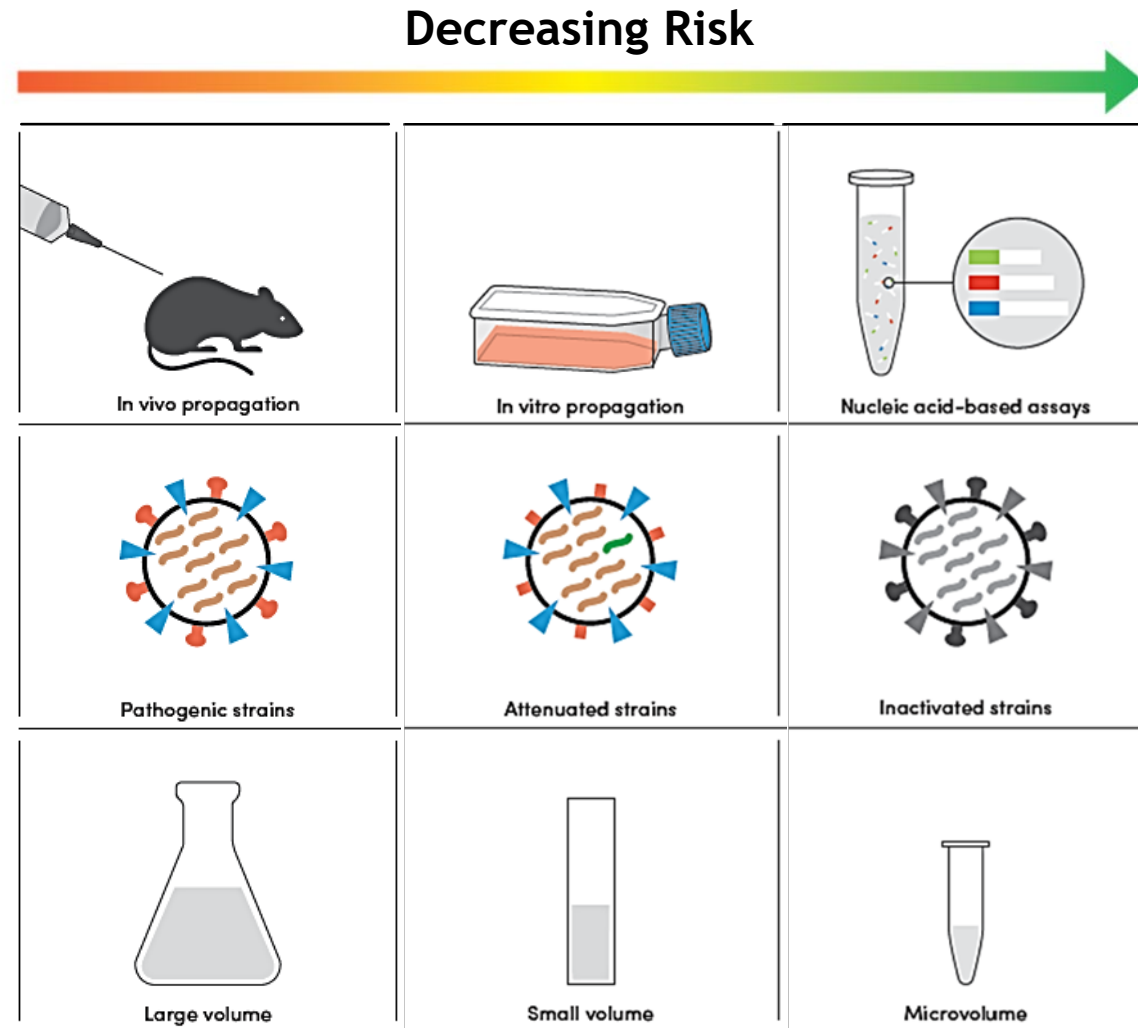




# RISK MITIGATION STRATEGIES

- ▶ **Elimination:** Removing hazards, not performing the intended work
- ▶ **Substitution (Replace):**
  - ❖ Using different material
  - ❖ Substitute or replace the hazards with less hazardous materials to mitigate the risk
- ▶ **Mitigation (Reduce):**
  - ❖ Use control measures
  - ❖ Use or add different measures to the process to mitigate the risk

# RISK RANK ACCORDING TO METHOD AND TYPE AND QUANTITY OF MATERIAL

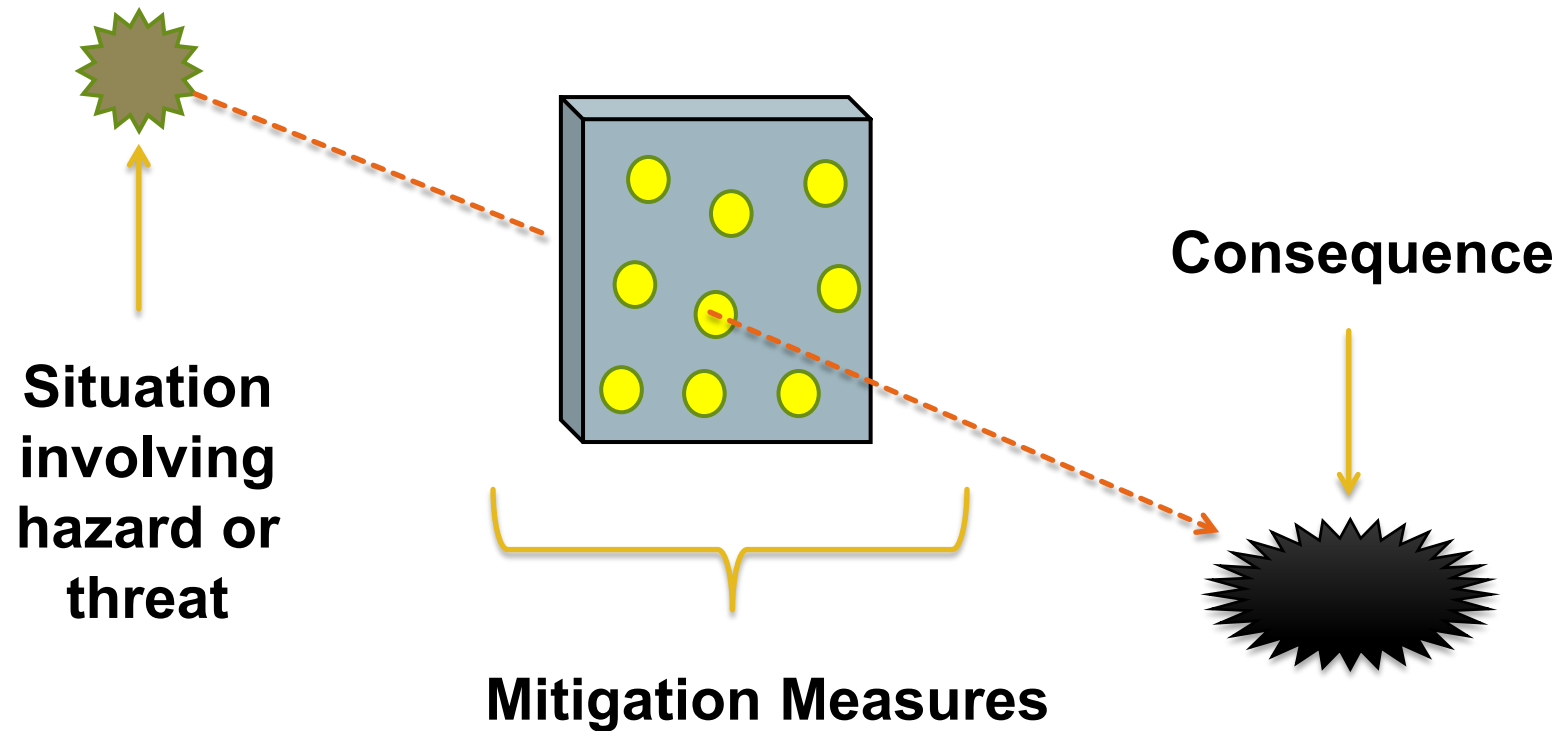


# STRATEGIES FOR RISK REDUCTION

| STRATEGY                                                      | EXAMPLE                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elimination                                                   | <p>Eliminate the hazard:</p> <ul style="list-style-type: none"> <li>▪ use an inactivated biological agent,</li> <li>▪ use a harmless surrogate</li> </ul>                                                                                                                                                                                          |
| Reduction and substitution                                    | <p>Reduce the level of risk:</p> <ul style="list-style-type: none"> <li>▪ substitute with an attenuated or less infectious biological agent,</li> <li>▪ reduce the volume/titre being used,</li> <li>▪ change the procedure for one that is less hazardous, e.g. polymerase chain reaction rather than culture.</li> </ul>                         |
| Isolation<br>Engineering Control                              | <p>Isolate the hazard:</p> <ul style="list-style-type: none"> <li>▪ elimination and reduction might not be possible, particularly in a clinical setting, therefore isolate the biological agent(s) (e.g. in a primary containment device).</li> </ul>                                                                                              |
| Protection<br>Personal Protective Equipment                   | <p>Protect personnel/the environment:</p> <ul style="list-style-type: none"> <li>▪ use engineering controls (e.g. directional airflow),</li> <li>▪ use PPE,</li> <li>▪ vaccinate personnel.</li> </ul>                                                                                                                                             |
| Compliance<br>Procedure & Practices<br>Administrative Control | <p>Have administrative controls and effective biosafety programme management in place such as:</p> <ul style="list-style-type: none"> <li>▪ GMPP observed by personnel,</li> <li>▪ good communication of hazards, risks and controls,</li> <li>▪ appropriate training,</li> <li>▪ clear SOPs,</li> <li>▪ an established safety culture.</li> </ul> |

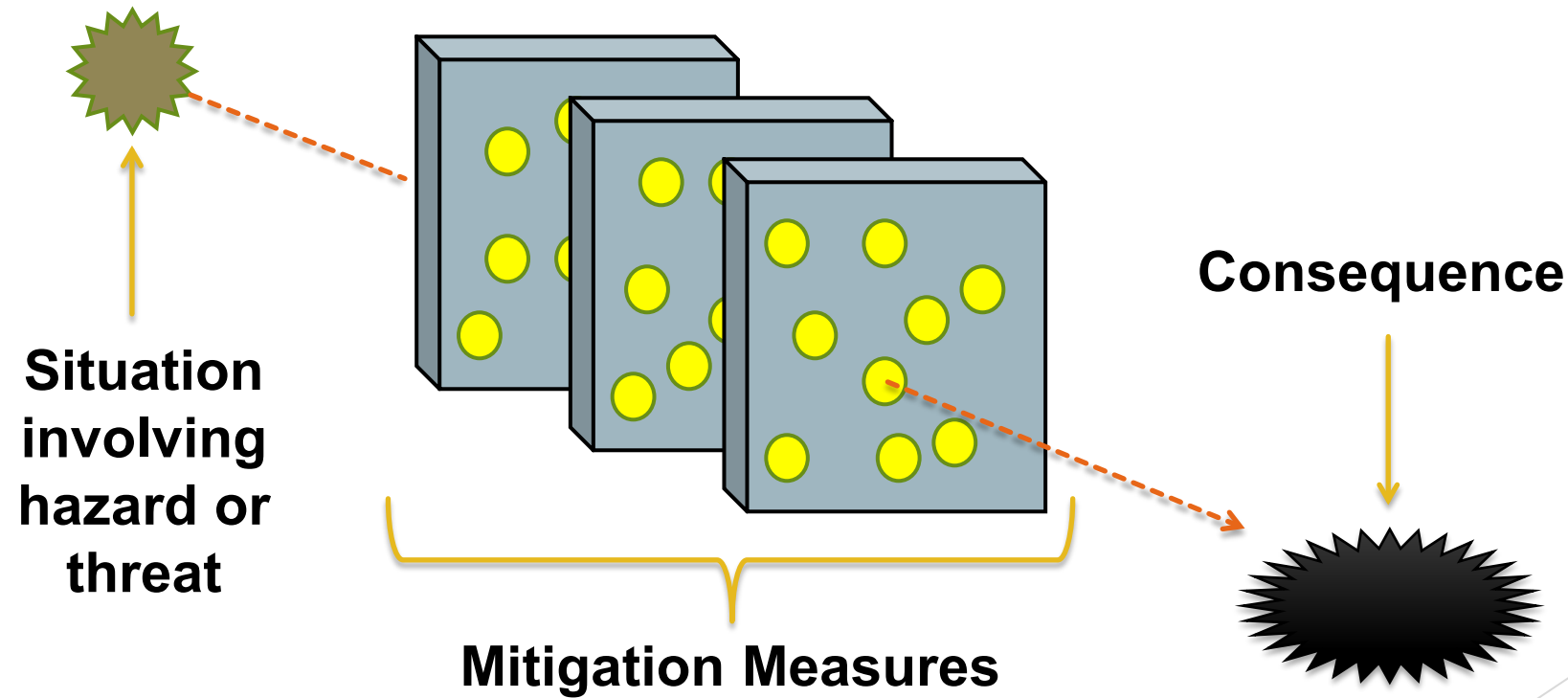
# No ONE Mitigation is Perfect

Implementing one mitigation measure alone has “holes” or weaknesses that may produce undesired consequences



# Multiple Mitigation Model

Implementing multiple layers of mitigation measures can greatly reduce but **not eliminate** the risk



<https://www.youtube.com/watch?v=3PhmnUtw3o8>

# IMPLEMENTING RISK CONTROL MEASURES

- ▶ laboratory personnel are responsible for following the appropriate practices and procedures and for providing feedback on their effectiveness
- ▶ function and use must be communicated to all relevant personnel if they are to be implemented correctly and effectively
- ▶ proper review of cost, availability of funding, installation, maintenance, and security and safety criteria should be undertaken
- ▶ ensure that the control measure(s) can be effectively used
- ▶ can be sustained by available laboratory resources

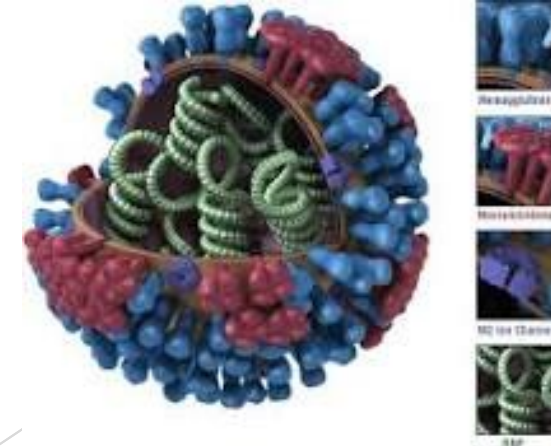
# Exercise 2: Small Group Discussion

## STRATEGIES FOR MITIGATING BIOLOGICAL RISK

### SCENARIO:

**Your laboratory is assigned to transport 5 vials of influenza culture stock to the National Institute of Health (NIH), Malaysia**

- ▶ What measures can you put in place or recommend to conduct the test?
- ▶ Each group will be assigned a mitigation control category
- ▶ In your group, you are required to list as many mitigation measures as possible that could be implemented under that category for the scenario above



# PASSING THOUGHT!

The actual steps of risk assessments, and the order by which they are carried out, are not as important as the careful consideration of all relevant information before making decisions on the selection and implementation of risk control measures. This is to ensure that the selected measures are relevant, effective, and sustainable



# Reference

WHO Laboratory biosafety manual - fourth edition- 2020

WHO Risk Assessment monograph -2020

Adapted from PERFORMING BIOLOGICAL RISK ASSESMENT - Principle and Methodology Workshop - Asia-Pacific Biosafety 11<sup>th</sup> Conference, Pre-conference Workshop, Se Thoe SY&Chook ML, Singapore

UM Biological Risk Assessment - IBBC Annex 1

# Thank you

