Transportation / Biorisk Workshop

JORDAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

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www.biosecurity.sandia.gov

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Biorisk Workshop Overview

- **Day 1: Introduction to Risk Assessment**
- **Day 1: Introduction to Hierarchy of Controls**
  - Engineering Controls
- **Day 2: Hierarchy of Controls**
  - Procedural Controls
  - Administrative Controls
  - Personnel Protective Equipment
- **Day 2: Introduction to Infectious Disease Transport**
- **Day 3: International Infectious Disease Transport**

Course Structure

- **This course will be made up of discussion and activities**
- **You will be working in groups**
- **Ask questions and participate!**

Biorisk Assessment

Why Risk Assessment?

- **Laboratory Biosafety**

  A set of preventive measures designed to reduce the risk of accidental exposure to or release of a biological agent

- **Laboratory Biosecurity**

  A set of preventive measures designed to reduce the risk of intentional removal (theft) and misuse of a biological agent – intent to cause harm

- **Identification of preventive measures is determined by the RISK ASSESSMENT**

- **What about the following agents makes the risk of working with them in a laboratory different?**
  - Work in your group to identify some of the factors that define these differences.
    - **Rhinovirus**
    - **HIV**
    - **MDR-TB**
    - ***B. Anthracis***
    - **Ebola**
  - Can you group or characterize the factors you defined?
  - Based on these characterizations, how would you define risk?

Risk

Is a function of Likelihood and Consequence

Risk Assessment Principles

- **Define the problem**
  - What is the question you are trying to answer with your risk assessment?
- **The risk assessment method should be as simple as possible**
  - Elaborate when needed
- **Those conducting risk assessments should be explicit about uncertainties**
- **Risk assessment methods can incorporate one or more approaches**

Laboratory Biorisk Assessment

Example:

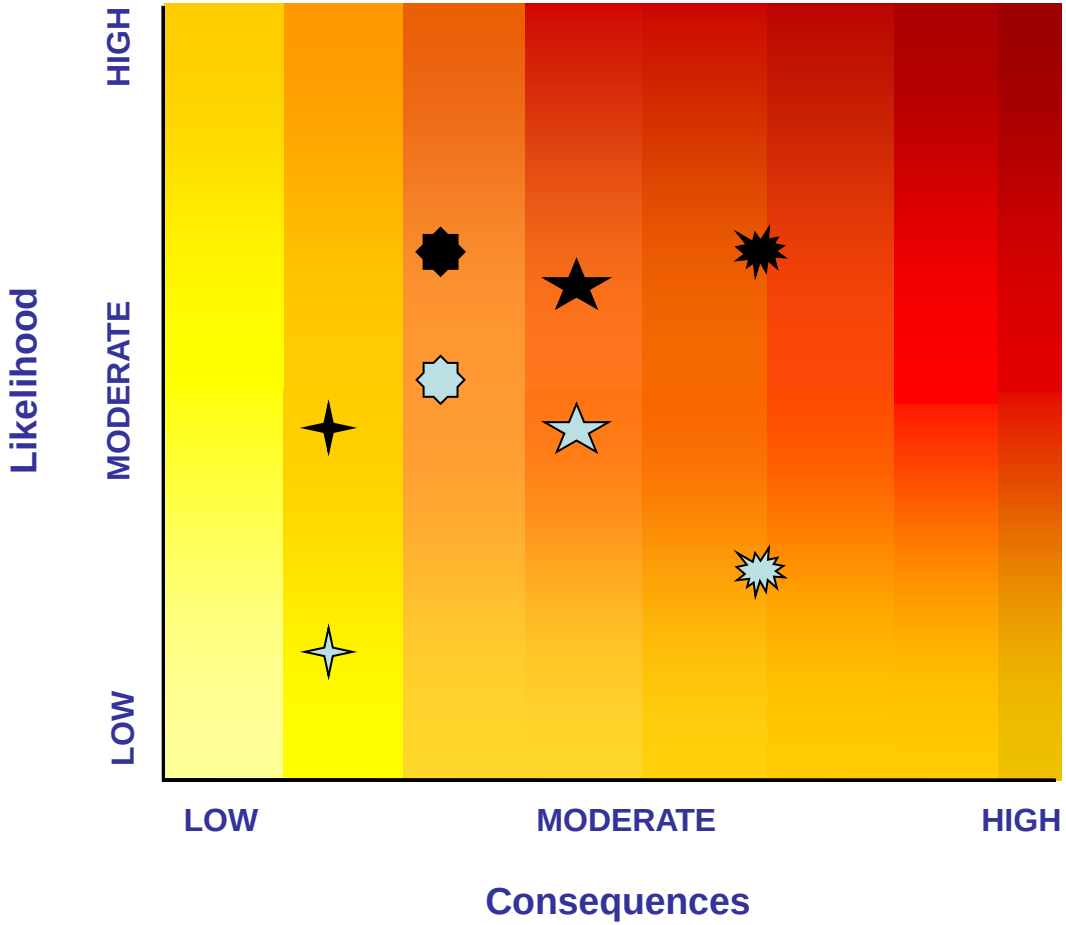
A researcher is working to create a new animal model for HIV studies.

Using mice, he plans on injecting HIV.

A technician will hold the animals for the researcher during inoculation.

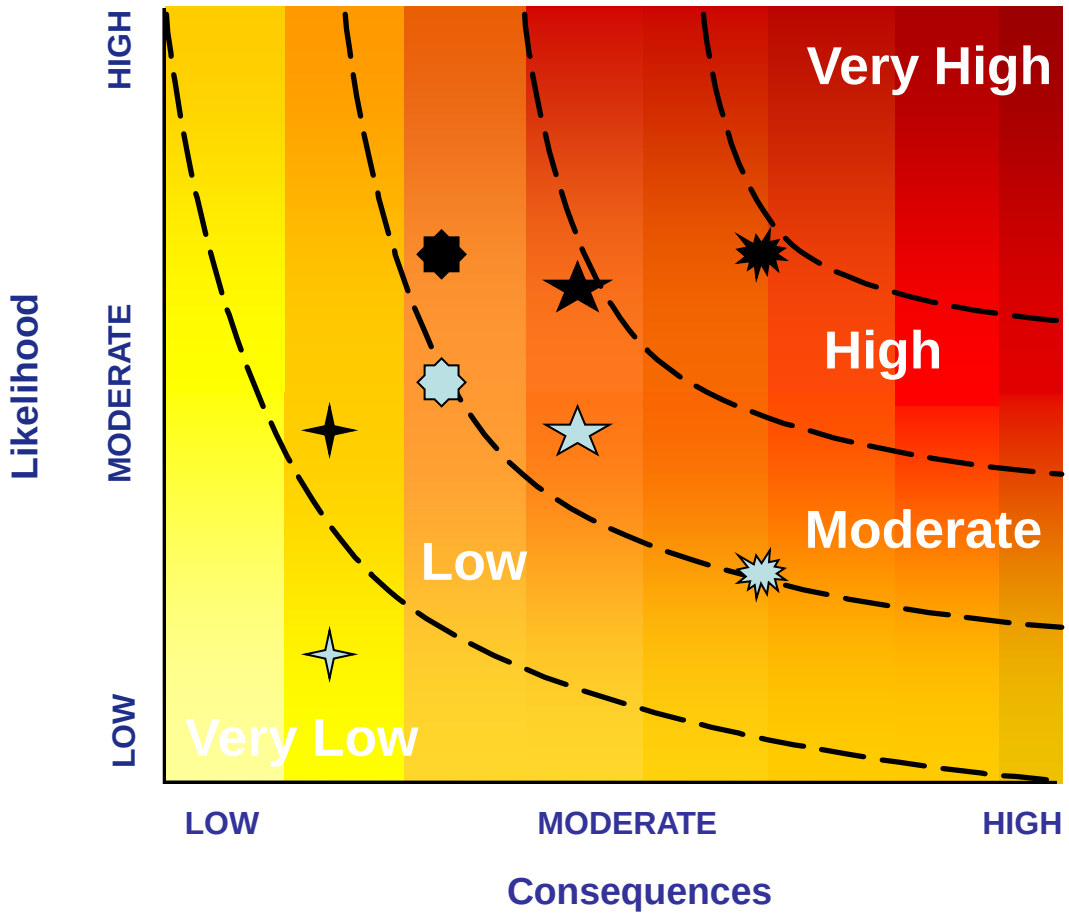
- **Work in your group to determine:**
  - What is/are the risk(s) you need to assess?
    - **Write down the risk(s) you are going to assess**
  - What are the key factors needed to conduct a risk assessment?
  - For each factor, define what would be considered okay and what would be considered bad

Risk Characterization



Risk Evaluation

What is acceptable, tolerable, and intolerable?



Laboratory Biosafety Risk Assessment Methodology (Biosafety RAM)

Risk = f (Likelihood, Consequence)

- **Likelihood**

  The likelihood of infection by the agent and the likelihood of exposure through an infectious route based on the procedures and work practices

- **Consequences**

  Of disease from accidental exposure

- **Risks**

  To laboratory workers
  - **Researchers**
  - **Animal care workers**
  - **Technicians**
  - **Engineers**

  Risk of accidental exposure to community

  Risk of accidental exposure to animal community

  Risks of secondary exposure to human and animal community

LDRD
LABORATORY DIRECTED RESEARCH & DEVELOPMENT

- **In your group, conduct a biosafety risk assessment based upon the example(s) provided.**
  - What are the routes of infection? What are the possible routes of exposure?
  - What are the consequences of disease and to whom?
  - Is this risk high, moderate, or low? Why?

- **What are some of the benefits to a structured process for conducting a biorisk assessment?**

Biorisk Mitigation

Group Exercise

Thinking about the questions from the risk assessment, take 5 minutes in your groups to discuss and identify eight different biorisk mitigation measures.

- **Four for safety**
- **Four for security**

Use post-it notes for each mitigation measure you identify.

Report on your answers to the class.

Working Definitions for Mitigation Control Measures

Engineering Controls	• *Physical changes to work stations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduce or prevent exposure to hazards*
Administrative Controls	• *Policies, standards and guidelines used to control risks*
Practices and Procedures	• *Processes and activities that have been shown in practice to be effective in reducing risks*
Personal Protective Equipment	• *Devices worn by the worker to protect against hazards in the laboratory*

Group Exercise

Engineering Controls

Administrative Controls

Practices and Procedures

Personal Protective Equipment

Place your post-it notes in the appropriate rows

Use the working definitions

Group Exercise

Engineering Controls

Administrative Controls

Practices and Procedures

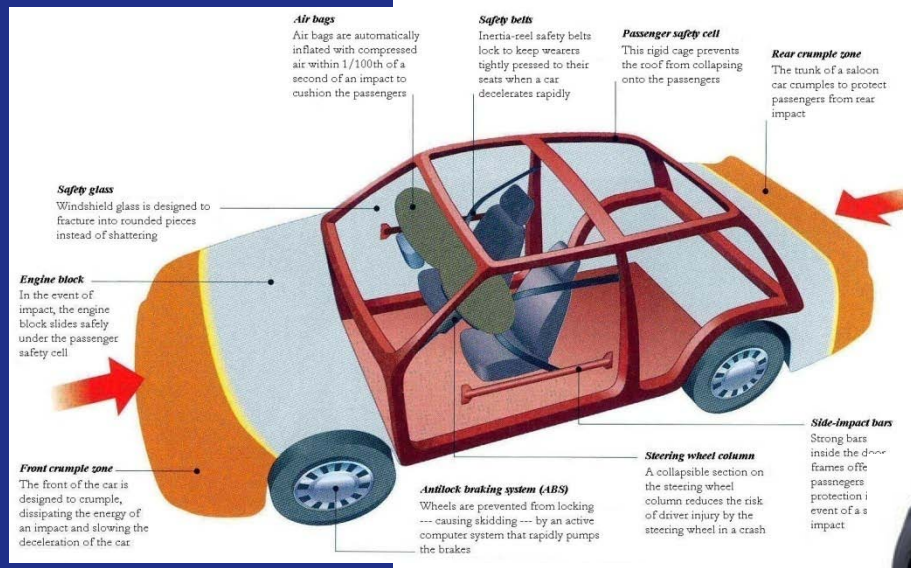
Personal Protective Equipment

Considering these mitigation control measures take 5 minutes:

- **In your group discuss the advantages and disadvantages of each measure,**
- **Record your findings on post-it notes**
- **Populate the flipchart with your notes**

	Advantages	Disadvantages
Engineering Controls		
Administrative Controls		
Practices and Procedures		
Personal Protective Equipment		

Car Safety vs Motorcycle Safety



- Car safety is all about engineering systems
- Motorcycle safety is all about PPE

Hierarchy of Controls (HOC)

- ***Elimination or Substitution***
- **Engineering Controls**
- **Administrative Control**
- **Practices and Procedures**
- **Personal Protective Equipment**

Control methods at the top of the list are in general more effective and protective than those at the bottom.

	Advantages	Disadvantages
Engineering Controls	Efficient, eliminates hazard	Cost, complexity
Administrative Controls	Authority approach	Indirect approach, primarily addresses the human factor
Practices and Procedures	SOP based (standardized approach)	Training and supervision requirements
Personal Protective Equipment	Ease of use, relative cost	Does not eliminate hazard, PPE fails exposure happens, uncomfortable, limits ability

Engineering Controls

- *Physical changes to work stations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduce or prevent exposure to hazards*

Administrative Controls

Practices and Procedures

Personal Protective Equipment

Some Examples of Engineering Controls

- **Primary Containment**
  - BSC
  - Sealable Containers including rotor cups
  - Cages
- **Secondary Containment**
  - Facility layout and construction
  - Airflow
  - Doors (with locks and access controls)
  - Sealable rooms
- **Waste**
  - Autoclave/Incinerator
  - Sharps Container

Activity

- What are the key considerations for each of these control measures?
- Who or what is being protected by each engineering control measure?
- When would you use each of these controls?

- Based upon your case study, determine what types of engineering controls would you like to have in place? And why?

Engineering Controls

Administrative Controls

- *Policies, standards and guidelines used to control risks*

Practices and Procedures

- *Processes and activities that have been shown in practice to be effective in reducing risks*

Personal Protective Equipment

Some Examples of Administrative/Procedural Controls

- **Personnel Management**
  - Training
  - Integrity verification
  - Medical clearance
- **Good Lab Practices**
  - No eating or drinking /No mouth pipetting
  - Hand washing
  - Spill cleaning / standard cleaning
  - Sharps handling
  - Aerosol prevention
  - Inventory
  - Documentation
  - Waste handling
  - Entry and Exit procedures

Activity

- **What are the key considerations for each of these measures?**
- **Who or what is being protected by each measure?**
- **When would you these measures?**

- **Based upon your case study, what types of measures would you like to have in place? And Why?**

Engineering Controls

Administrative Controls

Practices and Procedures

Personal Protective Equipment

- *Devices worn by the worker to protect against hazards in the laboratory*

Examples of Personal Protective Equipment (PPE)

- Respiratory Protection and Fit
- Gloves
- Body cover
- Feet cover
- Eyewear
- Face cover

Does Order Matter?

- **What are some key considerations in putting on (or donning) your PPE?**
- **What are some key considerations in removing (or doffing) your PPE?**
- **What are some key considerations for reusing PPE?**

Activity

- **In your group, determine how a person is being protected by each type of PPE?**
- **When would you use this PPE?**

- **Based upon your case study, what types of PPE would you like to have in place?**
  - What are the advantages and disadvantages to each?
  - How would you don and doff the PPE you have selected? Where would you ideally store it?

Biorisk Management

Where is the failure in this system?

Roles and Responsibilities

- **In your group, identify the responsibilities for your assigned role**
  - Senior Management
  - Biorisk Management Committee (Institution Biosafety Committee)
  - Biorisk Management Advisor (Biosafety or Biosecurity Officer)
  - Scientific Management (Principle Investigator)

System Effectiveness

- **In your group identify what verification or performance indicators might be used to measure the effectiveness of a facility's risk management system?**

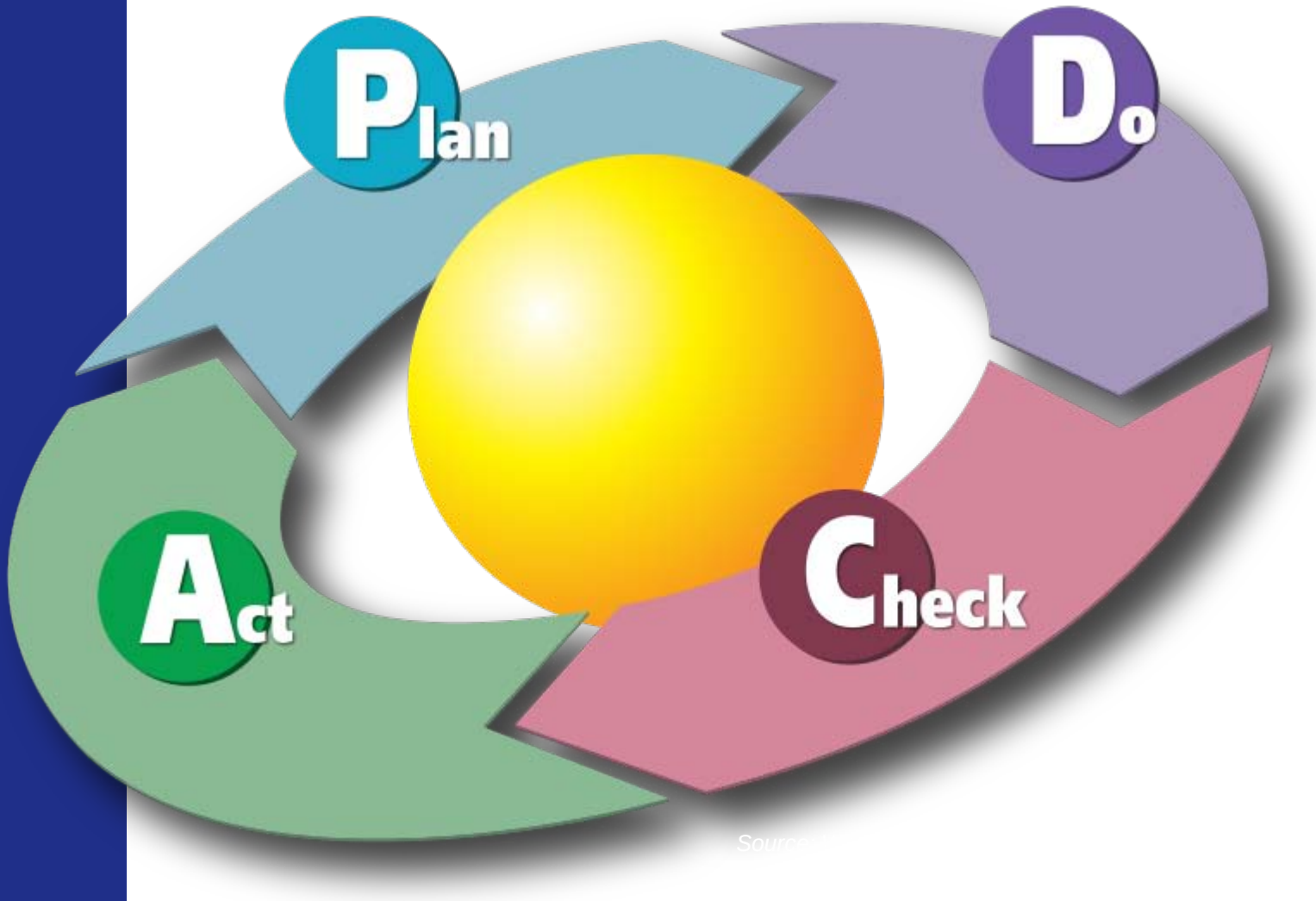
  Management performance indicators?

  Operational performance indicators?

  Biorisk status indicators?

- **Can the same metrics be used for biosafety and biosecurity?**

Systematic Approach



Laboratory Biorisk Management Standard

- CWA 15793:2008
  - Management system
  - Consistent with other international standards such as ISO 9001/14001 and OSHAS 18001
  - Performance based
  - Voluntary
  - PDCA based

CWA 15793:2008

CEN
WORKSHOP
AGREEMENT

CWA 15793

February 2008

English version

Laboratory biorisk management standard

Examples of topics covered:

- Biorisk Management Policy
- Hazard identification, risk assessment and risk control
- Roles, responsibilities and authorities
- Training, awareness and competence
- Operational control
- Emergency response and contingency plans
- Inventory monitoring and control
- Accident and incident investigation
- Inspection and audit
- Biorisk management review

Availability

http://www.cen.eu/CENORM/Sectors/technicalcommitteesworkshops/workshops/ws31.asp

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Summary

- **Assessing the risk and determining likelihood and consequence will allow for strategic decisions on control measures**
- **Ideally we will consider first elimination or substitution**
- **A combination of control measures should be used based on their effectiveness and our ability of implementation**