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# *Biosafety Risk Assessment Methodology and Model (Biosafety RAM)*

 Sandia National Laboratories



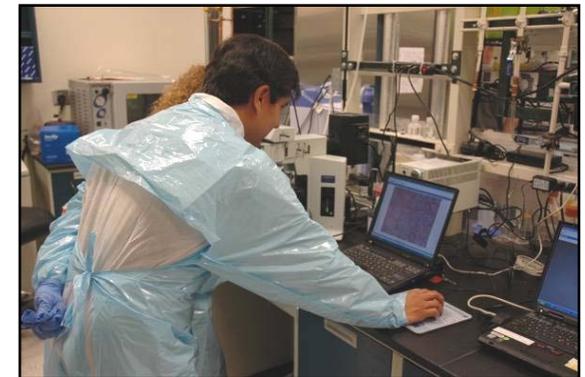
Enhancing US and International Security by Reducing Biological Threats Globally



LABORATORY DIRECTED RESEARCH & DEVELOPMENT

# Risk Assessment Process

- A standardized biological risk assessment process allows the risk assessments to be:
  - Repeatable
  - Quantifiable
- A systematic, standardized approach should include:
  - Accepted criteria for assessing the risk
  - A “scoring system” for evaluating the situation against the criteria
  - A process that ranks the criteria
  - A process that allows analysis of the risk to identify driving factors and allow better realization of mitigation measures
  - Enable better communication of risk
    - Help to define what is acceptable risk

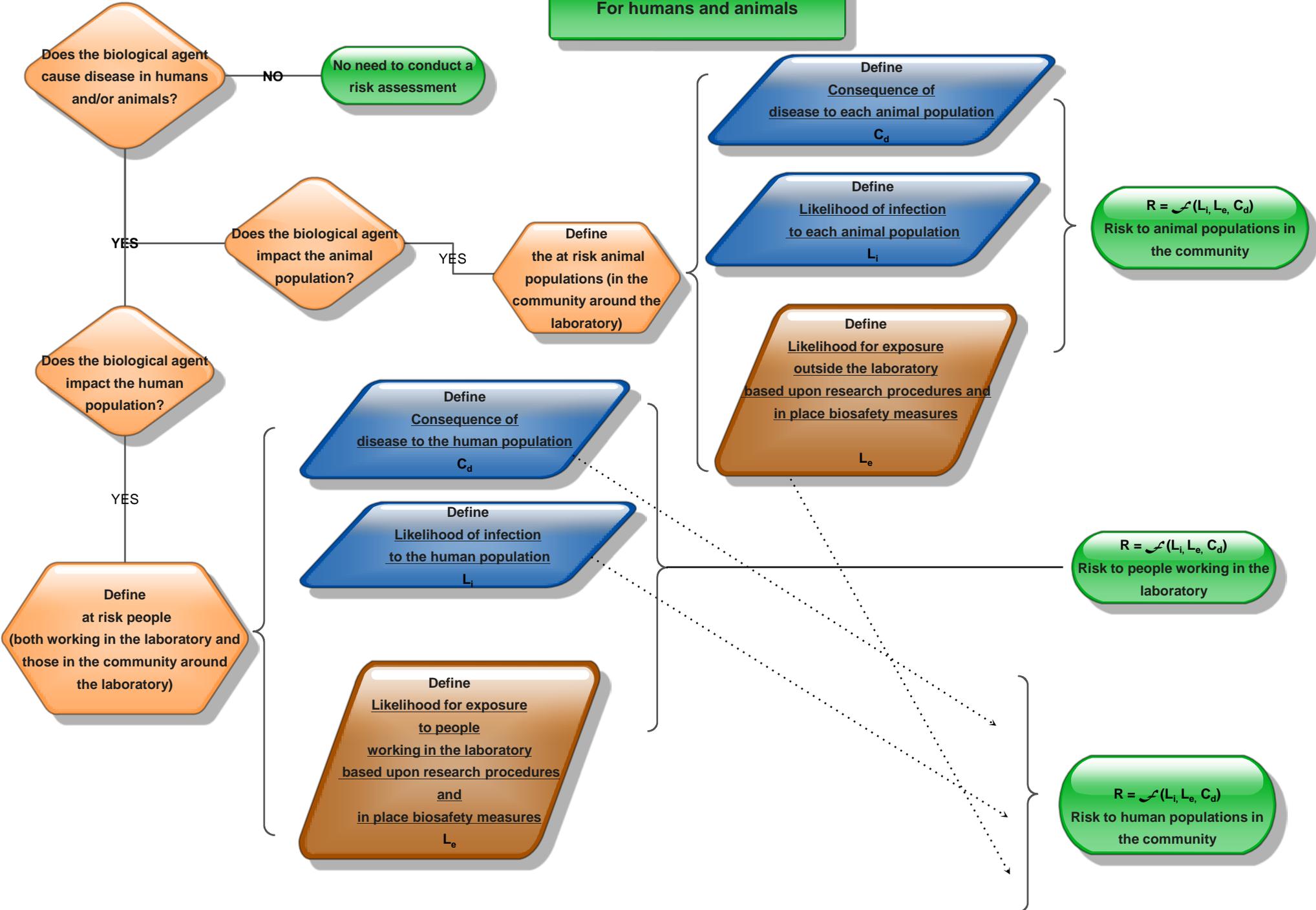


# Laboratory Biorisks

$$\text{Risk} = f(\text{Likelihood, Consequence})$$

- 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

# Biosafety Risk Assessment Model For humans and animals



# E.g. Risk to Laboratory Worker

- Likelihood of infection
  - Routes of infection of the agent (and infectious dose via that route)
    - Inhalation
    - Ingestion
    - Contact
    - Percutaneous
    - Vector-Borne
  - Stability of the agent
  - Infection mitigation measures (existence of prophylaxis)

# E.g. Risk to Laboratory Worker

- Likelihood of exposure (based on the routes of infection)
  - Potential of inhalation exposure
    - Procedures
    - Mitigation measures
  - Potential of ingestion exposure
    - Procedures
    - Mitigation measures
  - Potential of percutaneous exposure
    - Procedures
    - Mitigation measures
  - Potential of contact exposure
    - Procedures
    - Mitigation measures

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# E.g. Risk to Laboratory Worker

- Consequence of disease
  - Agent properties
  - Morbidity
  - Mortality
  - Consequence mitigation measures

### Example Laboratory Worker Biosafety Risk

