
Risk Assessment in the 21st Century (RISK21)



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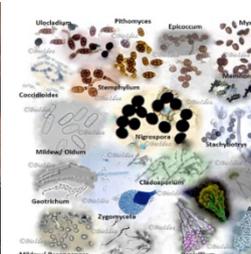
ILSI Health and
Environmental Sciences
Institute

The world of chemicals

- Drugs
- Cosmetics
- Agrochemicals
- Household products
- Food ingredients
- ...



- Industrial emissions
- Effluent
- Natural toxins
- ...



The changing landscape of risk assessment



- Rapid advances in scientific knowledge, e.g.
 - Genomics and epigenetics
- Profound technological advances
 - High-throughput technologies, computational toxicology, systems biology, bioinformatics, high content analysis
 - The era of 'big data'
- The need to assess risk from combined exposures
- Emerging issues, e.g.
 - Biofuels
 - Nanotechnology
 - Climate change
 - Biotechnology
- Increasing complexity of risk communication
- Societal and other demands for the move to non-animal assessment methods

- **MISSION:** Bring applicable, accurate, and resource appropriate approaches to the evolving world of human health risk assessment
 - Convene experts from academia, industry, government and other stakeholders.
 - RISK21 involves > 120 scientists from Europe and USA
 - Develop risk assessment approaches that embrace advances in scientific knowledge and methods.
 - Revise current thinking about how to approach the science and art of risk assessment.

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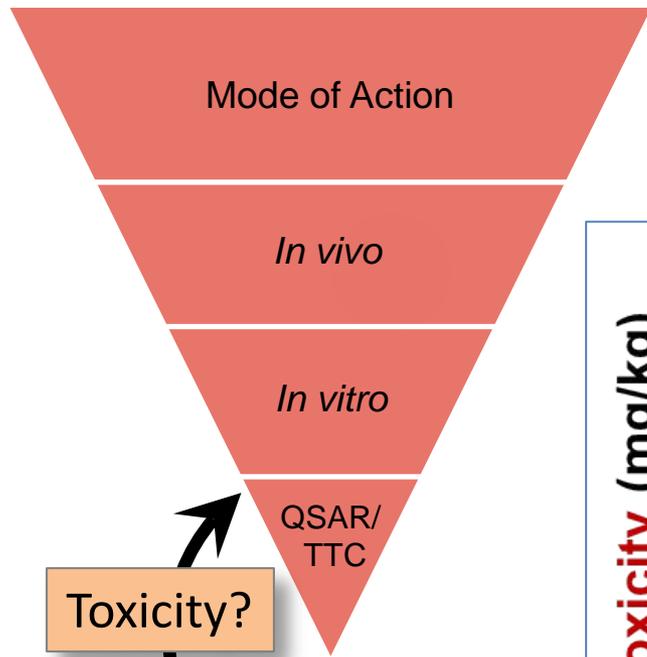
- Started in 2009; coordinated by HESI
- Has involved >120 participants from:
 - 12 countries
 - 15 government institutions
 - 20 universities
 - 2 NGOs
 - 12 corporations
- Several parallel, integrated project areas
 - Integrated evaluation strategies
 - Dose-response
 - In vitro to in vivo extrapolation
 - Exposure Science
 - Cumulative Risk
- Two cross-cutting case examples



How is RISK21 Different?

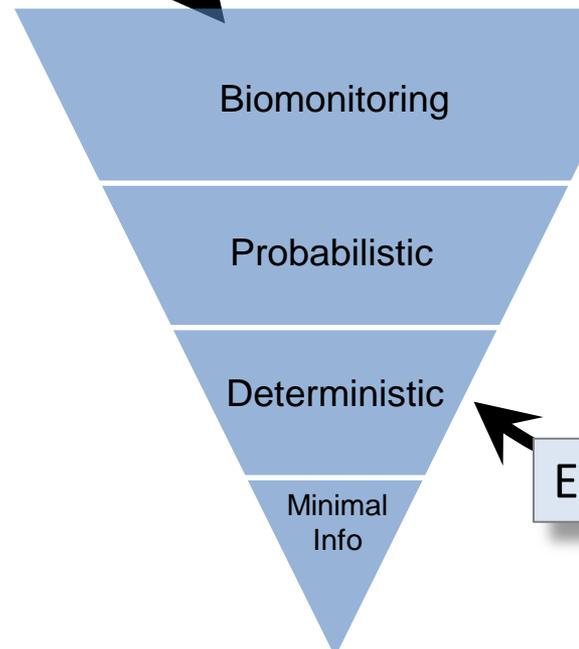
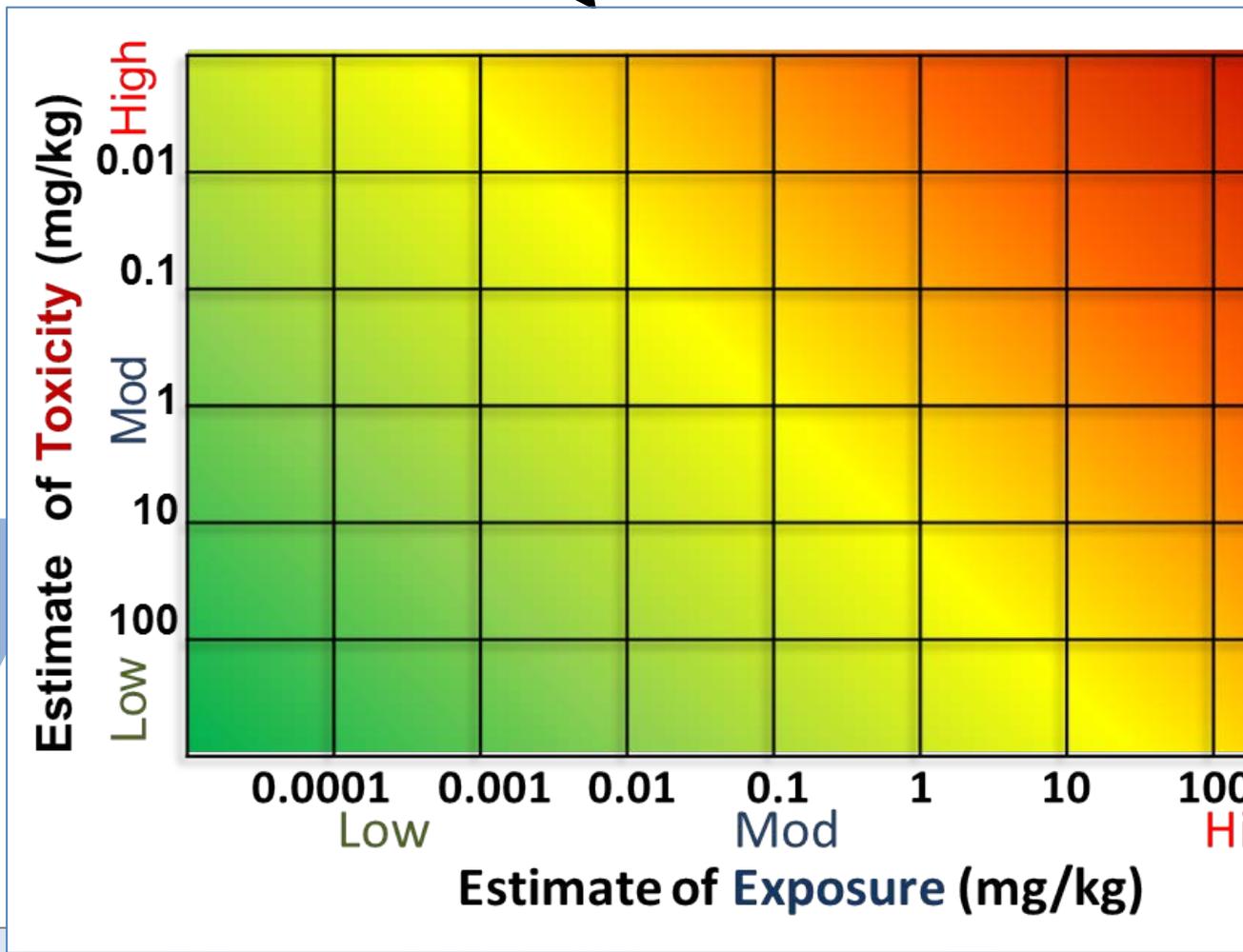


- Think about the problem that needs to be addressed; then select sources of information which will have the most value
- RISK21 Principles:
 - Problem-formulation based
 - Exposure-driven
 - Prior knowledge
 - “Enough precision to make the decision”
- Provide a framework that is...
 - Flexible
 - Transparent
 - Visual



Risk? Safety?

Toxicity?



Exposure?

Formulation

Conclude

Problem Formulation: The Starting Point

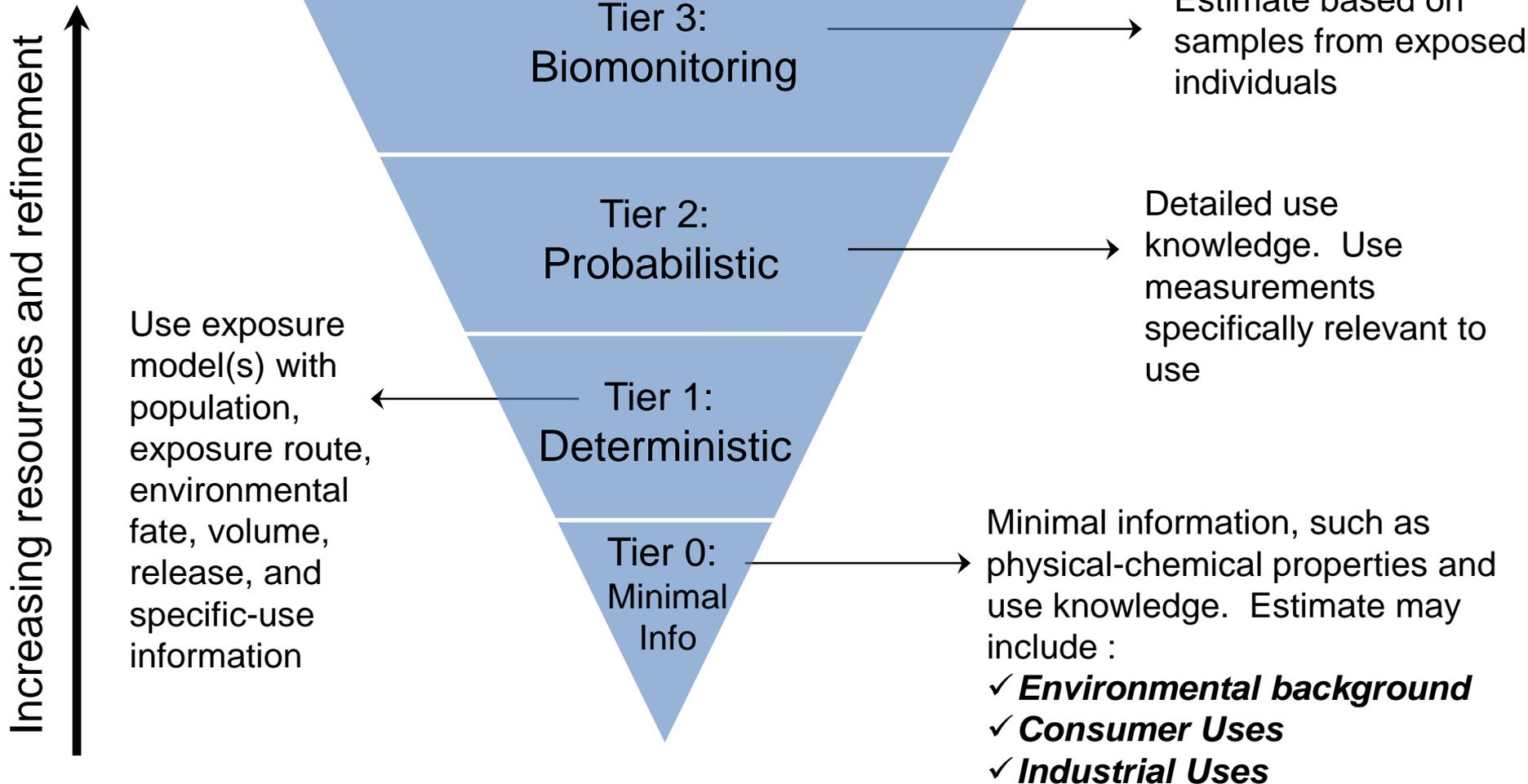


- **Sets out:**
 - Objectives
 - Scope
 - Hypotheses

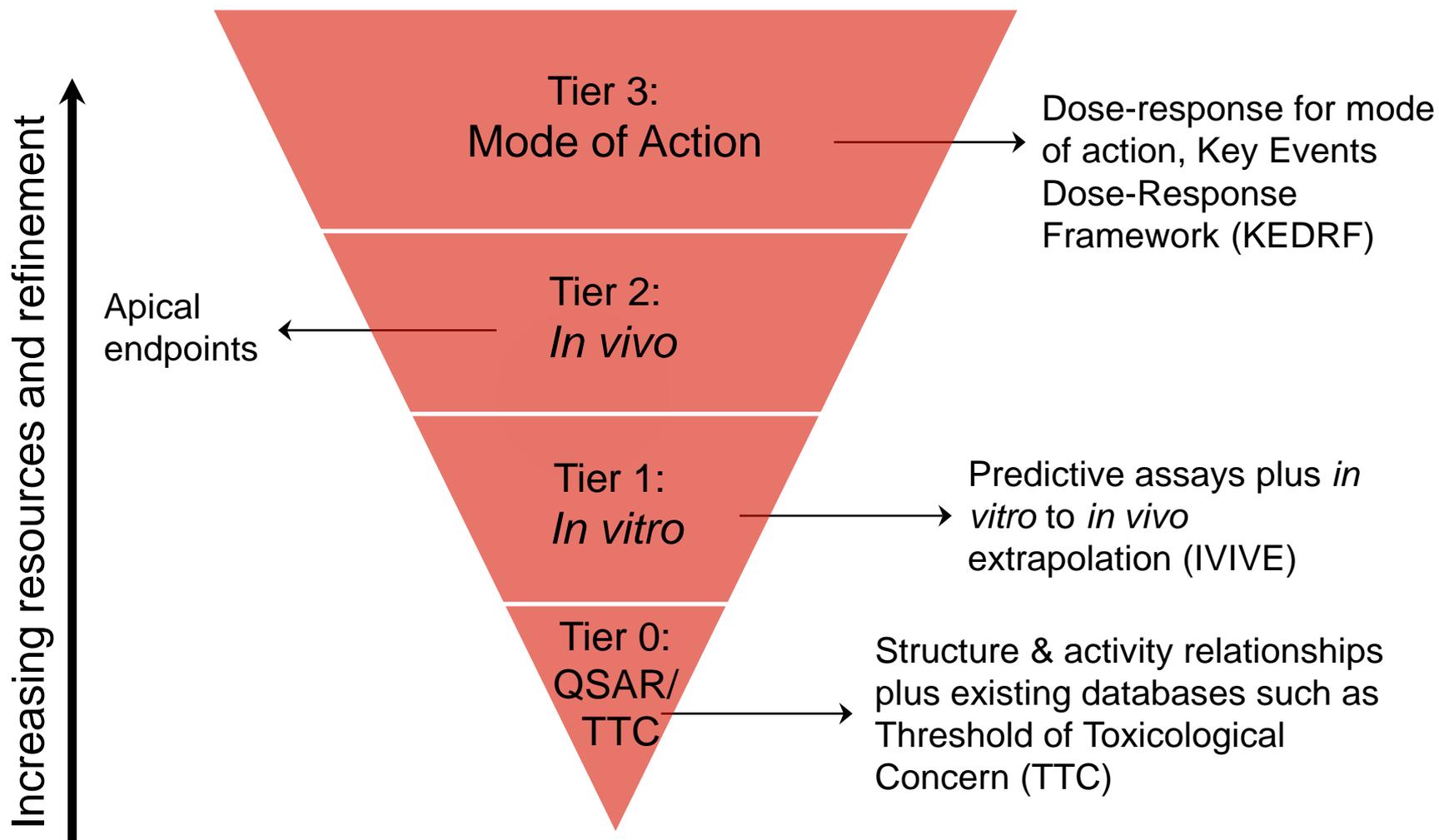
- **Asks:**
 - what do you know?
 - what do you need to know?
 - How do you know when you're done?

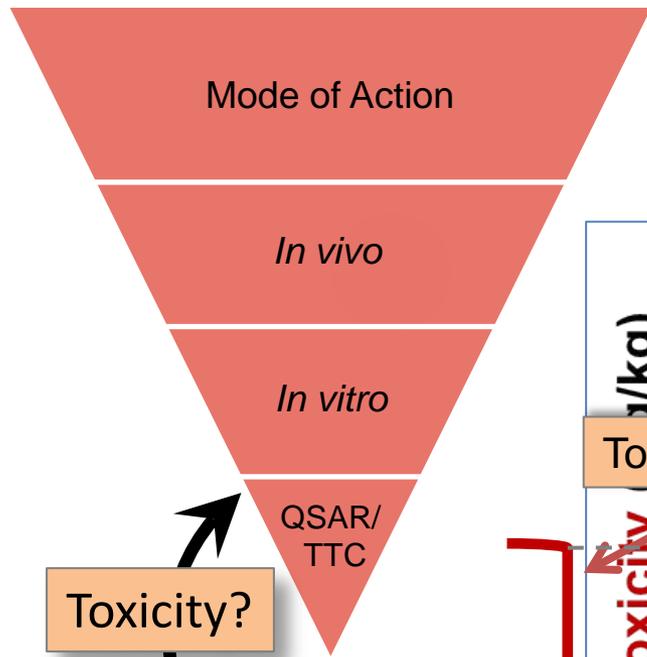
Enough precision to make a decision

Enough Precision for Exposure Estimate



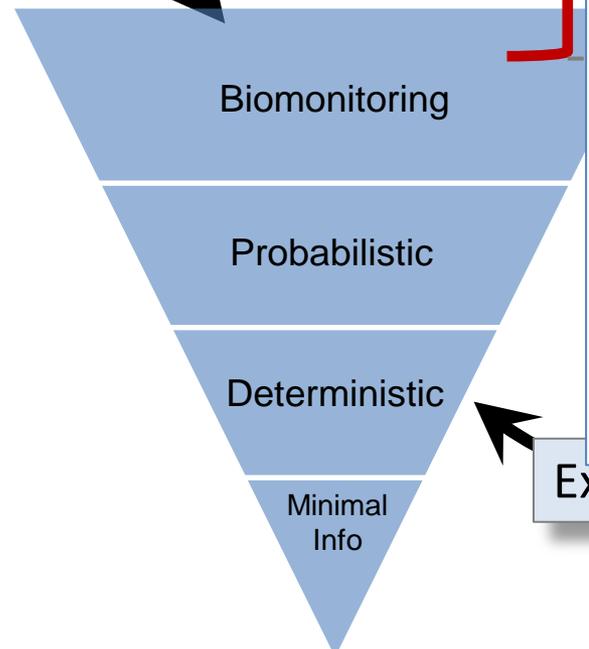
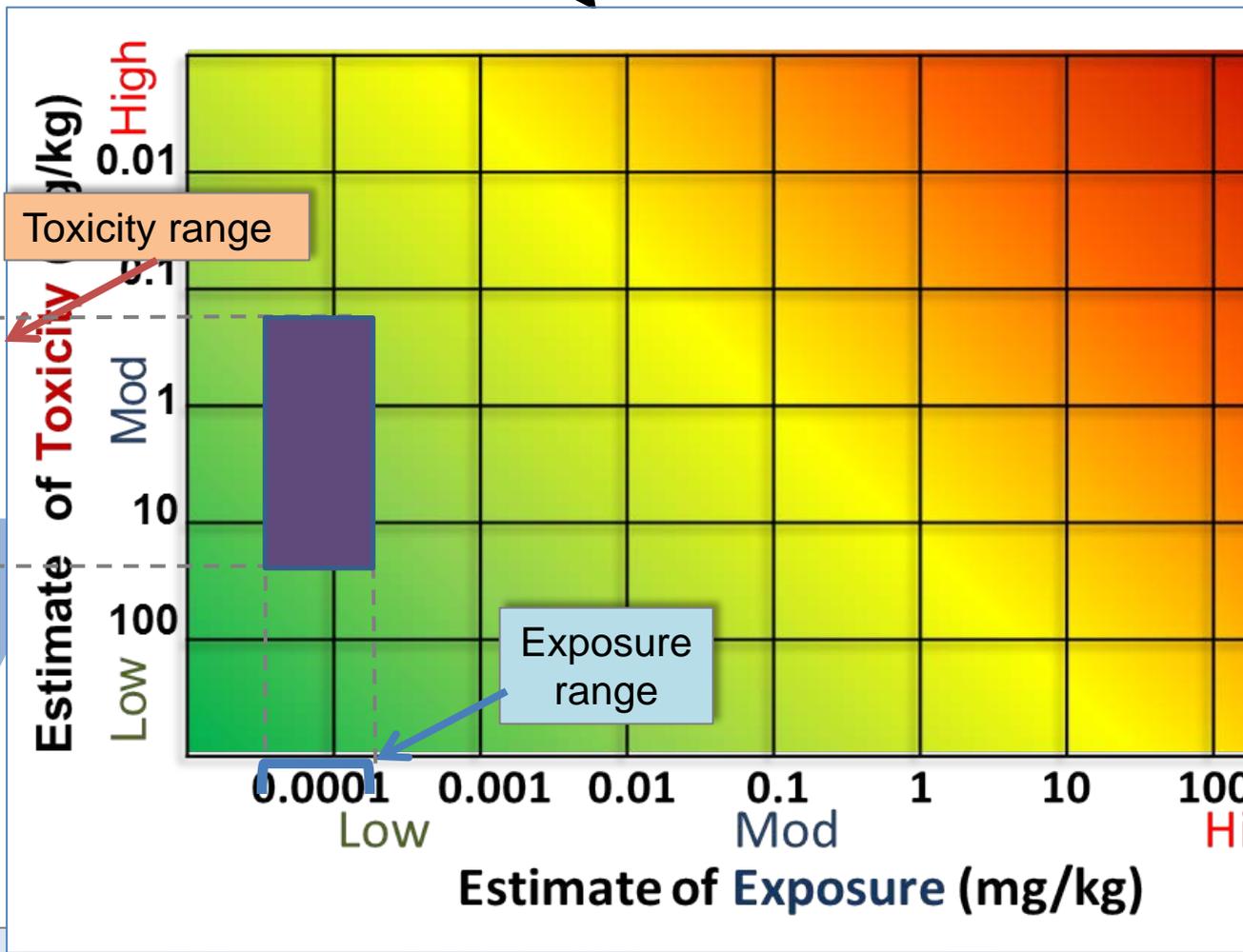
Enough Precision for Toxicity Estimate





Risk? Safety?

Toxicity?

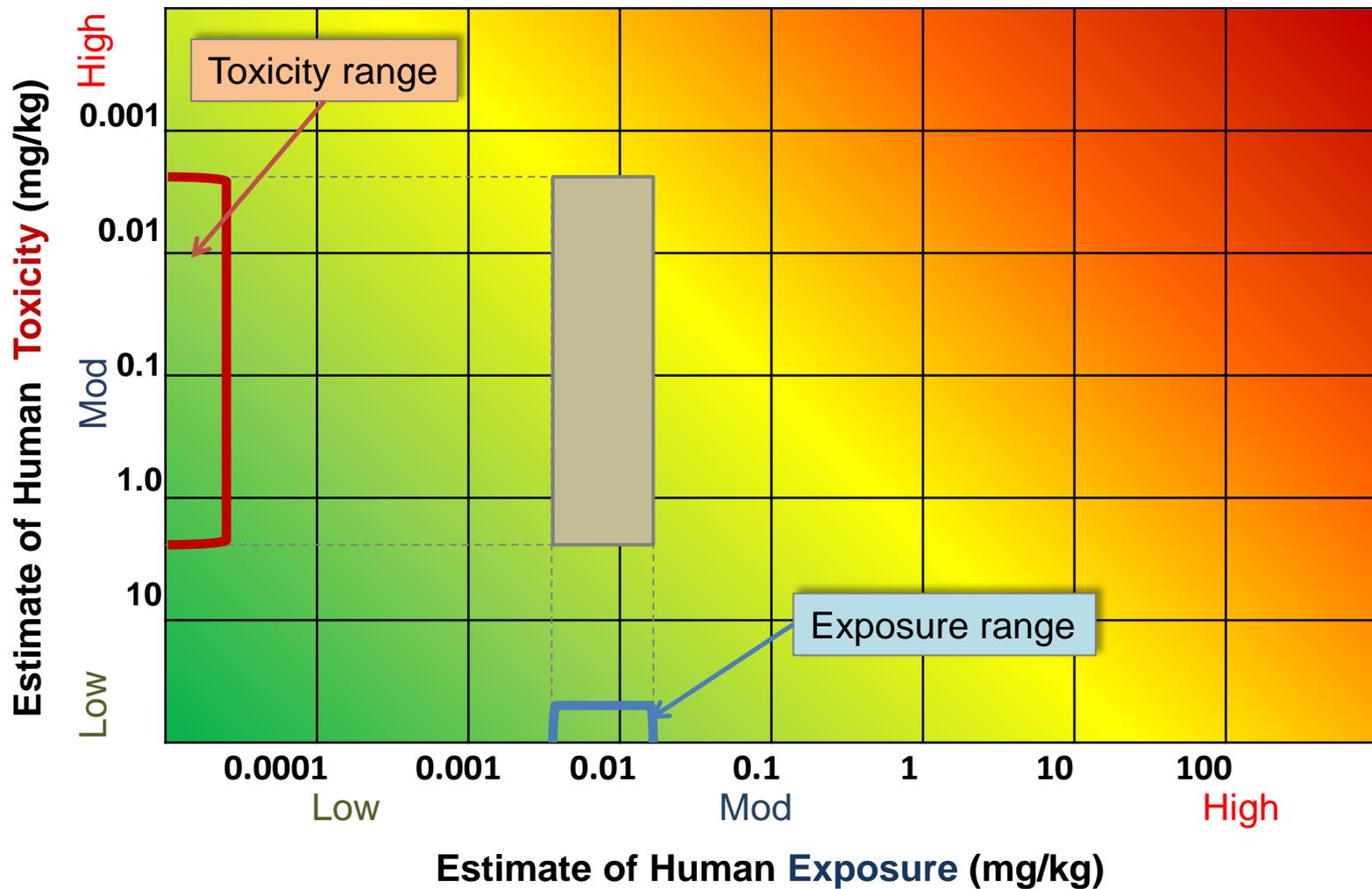


Exposure?

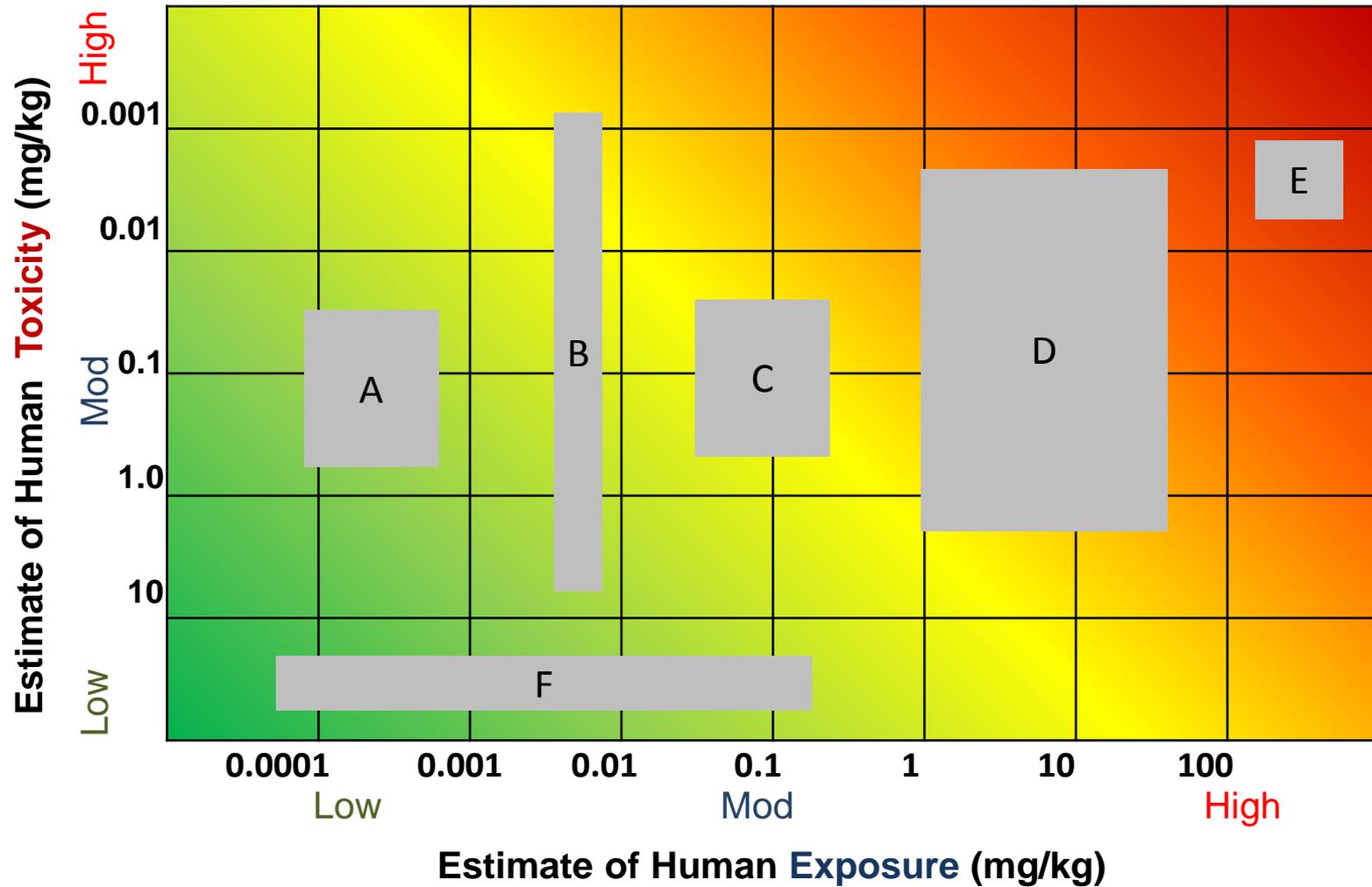
Formulation

Conclude

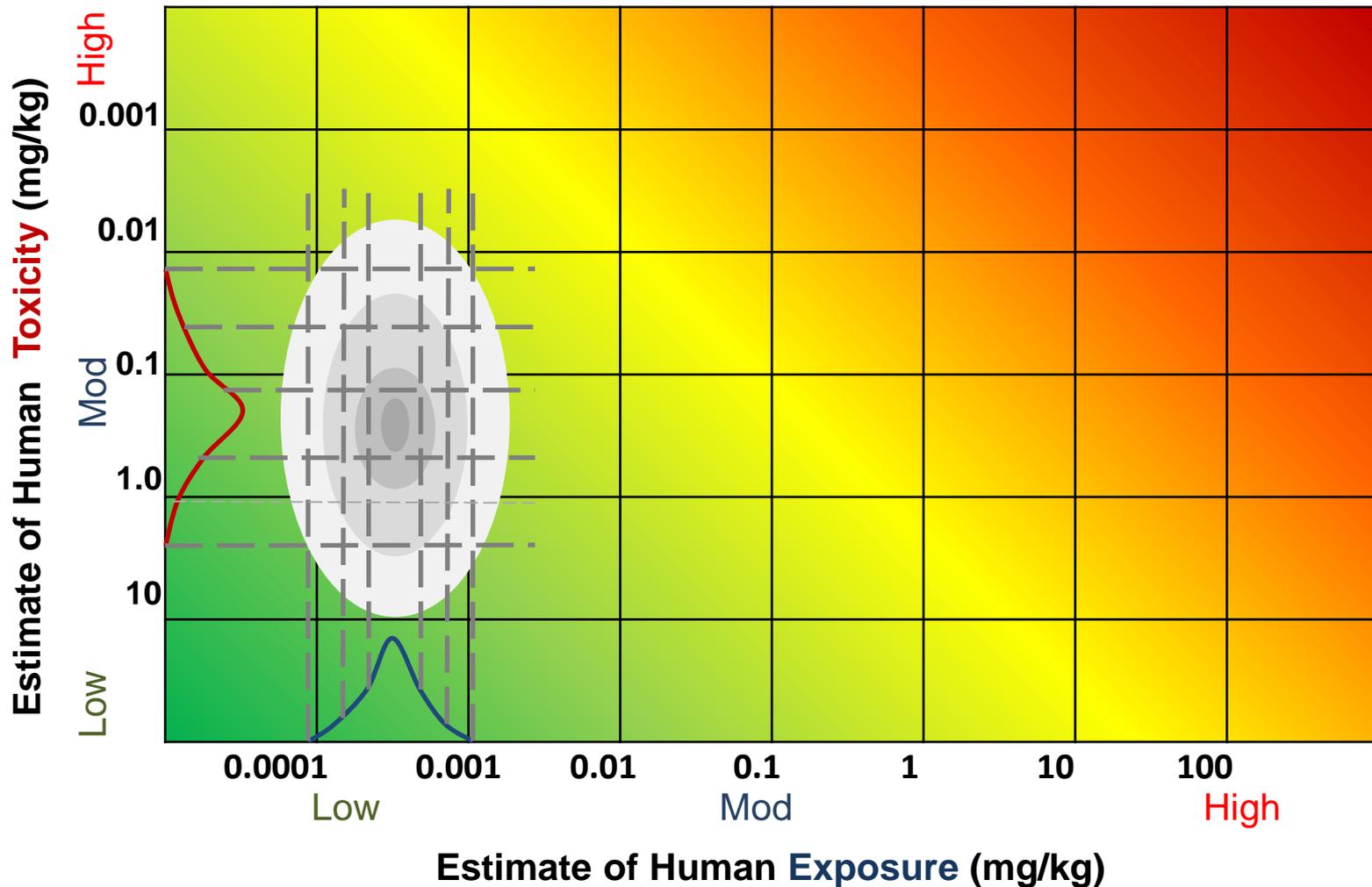
Plotting Ranges on the RISK21 Matrix



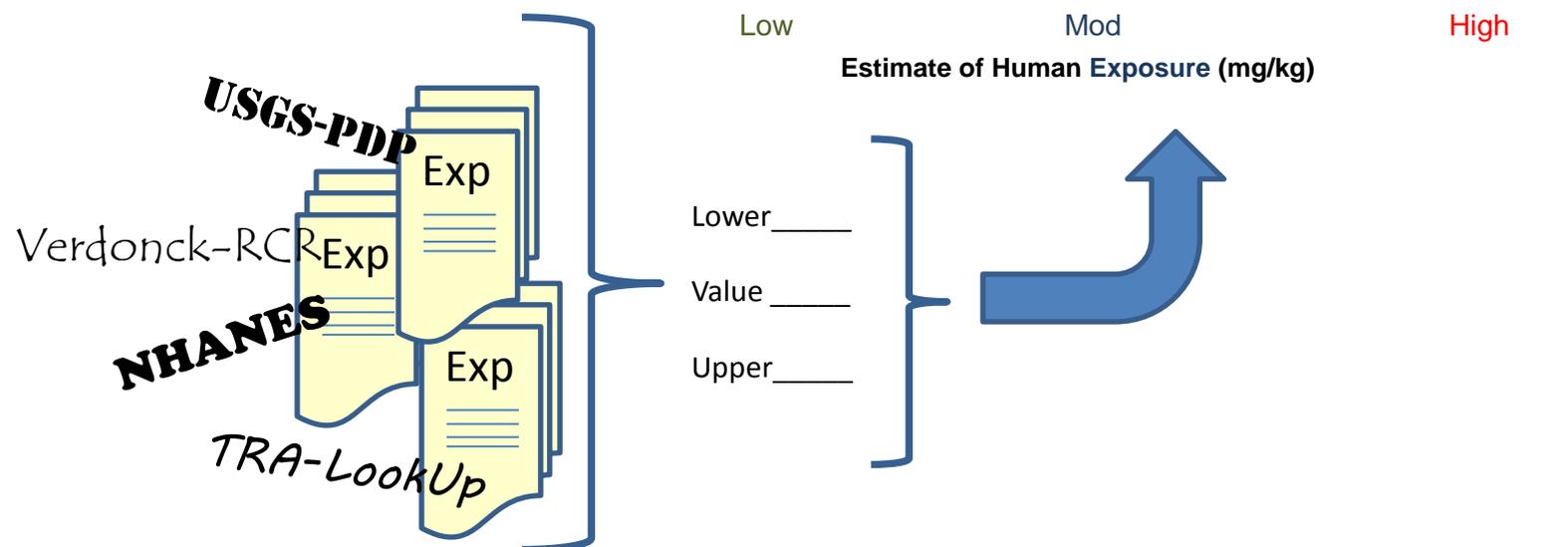
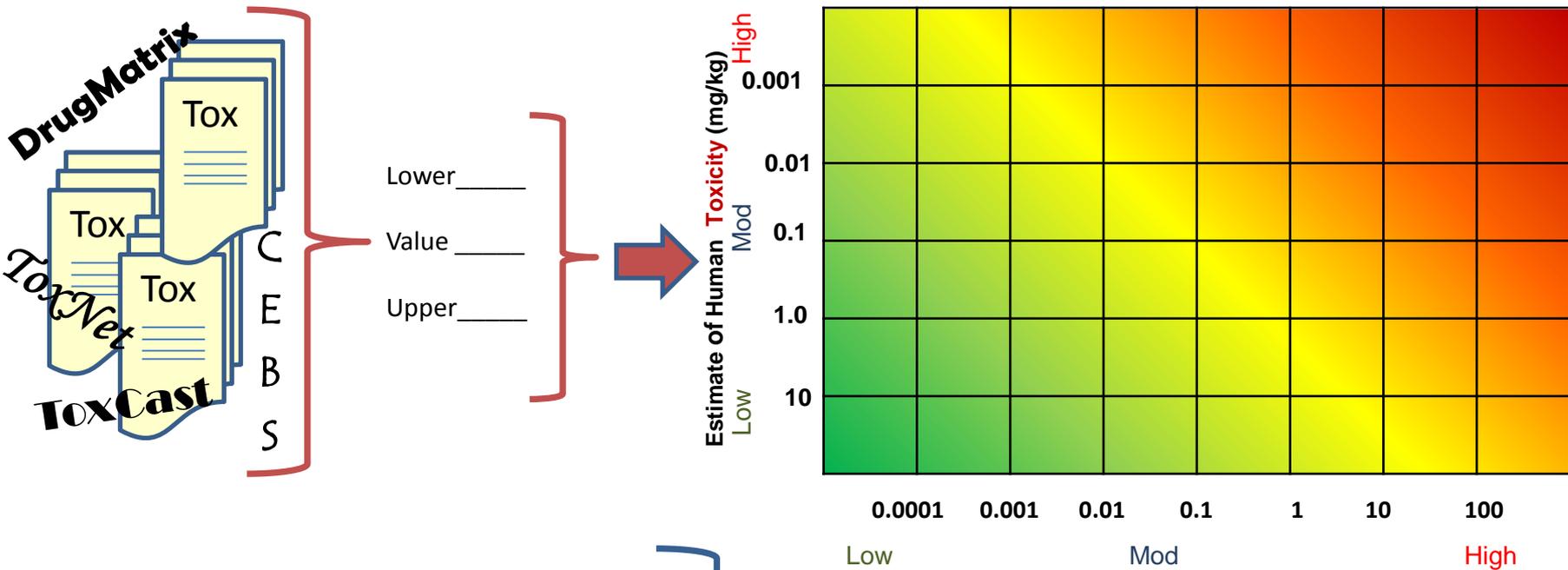
Use of RISK21 Matrix



Probability Distributions on the RISK21 Matrix



WEB-Based Tool



Risk21 Roadmap



TTC Plot Risk Plot

Problem Formulation

Graph Properties

Title:

Units:

Exposure Axis (X-axis)

Min. Exposure:

Max. Exposure:

Toxicity Axis (Y-axis)

Min. Toxicity:

Max. Toxicity:

Acceptable Margin of Exposure (MOE)

1:

Results

Name	Color	Min Exposure	Max Exposure	Exposure Point Estimate	Min Toxicity	Max Toxicity	Toxicity Point Estimate	Toxicity Uncertainty Factor
1-1 of 0								

Sample Plot



For More Information on HESI's RISK21 Project, contact...

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