

RISK CONTEXT FOR RADIOLOGICAL MATERIAL: HOW TO ASSESS THREATS AND CONSEQUENCES



International Conference on the Security of Radioactive Material: The Way Forward for Prevention and Detection

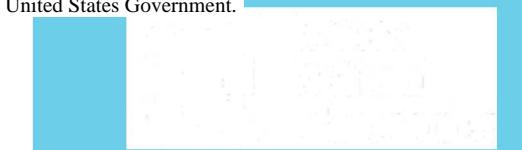
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PRESENTED BY

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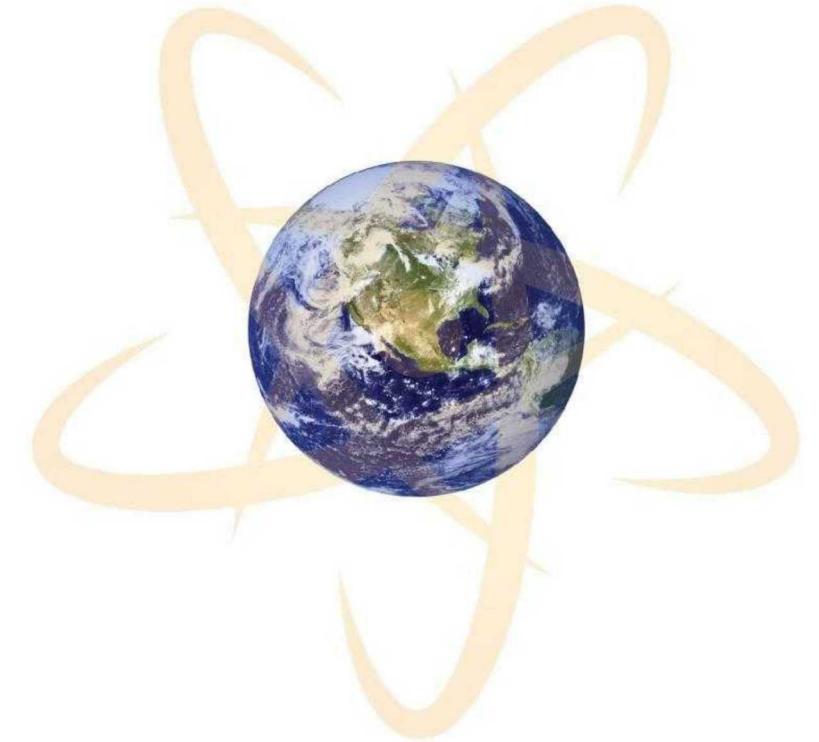
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OUTLINE

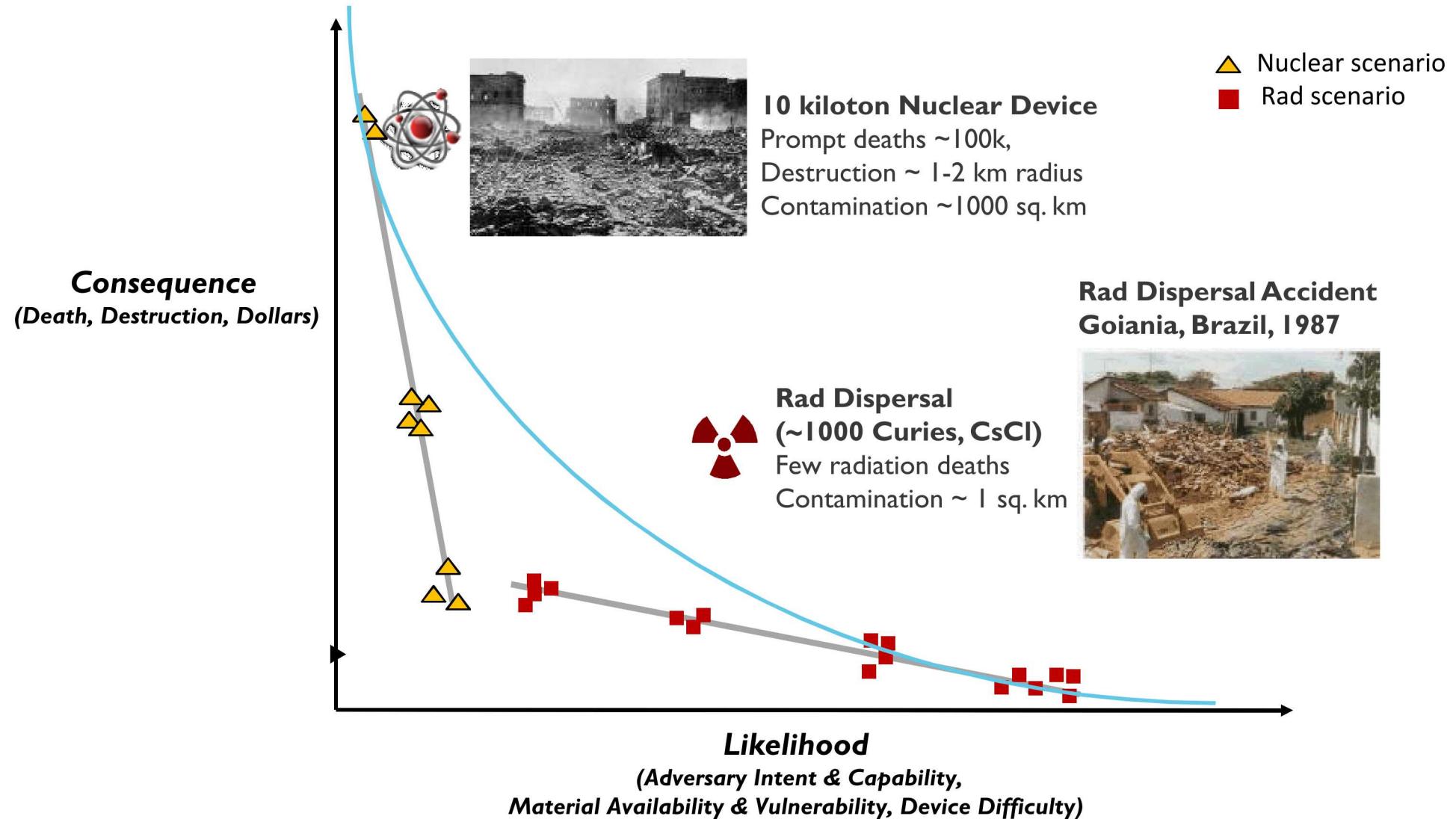
How to assess threats and consequences of radioactive material?

- Context & Framework
- Likelihood factors
- Consequence factors
- Conclusion



RISK CONTEXT (NOTIONAL)

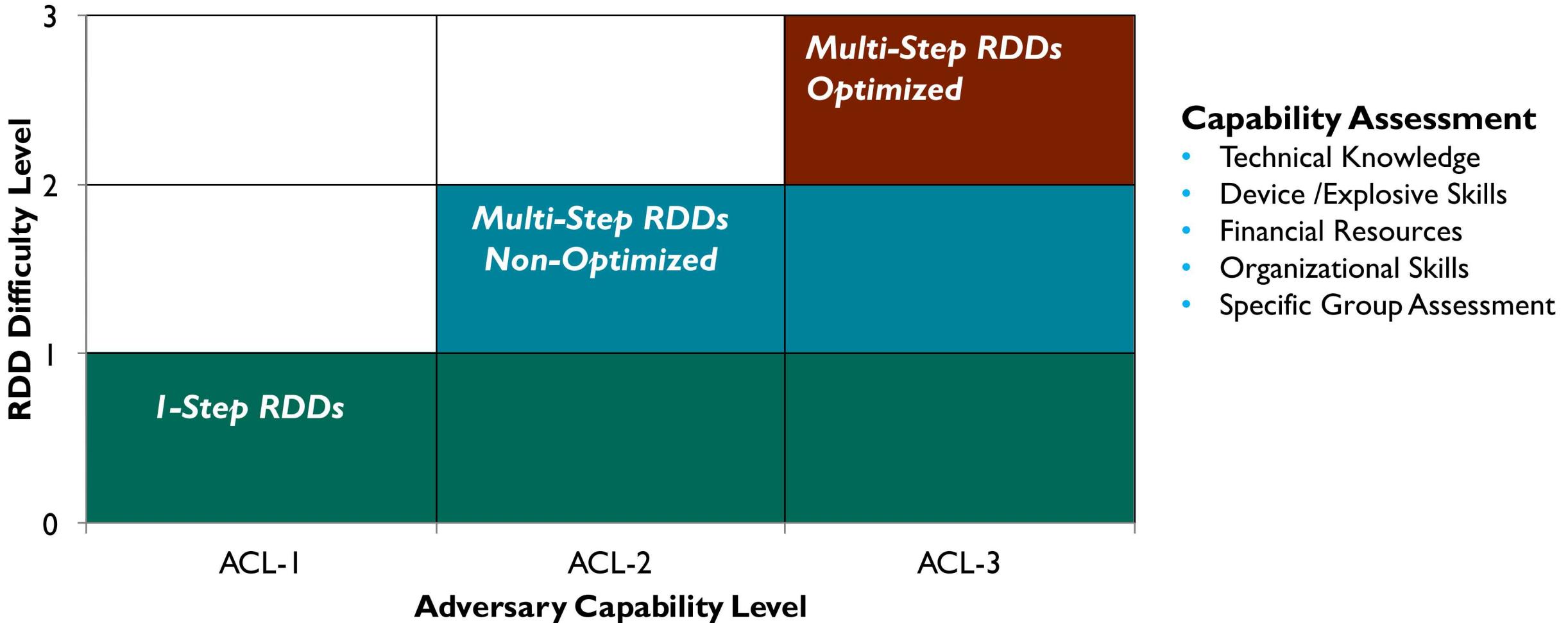
Risk = C x P. Some probability factors are hard to quantify.



ADVERSARY CAPABILITY MODELING



More capability opens up more complexity in attack design.



SOURCE THEFT VULNERABILITY



Is it too hard to remove the source?

Difficulty of attack key part of risk assessment for self contained irradiator.

Attack testing established timelines for response and site vulnerability assessments.

- Technologist used for attack assessment.
- Required radiation effects and mechanical knowledge.
- Tests demonstrated the ability to obtain source is relatively short time.

Exposure Analysis

- Teletherapy: 0.3 - 2.3 rems (3 – 23 mSv).
- Typical Cs-137 blood irradiators: 4 – 24 rems (40 – 240 mSv).

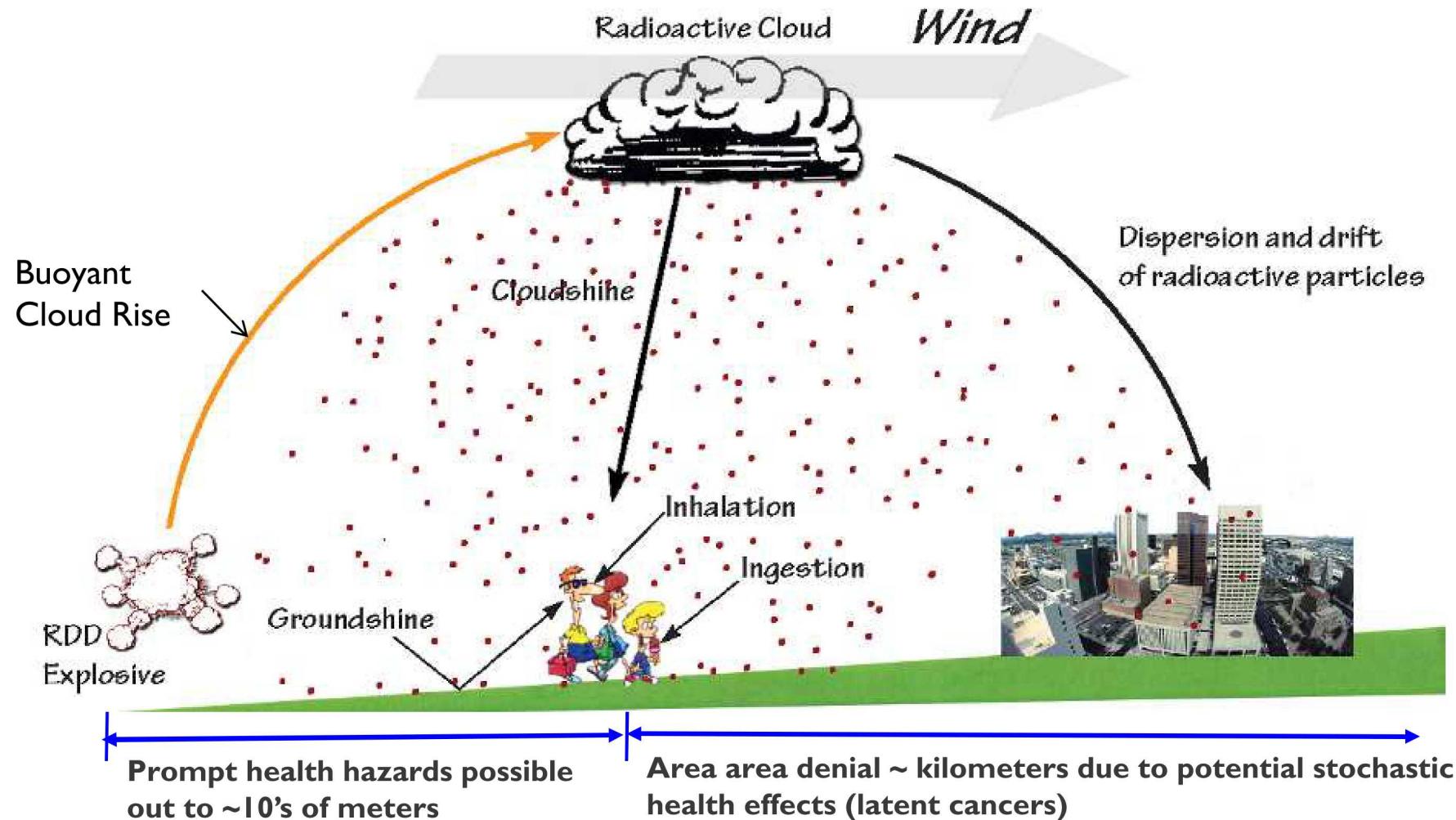
Results motivated USA interagency consensus to move forward with security enhancements throughout the US.



IBL 437c blood irradiator contains ~5500 Ci of Cs-137; weighs ~2100 kg (2+ tons).

CONSEQUENCES FOR THE EXPLOSIVE RDD

Radioactive ground contamination can have a lasting, mass effect by creating an “area denial.”



CONSEQUENCE FOR Cs-137 RDD IN NEW YORK CITY



Representative, not worse case, scenario defined.

Scenario

- Prevalent weather conditions.
- Tall buildings accounted for.
- Device design aligned with threat definition.

Assumptions

- Threshold of action defines actions and area of concern.
- Prompt and affective response protocols for analysis.

Results

- US GDP impact tens of billions (\$USD)
- Some deaths/serious injuries from dispersion explosion
- 195,000 people evacuated.



Plume large but missed air and seaports.

The study used the US relocation threshold of 500 mrem/2yr (5mSv/2yr), which is guidance, not the law.

PSYCHOSOCIAL IMPACTS OF AN RDD ATTACK ARE THE LARGEST CONTRIBUTOR TOWARDS THE ECONOMIC IMPACTS

General Avoidance Behaviors

- Tourism.
- Consumer spending patterns.

Property Values

- Determined by both characteristics of the house and the external factors.
- Fears of safety near contamination.

Mental Health

- People evacuated.
- People relocated.
- Worried well.



CONCLUSION: USE A FRAMEWORK TO DEFINE A RISK THRESHOLD

A curve defines equivalent risk but it's easier to define unacceptable risk in terms of consequence.

