



Methods for Nuclear Terrorism Risk Assessments

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assessing risks of nuclear war and nuclear terror

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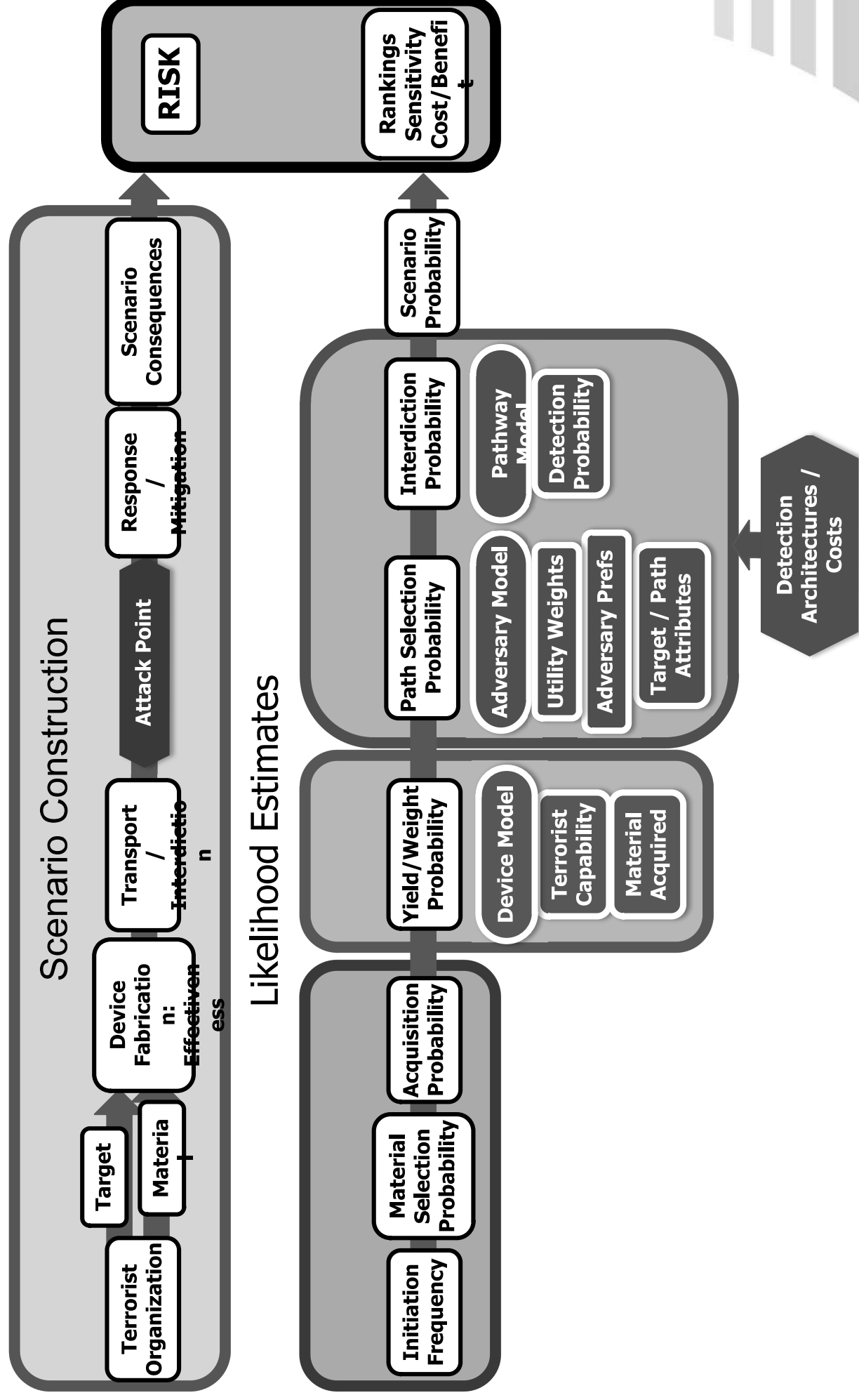
Nuclear Terrorism Risk Assessment Background

- Integrated CBRN terrorism risk assessment (ITRA)
 - Intended to inform medical countermeasure procurement for HHS
 - PD-18 mandate
- Radiological and nuclear terrorism risk assessment (RNTRA)
 - Conducted by DHS/DNDO (now CWMD)
 - Used to inform procurement process
 - Used by DHS to determine future of portal monitor program
 - Numerous individual studies to evaluate risk reduction/increase from potential defensive measures





Risk Assessment Framework





Modeling Methods

- **Expert Elicitation**
 - Adversary Intent
 - Adversary Capability
- **Physical Modeling**
 - Device Effectiveness / Consequences and Impacts
 - Interdiction Likelihood / Point Architecture Models
- **Game Theory / Multi-attribute Utility**
 - Material / Device / Pathway / Target Selection
 - Context of Selection / Defensive Architecture
 - Degree of Difficulty Estimation
 - Dijkstra Pathway Models
- **Historical Estimates**
 - Power Law Projection (used as comparison study)





Risk Informed Decision Making

- Risk Informed vs. Risk Based Decisions
- Develop Quantitative Models but Report Qualitative Results
 - Precision vs. Accuracy
 - Care must be taken in presenting to decision makers
- Uncertainty and Sensitivity Analysis
 - Monte Carlo methods
 - Epistemic vs. Aleatory Uncertainty and Correlation
 - Must be designed in at the beginning
- Expert Bias in Elicitations Must Be Addressed
- Must Account for Change in Adversary Decisions Based on Changes in Defense Capabilities





Key Points

- Quantitative assessment forces you to better define and structure your models
 - Importance of quantitative approach is not the numerical results but the relationship of results
 - Assumptions about adversary capabilities and objectives must be 'equivalently conservative' across models
- Decision makers should not focus on numbers but on actionable results
- Assessments should be as precise and as detailed as necessary to provide answers – and not more detailed
 - Collapsible risk trees
- The scope of the risk assessment and the timeframe of the assessment must be part of the communication as well as any other contextual definition



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