

# Architecture Evaluation

## Nuclear Security Detection Architecture Module N

# Nuclear Security Detection Architecture

## Foundational Concepts

Pathway View

Competent Authorities

Detection Strategy

Legal Framework

### Design & Development

Capabilities & Needs

Design Attributes

Detection by Instrument Alarm

Detection by Information Alert

### Operational Implementation

Roles & Responsibilities

Instrument Deployment

Concept of Operations

Searches & Surveys

### Initial Assessment of Alarms and Alerts

Assessment Flowcharts

Operations & Analysis Center

### Principles of Detection

### International & Regional Cooperation

Role of Cooperation

Cooperation Options

### Role of Information

Information Management

Delivering Information to Users

### Human Resources

Nuclear Security Culture

Awareness, Training, and Exercise

### Sustainability

## Architecture Evaluation

Methodologies

Performance Criteria

# Module Objectives

Participants will recognize the importance of developing measures and criteria necessary for evaluating the effectiveness of the nuclear security detection architecture.

- Methodologies
- Performance criteria

The information presented in this module is relevant to checklist questions:  
**8, 13, 38, 51, 52, 53, 54, 70, 74, 77, 80**

# Architecture Evaluation

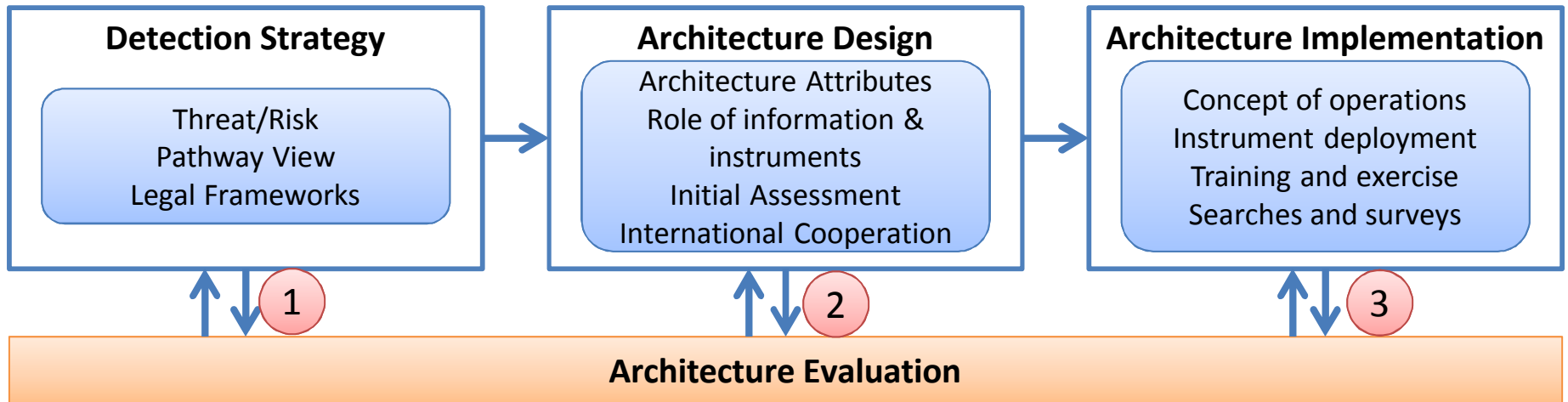
**The systematic process of determining the value or effectiveness of a program or other initiative, in order to promote and support the continuous effort to evolve and improve the efficacy of that program or initiative**

## Purpose and Benefits

- Validates and justifies architecture goals and objectives
- Demonstrates desired performance levels
- Provides feedback and guidance on the performance of capabilities and assets in achieving desired outcomes
- Provides a basis for architecture improvements and modifications

# Role of Evaluation

- Evaluations contribute to the development of an NSDA by assessing the:
  1. Detection strategy
  2. Architecture design
  3. Implemented architecture, and corresponding components
- Results from these evaluations can be used to improve and evolve the architecture

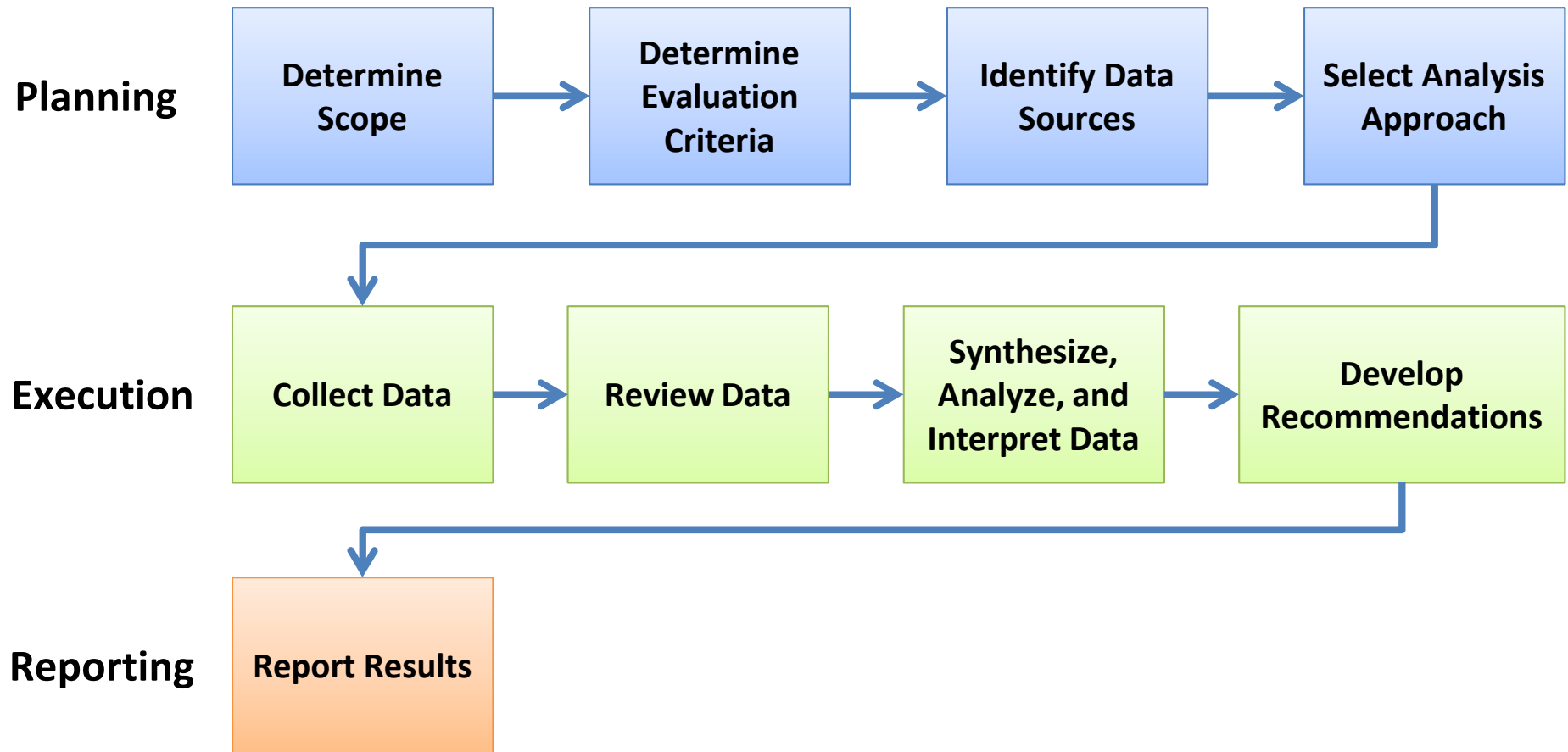


# Evaluation Overview



- Architecture evaluations consists of three phases:
  - **Plan**: activities aimed at determination of evaluation scope and design
  - **Execute**: activities aimed at collecting and analyzing data
  - **Report**: activities aimed at communicating key results, findings, and recommendations
- The effectiveness of an evaluation can be affected by insufficient planning, execution, or reporting.

# Evaluation Process



## Slide 7

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**SM2**

I might put this at the end of the presentation as a summary.

Stacy Mui, 10/3/2012

# Evaluation Planning Overview



- Architecture evaluations require sufficient planning to be effective
- Considerations for planning include:
  - Scope
  - Evaluation stakeholders
  - Evaluation criteria
  - Analysis approaches
  - Data sources

# Evaluation Scope & Stakeholders

- The evaluation scope focuses the evaluation by:
  - Defining the purpose
  - Clarifying what is being evaluated
  - Determining the evaluation objectives
  - Identifying the information output of the evaluation
- Appropriate stakeholders for evaluation should be identified early in the planning phase
  - Senior leadership / coordinating body
  - Participating organizations
  - Evaluators



# Evaluation Criteria / Metrics

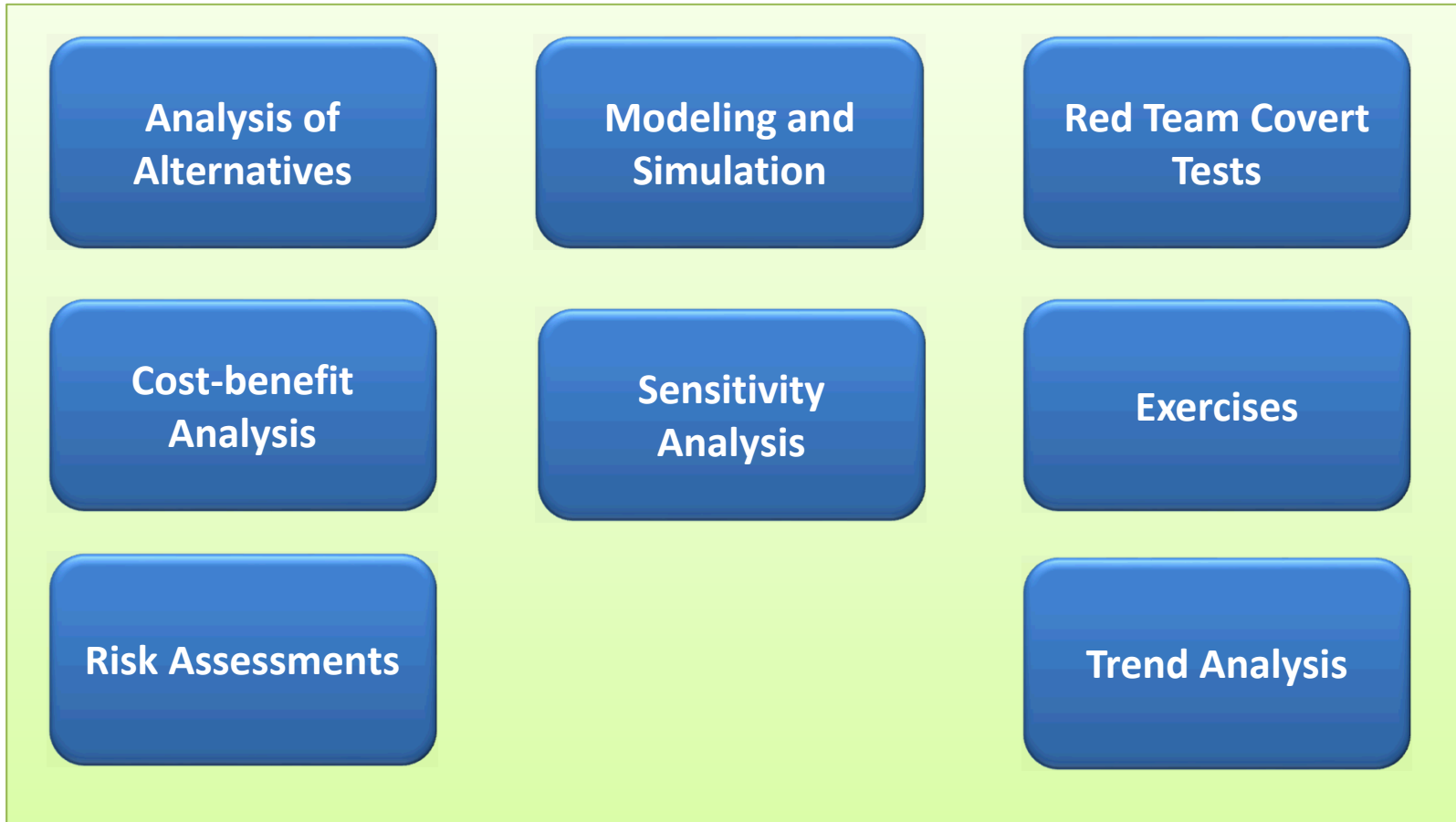
- Effective evaluations utilize evaluation criteria and metrics to systematically gauge progress with respect to a stated goal.
- Evaluation criteria should be established early in the planning stages of architecture development and reviewed as appropriate.
- Characteristics of evaluation criteria include:
  - Strategic
  - Actionable
  - Measureable
  - Accurate
  - Objective
  - Consistent
- Often architecture evaluations of assess performance along capacity and efficacy dimensions. Performance criteria and metrics should be developed to address both dimensions.



# Data Sources

- Because the NSDA produces and utilizes a wide variety of data and information, the planning phase of an evaluation should consider the types of data sources available.
- Types of data sources include
  - Primary sources includes raw instrument data, first hand observations, etc.
  - Secondary sources integrate primary data (e.g., reports)
  - Proxy data are substitute measurements that approximate information that is unavailable in primary or secondary sources
- Data sources are also qualitative or quantitative in nature.
  - Qualitative data consists of a narrative description of capabilities, problems, behaviors, or events
  - Quantitative data consists of counts, frequencies, rates, or other statistics that numerically describe capabilities, trends, behaviors, or occurrences of the architecture.

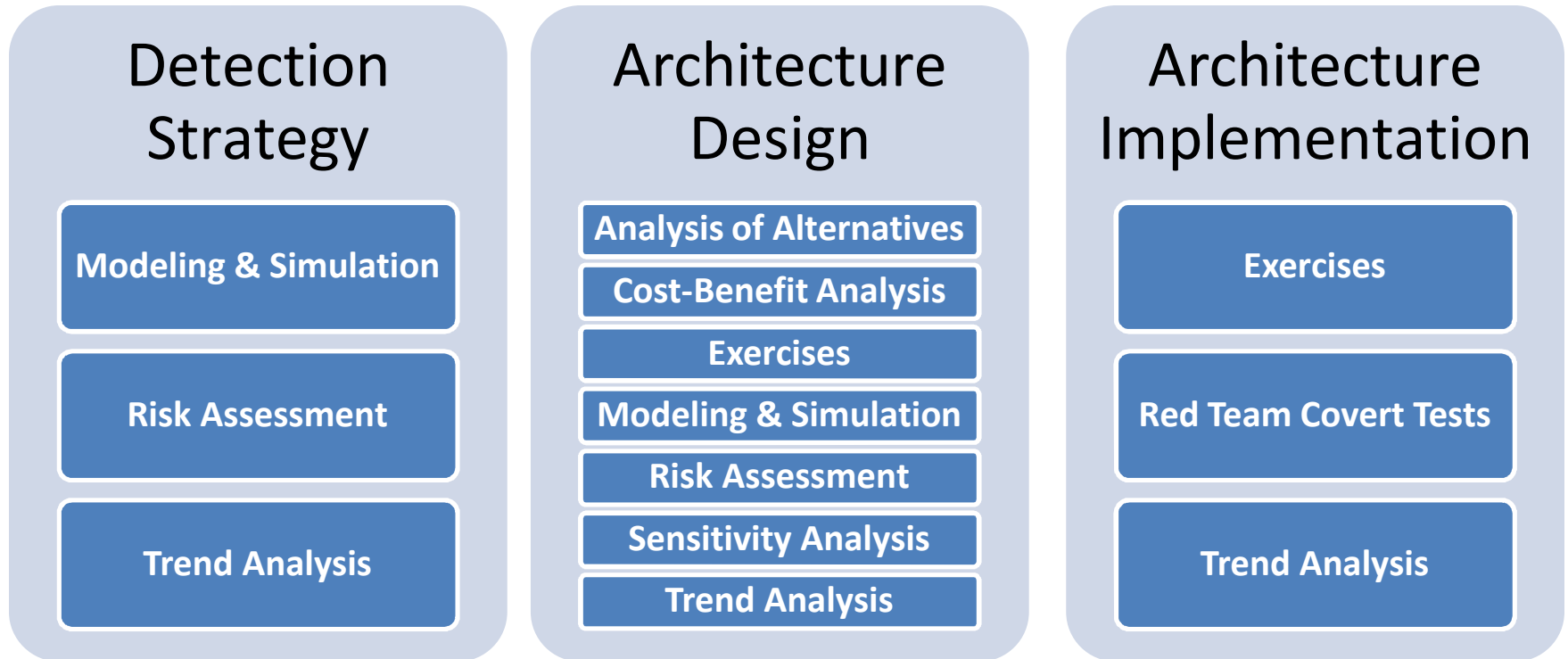
# Analysis Approaches



# Analysis Approaches

Method	Overview
Analysis of Alternatives	Analytical process for identifying most probable threat scenarios and measuring and ranking alternative mitigation options
Cost-benefit Analysis	Systematic process for calculating and comparing the costs and benefits of alternatives
Exercises	Discussions, maneuvers, or simulated operations that enable training, evaluation, and validation of plans, policies, procedures, equipment, and operations
Modeling and Simulation	The use of models to develop data as a basis for making decisions
Red Team Covert Tests	A covert testing method, in which the red team serves as a surrogate adversary and attempts to introduce a threat into the system without detection. Such tests exercise the “live” operational environment.
Risk Assessment	Determination of quantitative or qualitative risk related to a recognized threat or situation.
Sensitivity Analysis	Analytical process to characterize how much the results change if different input assumptions are used.
Trend Analysis	Examination of data sets in order to identify patterns or trends.

# Applications of Analysis Approaches



**Analytical techniques are not mutually exclusive and are often used in combination**



# Evaluation Execution Overview



- The execution of evaluations consists of three main steps:
  - Data collection
  - Data review
  - Synthesis, analysis, and interpretation of data

# Data Collection

- Collecting relevant data is essential to the evaluation process.
- Data provides information on how the architecture functions and performs.
- The data collection process should include provisions for access, accuracy, comprehensiveness, consistency, and sampling.
- Collection Tools and Strategies
  - Interviews
  - Program evaluation forms
  - Participant comments through training and exercise
  - Individual training tests
  - Observation and feedback by peers, managers, and evaluators
  - Focus groups
  - Red team covert tests
  - Data streaming

# Data Review

- The quality of the evaluation results will depend on the quality of the data gathered.
- The collected data should be reviewed for:
  - Completeness
  - Objectivity or bias
  - Accuracy and precision
  - Consistency
  - Timeliness.

# Data Synthesis, Analysis, and Interpretation

- The reviewed data must be synthesized, analyzed, and interpreted to develop conclusions and recommendations.
- Qualitative data analysis
  - Data is analyzed in order to identify, examine, compare, and contrast themes, categories, patterns, and relationships that are present in the data set.
- Quantitative data analysis
  - Utilizes numeric techniques to assess the data collected. The creation of charts and plots can be used to demonstrate trends in the data set, or statistical methods can be used to show aggregated information about the data.
- Results of the data gathering and analysis should be evaluated against the evaluation criteria and architecture goals.

# Report Results



- The reporting phase of an evaluation consists of the development of recommendations and communicating the results to stakeholders
- Recommendations should be actionable and prioritized
- Report
  - Allows stakeholders to be aware of evaluation procedures and findings, ensures that the evaluation results are considered in future decisions and actions, and validates participant's involvement in the process
  - Tailored to stakeholders

# General Considerations for Evaluation

- A State should consider many factors performing an evaluation, including:
  - Evaluation stakeholders, such as sponsors, evaluators, participants, recipients
  - Frequency of evaluations

Module K

# **DISCUSSION QUESTIONS**

# Discussion Questions