Sandia National Laboratories

SEDSS

Sandia Environmental Decision Support System

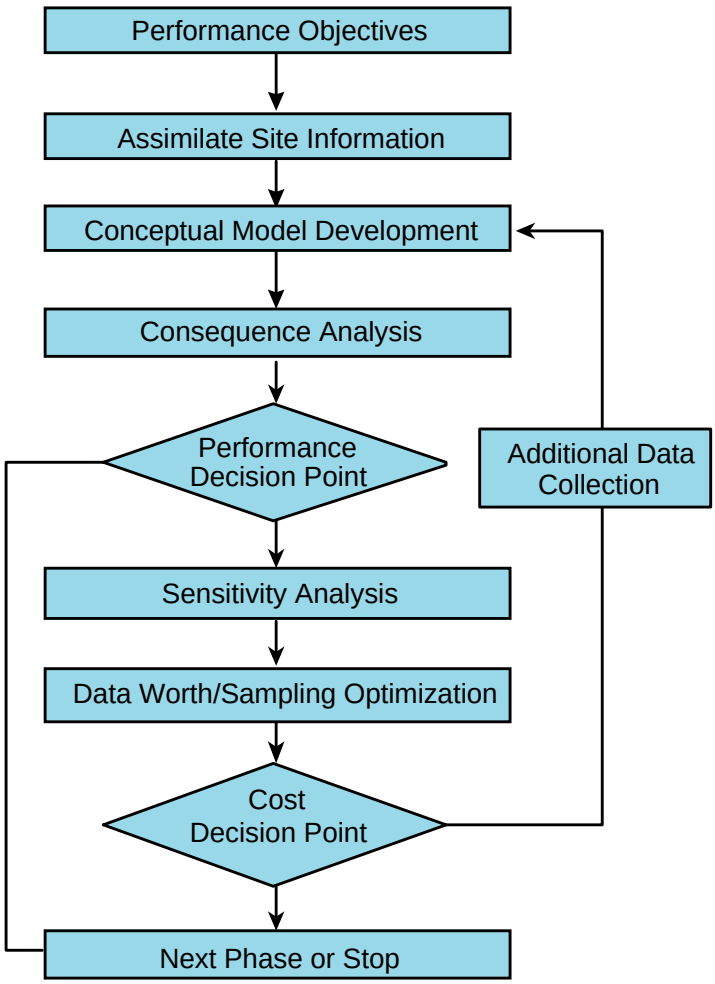
A Methodology and Tool for Risk Assessment, Site Characterization, and Comparing Remedial Alternatives for Environmental Restoration

Overview

The SEDSS methodology provides a generalized probabilistic framework for making consistent, technically-defensible, and traceable environmental decisions. These decisions apply to adequacy of system performance, resource management, prioritization of data collection activities, and remediation selection and design. Most importantly, the methodology provides a consistent, structured foundation for negotiation between owner / operators, regulators, and stakeholders that facilitates coming to closure on decisions in a timely and cost-effective manner. In this framework, risk management involves the application of probabilistic approaches for guiding environmental restoration, risk assessment, and waste management decision making. Resource management, as guided by this framework, is accomplished through up-front, articulated objective setting, and continuous cognizance of those objectives while using sensitivity and data worth analysis to set information collection priorities.

The methodology incorporates process modeling, performance assessment analysis, decision analyses, cost / benefit analysis, and site sampling optimization techniques. Quantitative estimates of risk, dose, or other performance measures are based on a probabilistic assessment of the site conditions. This analysis explicitly incorporates the uncertainty in information about the natural system and in turn, provides a representation of the uncertainty associated with the performance of the system; consequently, it provides a complete set of information necessary to make robust decisions. The framework also allows comparison of alternative system conceptualizations, and alternative engineered designs, and tracks reduction of uncertainty.

Decision Framework



Methodology

The SEDSS methodology is designed to answer the following questions:

- Is the site safe?
- What remedial approach should be used?
- When is the remediation complete?
- Is a new facility likely to be safe?
- Is a monitoring program adequate to detect a release?
- Do we need more data and which data do we need?

Attributes of the SEDSS methodology:

- *Probabilistic* – Monte Carlo analysis provide distribution of possible outcomes
- *Quantitative* – explicitly provides a measure of the uncertainty associated with the decision to be made
- *Iterative* – the analysis directs data collection that impact the decision; the data are then used to update the analysis and reduce uncertainty
- *Model-Based* – analysis and decisions are constrained by physical models of the system
- *Cost-Based* – explicitly ties cost of alternatives to resolution of risk

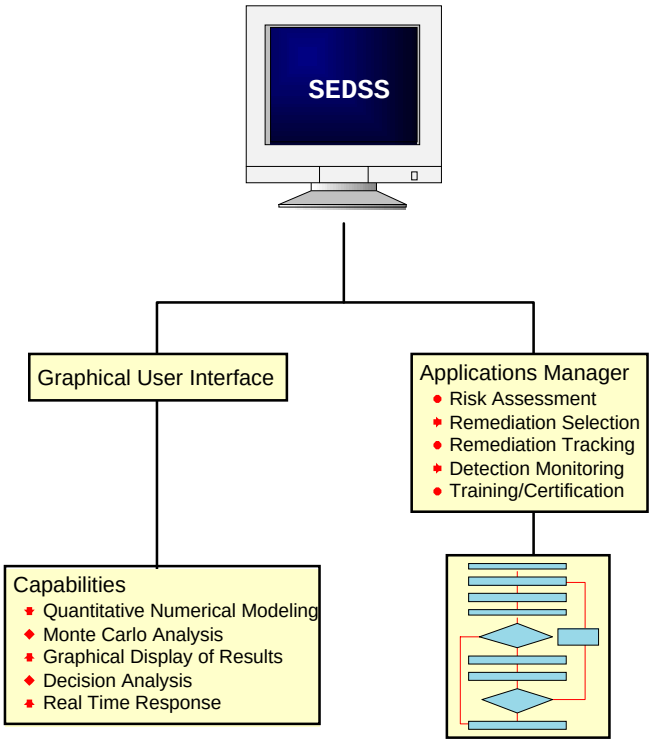
Software

Objectives of the SEDSS software tool:

- Automate and structure the analysis allowing the decision maker to focus on the decision
- Ensure consistency of approaches
- Document the decision process
- Reduce loss of information between steps
- Provide an improved basis for negotiation and conflict resolution
- Save time and money

Attributes of the SEDSS software tool:

- *Transparent* – Articulates decision framework to user; steps user through assumptions
- *Consistent* – Facilitates use of a single agreed-upon framework through a user-friendly platform
- *Documented* – The analysis can be automatically documented, justified, and reported in real time
- *Information Transfer* – Results in seamless transfer of data and information from step to step within application of methodology



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