

**TRW ENVIRONMENTAL SAFETY SYSTEMS INC.
CRWMS MANAGEMENT AND OPERATING CONTRACTOR**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

SUBJECT: Decision Hierarchy Activity

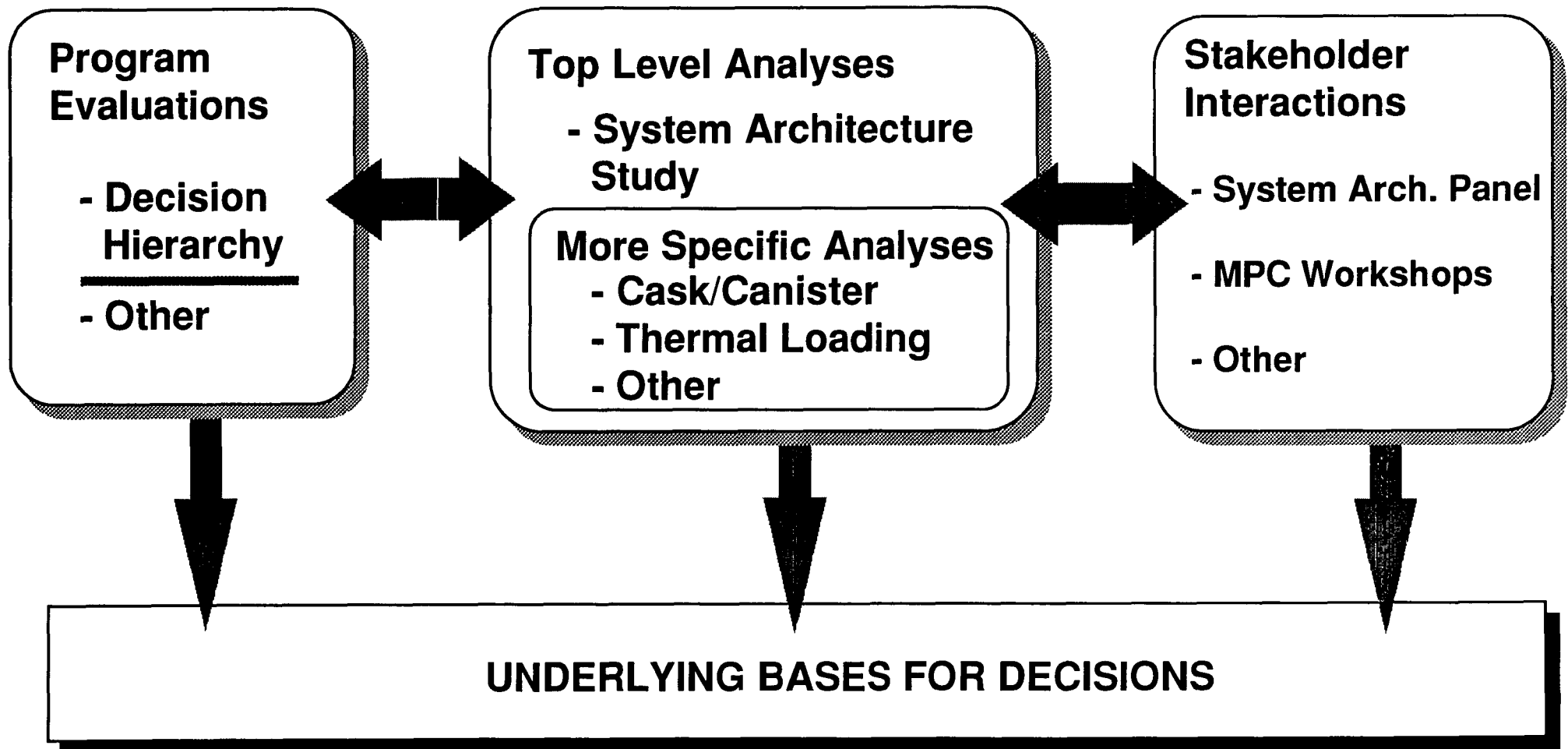
PRESENTER: Jim Crane

**PRESENTER'S TITLE System Engineer
AND ORGANIZATION: System Development**

**PRESENTER'S
TELEPHONE NUMBER: 703-204-8733**

**ARLINGTON, VIRGINIA
JANUARY 11, 1994**

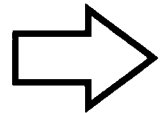
INTER-RELATIONSHIP OF ANALYSIS AND DECISION PROCESS



Overview of Decision Hierarchy Activity

- **Identify Program Level Decisions**

- Logical order (Hierarchy)
- Schedule



- **Identify Programmatic Risks**

- Possible increases in cost
- Possible increases in schedule
- No changes in safety requirements

- **Identify decision support data needs**

- **Identify decision support system analyses**

Briefing Objectives

- **This briefing addresses the systematic identification of one type of programmatic risk:**
 - **Associated with anticipating future decisions**
 - **Schedule sensitive**
 - **Referred to as “schedule-induced”**
- **This briefing also addresses identification of system analysis needs**

Overview of Analysis

- **Analyzed the Reference System modified to include the Multipurpose Canister (MPC)**
 - MPC (fabrication starts in 1997)
 - Phase 2 Truck Casks (fabrication starts in 1997)
 - MRS (storage starts in 2000)
 - Repository (emplacement starts in 2010)
 - Exploratory Studies Facility (testing starts in 1997)
thermal
- **Decisions for all elements of the CRWMS were addressed**
 - Program level decision milestones and schedule
 - System technological decision hierarchy
 - Contingency options

Overview of Results

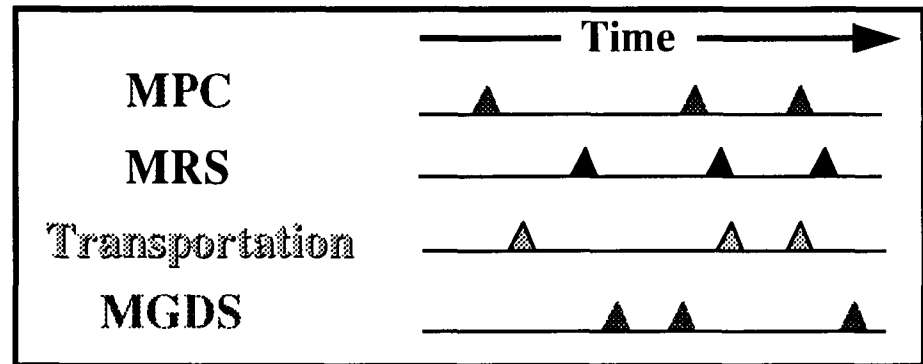
- **128 linkages between milestones**
 - When decisions affect future options
 - When assumptions need to be made about future decisions
 - Based on technological hierarchy
- **13 instances of schedule-induced programmatic risks related to thermal load and waste package design decisions**
 - Relevant to the MPC and MRS
 - Relevant to the Repository and ESF
- **11 instances of schedule-induced programmatic risks readily mitigated by schedule changes or engineering solutions**

Example Results

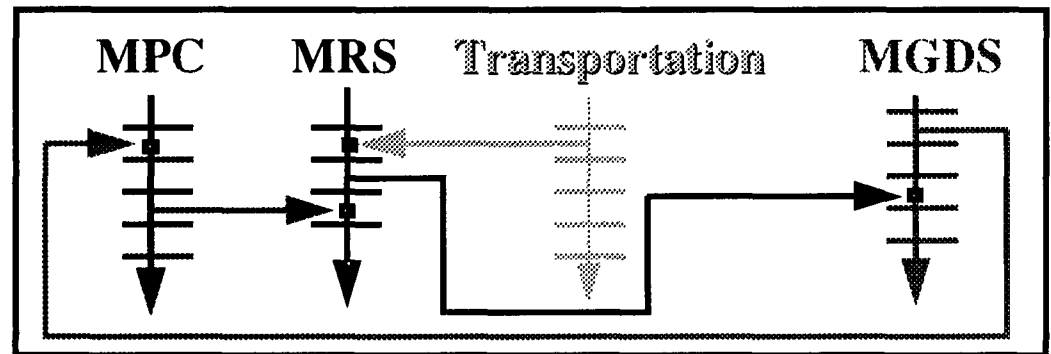
- **Approach**
- **Example**
 - **Illustrate technological hierarchy**
 - **Illustrate schedule-induced programmatic risks**

Approach

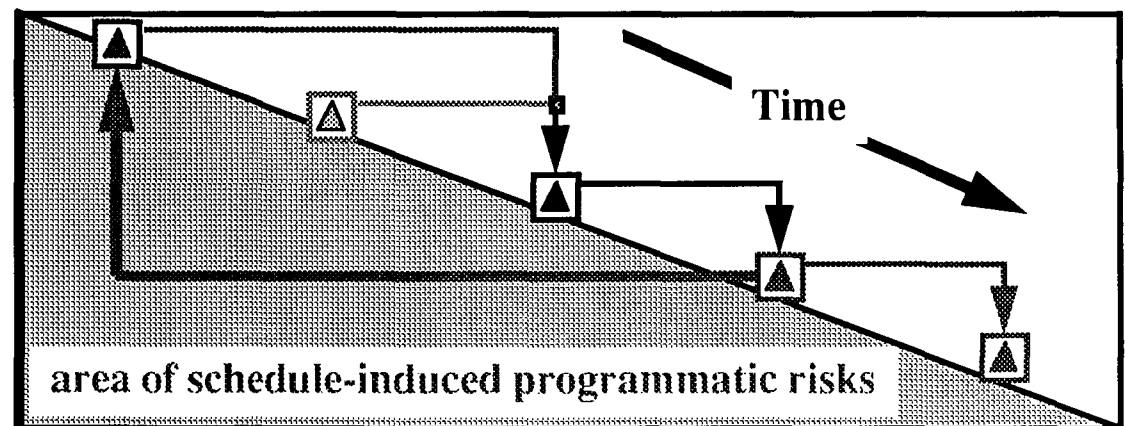
- Identify Program-Level Decision Milestones and Schedules



- Construct Technological Decision Hierarchy for CRWMS
(Logical precedence in direction of arrows)



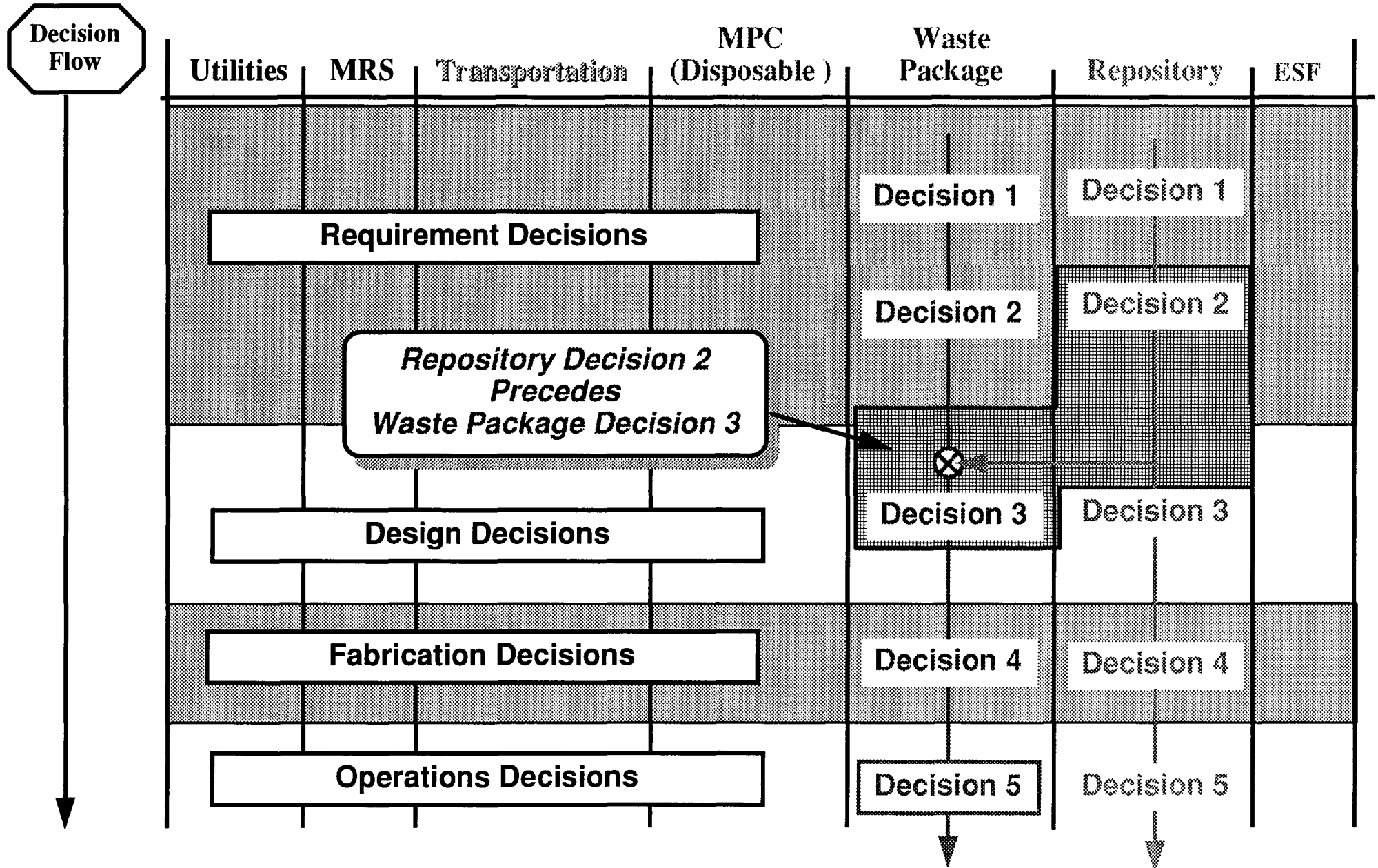
- Integrate Technological Hierarchies and Schedule
(Milestones linked per technological decision hierarchy)



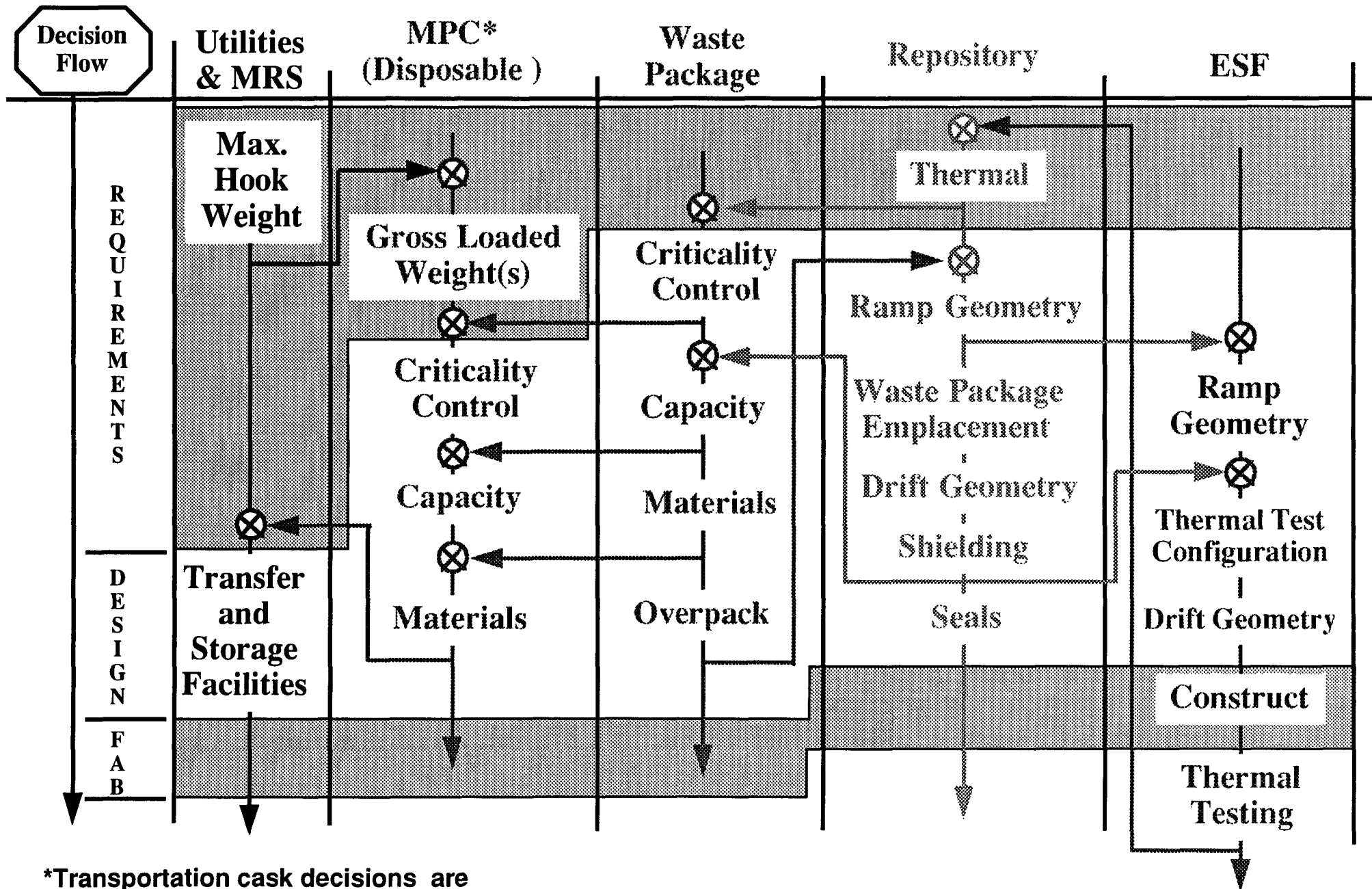
- Identify Schedule-Induced Programmatic Risks (←)

backward arrow = S-I PR = logical disconnect on order of decisions

Technological Decision Hierarchy Format

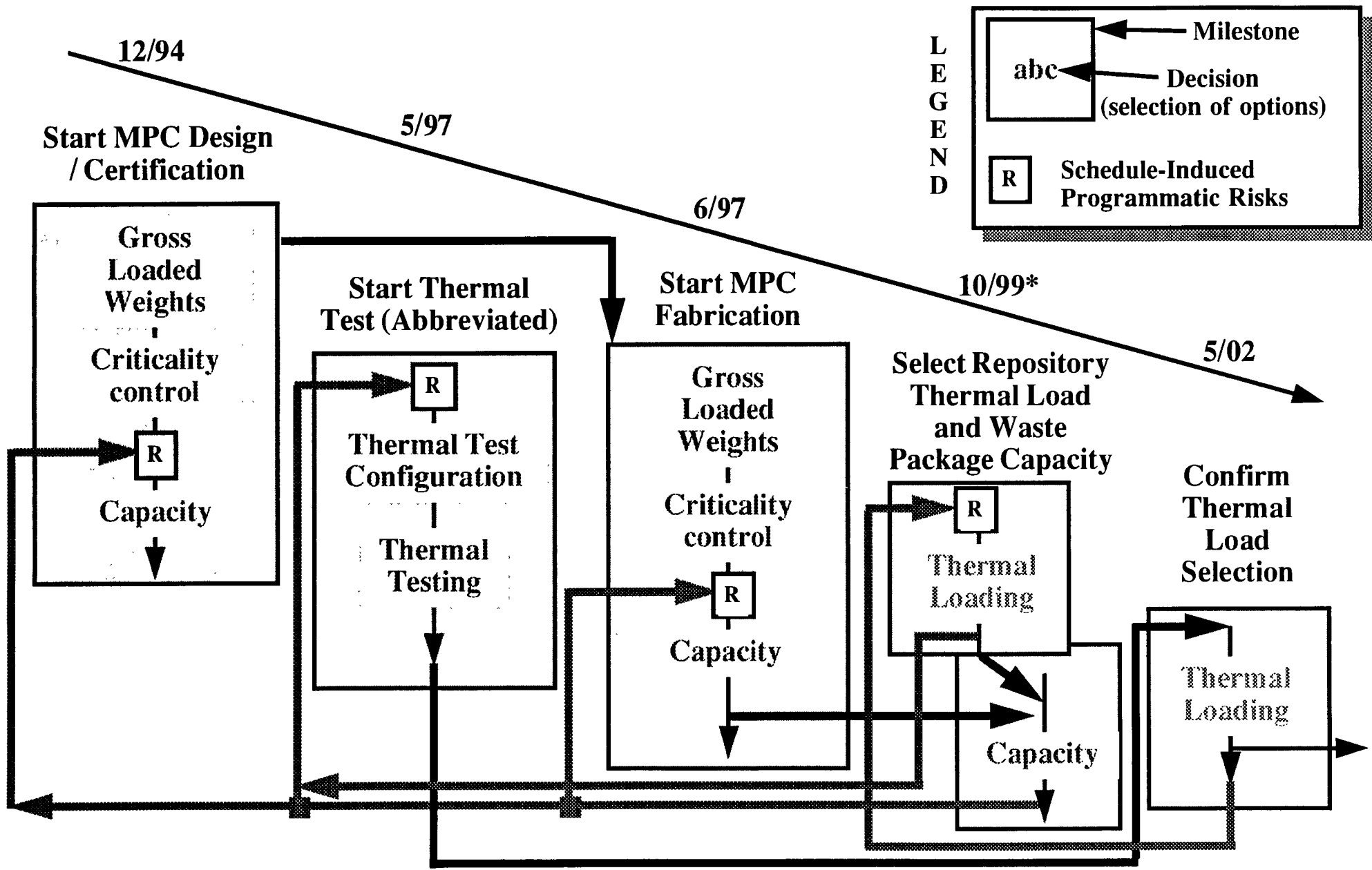


Example Technological Decision Hierarchy - MPC Canister/Cask



*Transportation cask decisions are included in the MPC decision hierarchy

Example Schedule-Induced Risks: MPC Canister/Cask



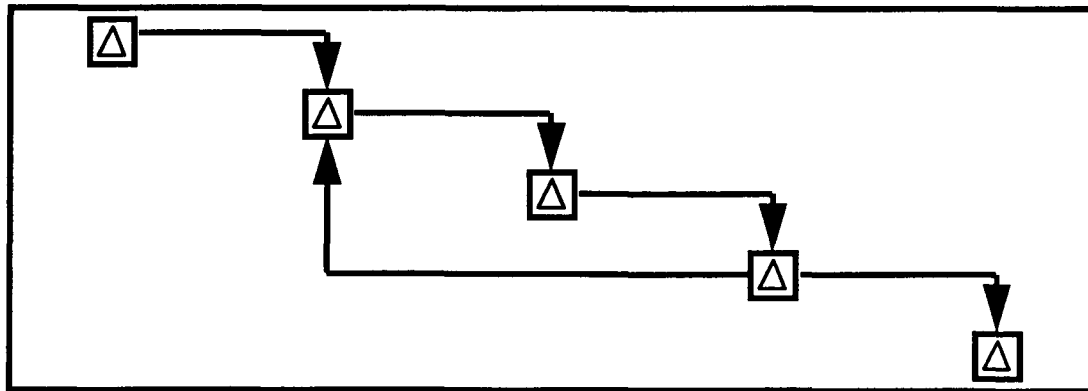
*Prior to data freeze for LAD

Findings

- **Milestone network diagram**
- **Schedule-induced programmatic risks**

Program-Level Decision Milestone Network Diagram

- **Chart shows milestones in chronological order (left to right)**
- **Chart shows technological precedence of decision milestones (arrows)**
- **Chart shows instances of schedule-induced programmatic risks (backward arrows)**



Schedule-Induced Programmatic Risks

- **MPC design and fabrication decisions must anticipate waste package thermal, criticality and material design decisions**
- **Repository and Waste Package license application design decisions must anticipate thermal decisions**

- **ESF thermal test configuration decisions must anticipate thermal and waste package design decisions**
- **MRS design decisions must anticipate MPC design and contingencies**

- **MRS design decisions must anticipate repository requirements for ageing and blending**
- **Repository surface facility design decisions must anticipate non-standard fuel and HLW transportation cask design decisions**

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Conclusion

- **System analyses need to address mitigating programmatic risks for:**
 - **MPC design and fabrication strategies for anticipating waste package thermal, criticality and material decisions**
 - **The thermal testing program**
 - **MRS design anticipation of MPC evolution**
 - **MRS and Repository options for ageing and blending**
 - **Repository anticipation of non-standard fuel and high level waste cask designs**
- **The tool that has been described is to be used for identifying “schedule-induced” programmatic risks as the program evolves**