

**PRESENTATION TO THE
NUCLEAR WASTE TECHNICAL REVIEW BOARD**

**Subject: Scope and Approach to the
Physical System Functional
Analysis**



**By
William A. Lemeszewsky
Chief, Systems Engineering Branch
RW-321
July 15, 1991**

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PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Introduction

- **November 1989 Secretary's report announced improved management procedures including increased use of systems engineering**
- **Director, OCRWM requested in the August 1990 Management System Improvement Strategy (MSIS):**
 - **A rigorous implement of systems engineering principles**
 - **Special emphasis on a functional analysis approach to achieve thorough integration of program functions with physical system requirements**
- **Implementation of efforts related to the physical system was initiated in August 1990 in order to produce revised technical baseline requirements documents**

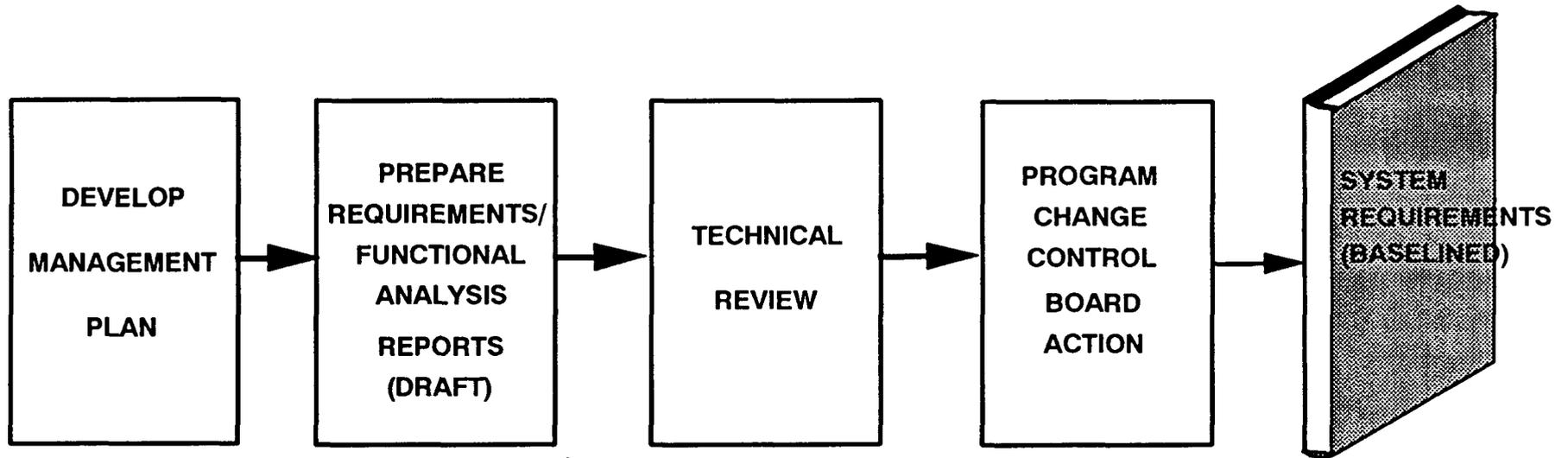
PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Approach

- **A technical document management plan was prepared and approved in accordance with QA procedures for the development of baseline requirements documents (Physical System Requirements/Functional Analysis Management Plan)**
- **A functional analysis approach was implemented in the conduct and preparation of requirements documents**
- **A technically and QA qualified contractor team was formed to conduct functional analyses and develop draft requirements documents**
- **A separate regulatory requirements group was formed to identify detailed regulatory requirements affecting physical systems**
- **OCRWM Technical line personnel and technical experts were required to participate in the functional analysis meetings**

PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Baseline Document Evolution

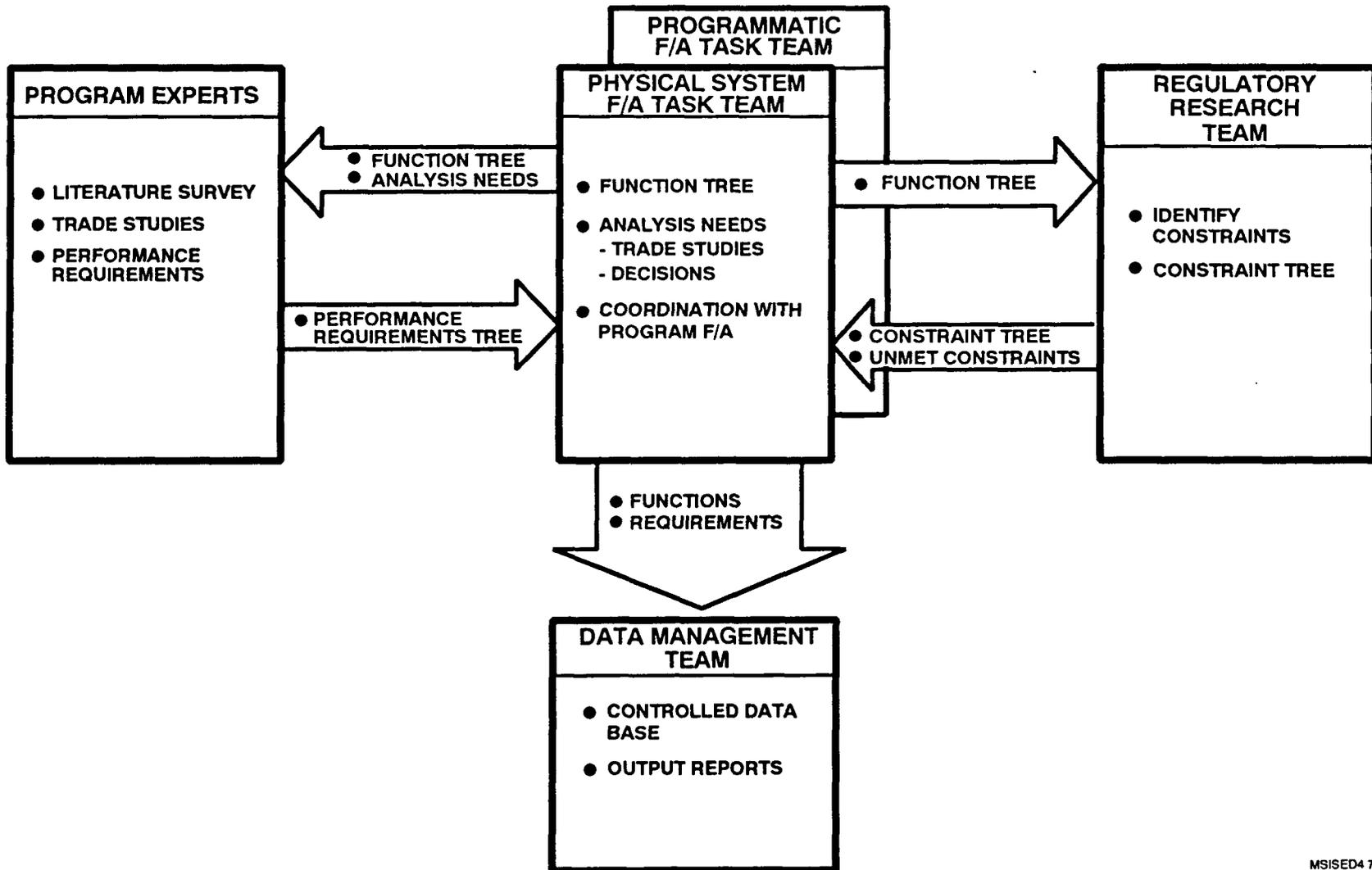


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PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Functional Analysis Implementation



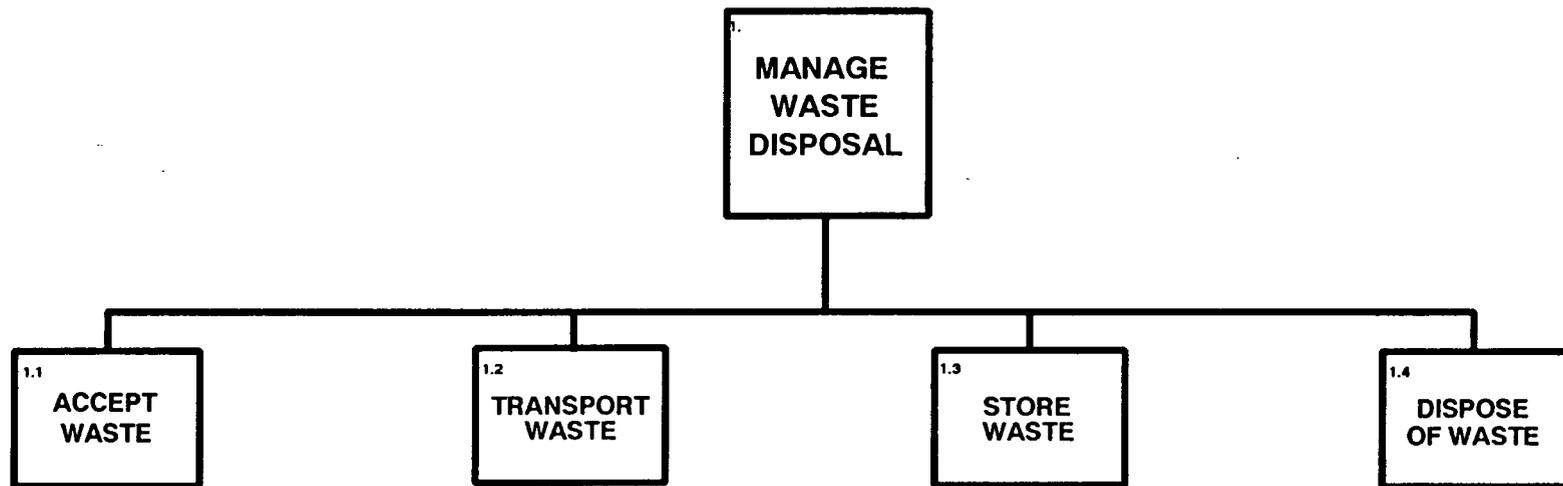
PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

The system engineering functional analysis approach has resulted in:

- **Revised documents developed using a structured and credible approach based on accepted engineering practices**
- **Functional analysis meetings that utilized the best available DOE line and contractor/lab personnel for determining and allocating functions and requirements**
- **A process that ensures traceability of functions, requirements and interfaces as required by NRC**
- **A list of management decisions and system studies that need resolution in order to fully determine all physical system requirements**
- **A functions and requirements computer data base that will simplify and facilitate future modifications, traceability, verification and impact analyses**

PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Function Tree



PHYSICAL SYSTEM FUNCTIONAL ANALYSIS

Participation

- In the development of the 4 requirements documents to date 60 individuals have contributed approximately 20 manyears of effort
- Documents have been reviewed by approximately 15 additional personnel during four documented technical reviews and two change control board reviews
- Preparers, reviewers and expert participants were utilized from:
 - . DOE/OCRWM
 - . USGS
 - . Battelle
 - . Weston
 - . SNL
 - . LANL
 - . LLNL
 - . SAIC
 - . E.R. Johnson Assoc.
 - . Raytheon
 - . PNL
 - . OCRWM/M&O