EPA

Systems

Development

Center

INITIAL REPORT ON THE FEASIBILITY OF AN EPA SYSTEMS DEVELOPMENT CENTER

EXECUTIVE SUMMARY

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D R A F T

FEASIBILITY STUDY
FOR
SYSTEM DEVELOPMENT CENTER (SDC) IMPLEMENTATION

EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

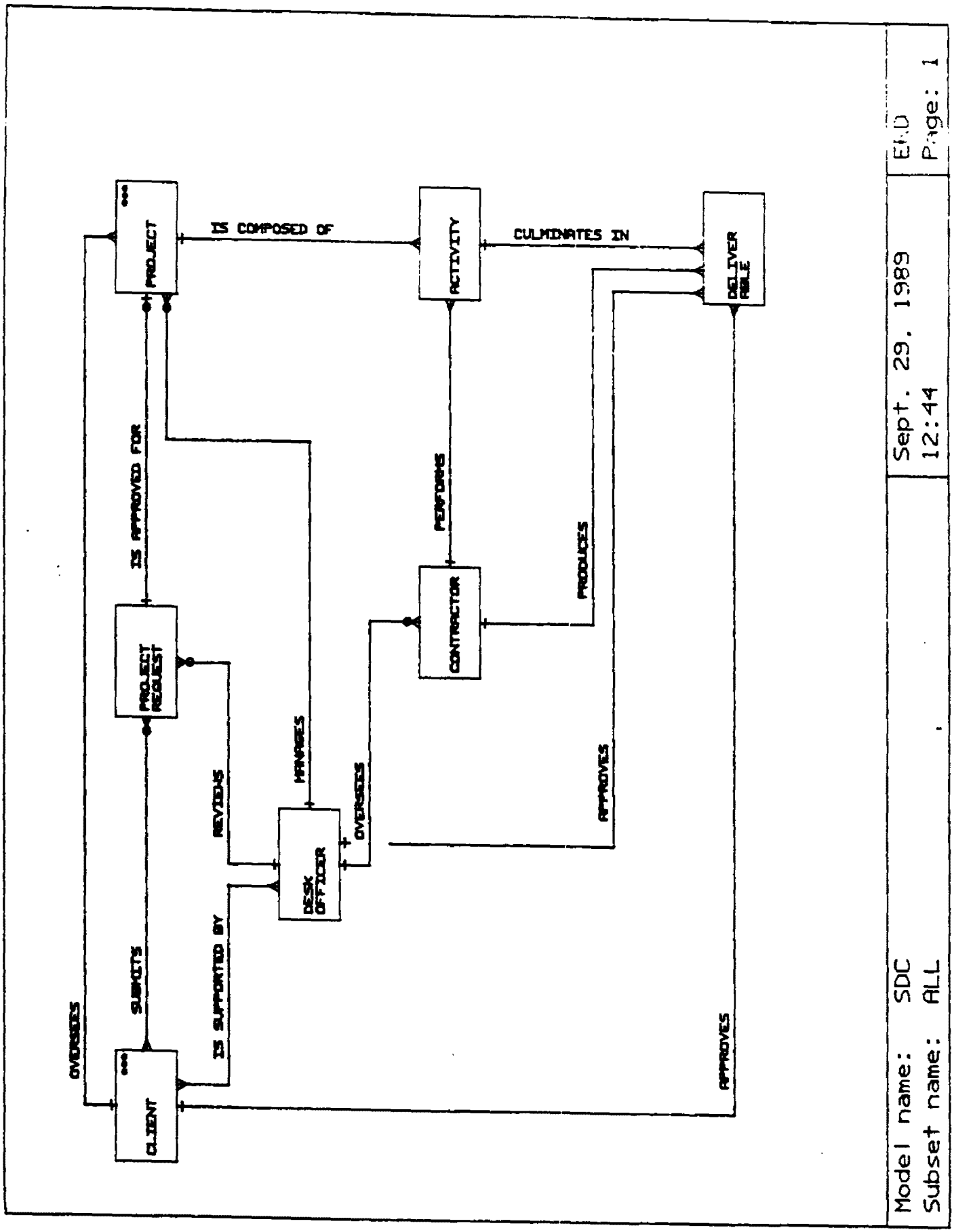
This document presents the feasibility of establishing the EPA Systems Development Center (SDC), a centralized facility to manage, support, and coordinate the system life cycle (SLC) in the development of higher quality, cost-effective, efficient and maintainable computer systems. The establishment of the SDC is in accordance with the Systems Modernization Initiative (SMI), which directs the EPA to build and renew systems for more accessibility and usability by a growing population of information users.

The Feasibility Study

A feasibility study was conducted by implementing a prototype development center and three pilot projects of differing development types within the SDC structure. The pilot project team was modelled as envisioned in the operational SDC environment: staffed with the EPA Office of Information Resources Management (OIRM) desk officers, contract developers and EPA program office information users. An illustration of this model is presented in Figure 1. A structured development methodology was implemented to test a rigorous, standardized, information-oriented approach to the system life cycle. James Martin's Information Engineering Methodology (IEM) and Texas Instrument's (TI) Information Engineering Facility (IEF) were selected as the methodology and associated Computer-Aided Software Engineering (CASE) tool

FIGURE 1

THE SDC MODEL



to be tested in the pilot studies because of their orientation toward defining the business structure and user requirements through informational (data) flow, the full implementation of the system life cycle, and the well-defined framework for establishing enforceable development standards.

Benefits to EPA

This Feasibility Study documents the benefits of the SDC prototype and the IEM implementation, outstanding technological issues, and SDC implementation considerations as experienced in the pilot projects. These results will help guide management in their evaluation of SDC effectiveness in building better, more usable systems and help determine acceptance and further implementation of the SDC.

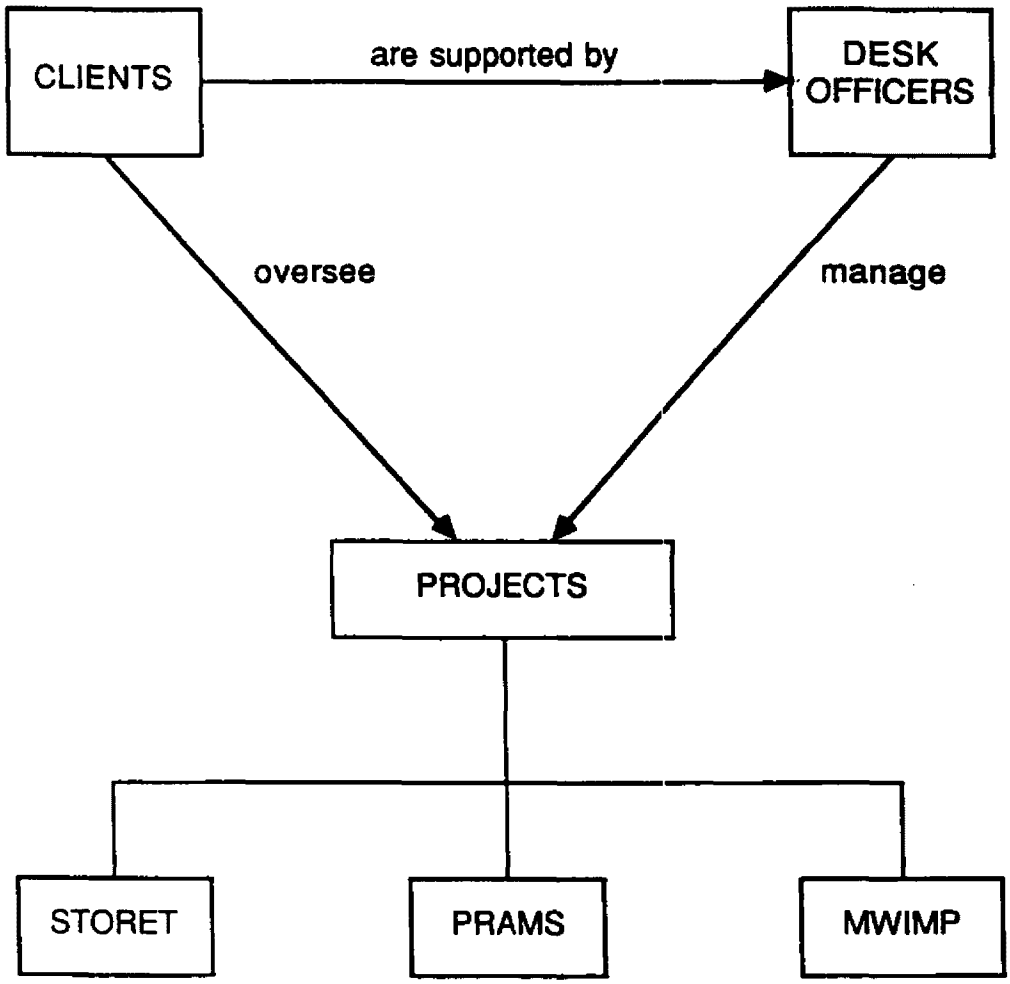
Accomplishments of the Pilots

Using the structured methodology techniques, the project team accomplished the development of two microcomputer information systems and the high-level analysis of an existing, well-used water quality system (Figure 2).

The STORET water quality system was defined and described; its user profile and information needs were identified; and a logical model of the water quality enterprise was developed. This

FIGURE 2

PROJECTS



constituted the initial assessment of the strategic planning stage within the methodology and provided management with an information architecture from which systems can be built. The Paperwork Reduction Act Management System (PRAMS), an existing minicomputer system supporting information collection request management for the Information Policy Branch (IPB), was constrained by the existing hardware technology. The team redesigned this system and enhanced it based on the IPB needs defined in the detailed business area analysis of the methodology. The system is in the testing stage of development at this time. The Medical Waste Information Management Project (MWIMP) is a new EPA program in compliance with both the Medical Waste Tracking Act (MWTA) of 1988 and the resulting EPA program to monitor this process for two years in five states. A new microcomputer system is being developed to accommodate this need. The project is completed through the design stage and is expected to be implemented in December 1989.

Summary of Findings

Results generated from the pilot projects identified several benefits in accordance with SDC goals.

One benefit has been the consistent demonstration that Information Engineering answers the objectives for the EPA information needs management. The models developed in the pilot studies provided a sound base for the understanding of the business

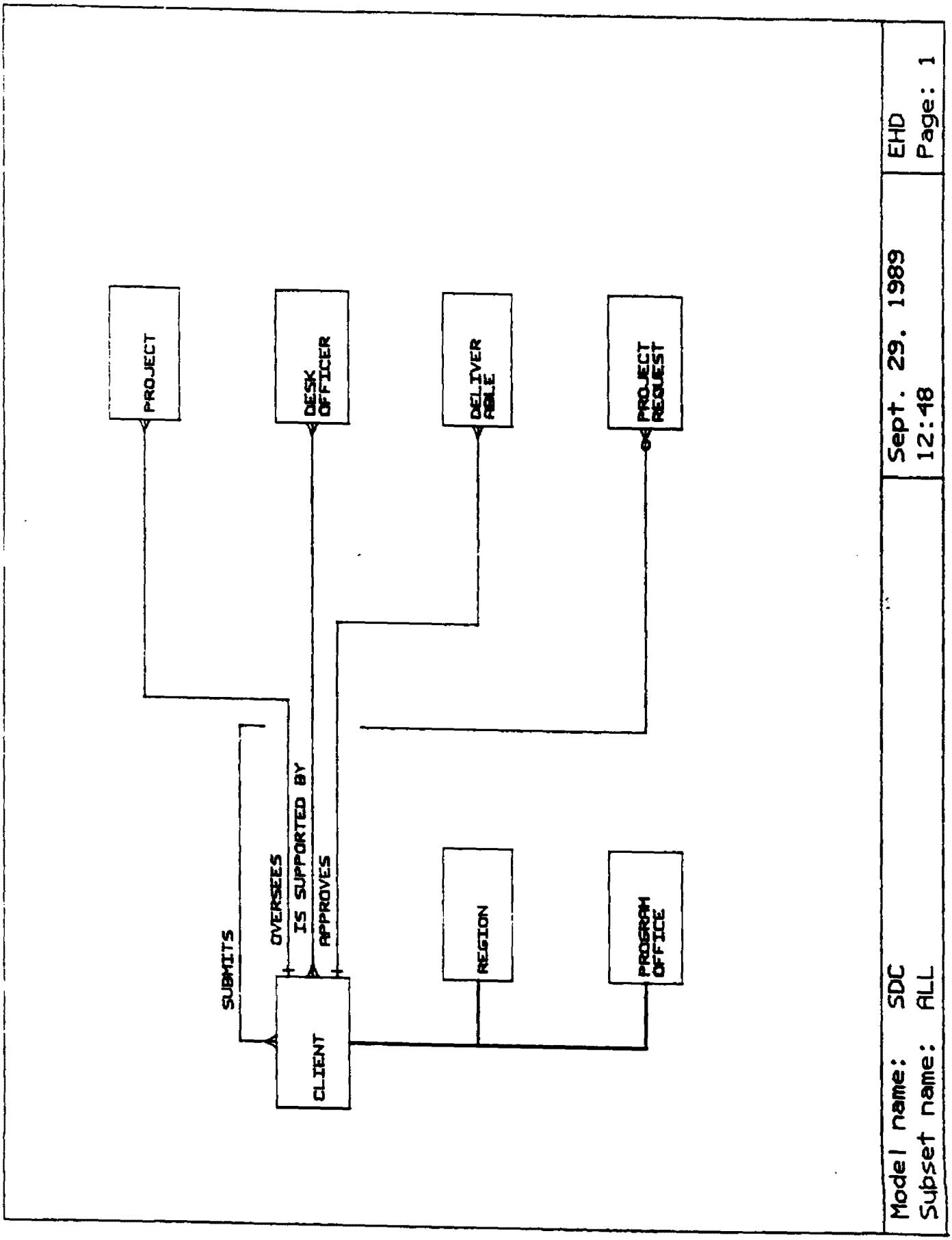
areas represented. The strategic planning stage of Information Engineering, analyzing information needs from a high-level management view and independent from current computer systems, may provide EPA a new perspective with which to define information systems more applicably across functional enterprises and less focused within a program unit.

The IEF CASE tool provides rigid enforcement of consistent, uniform methods and comprehensive automated consistency checks for high-level quality assurance. Developers found that the step-by-step progression of the early SLC stages, in conjunction with early prototyping, enforced the front-end analysis often omitted or reduced due to time constraints. Early problem identification, increased user understanding, and the automated environment made the development environment more effective.

There is confidence among the program office information users that the systems being developed will better meet their business needs and be more usable. This was attributed to the standardized diagrams and techniques, providing understandable graphics and increased detail for the program office information users in describing the prospective system; increased communications with the SDC project team; and the review and approval process (Figure 3) enforced within the methodology and CASE tool.

FIGURE 3

CLIENT INTERACTIONS



Experience Gained

Experience gained from the pilot studies and findings documented in this report are important to the SDC's implementation planning. Areas of consideration include the development of customized methodology training particular to the program office staff; the applicability and use of the methodology for differing project types (i.e., system size and longevity); and the need for continued high-level technical support throughout the learning process. The project team structure, as effected in the SDC prototype, was determined to be a stabilizing and supporting influence for the program office users. The SDC (Figure 4) is an effective alternative to the current development team structure.

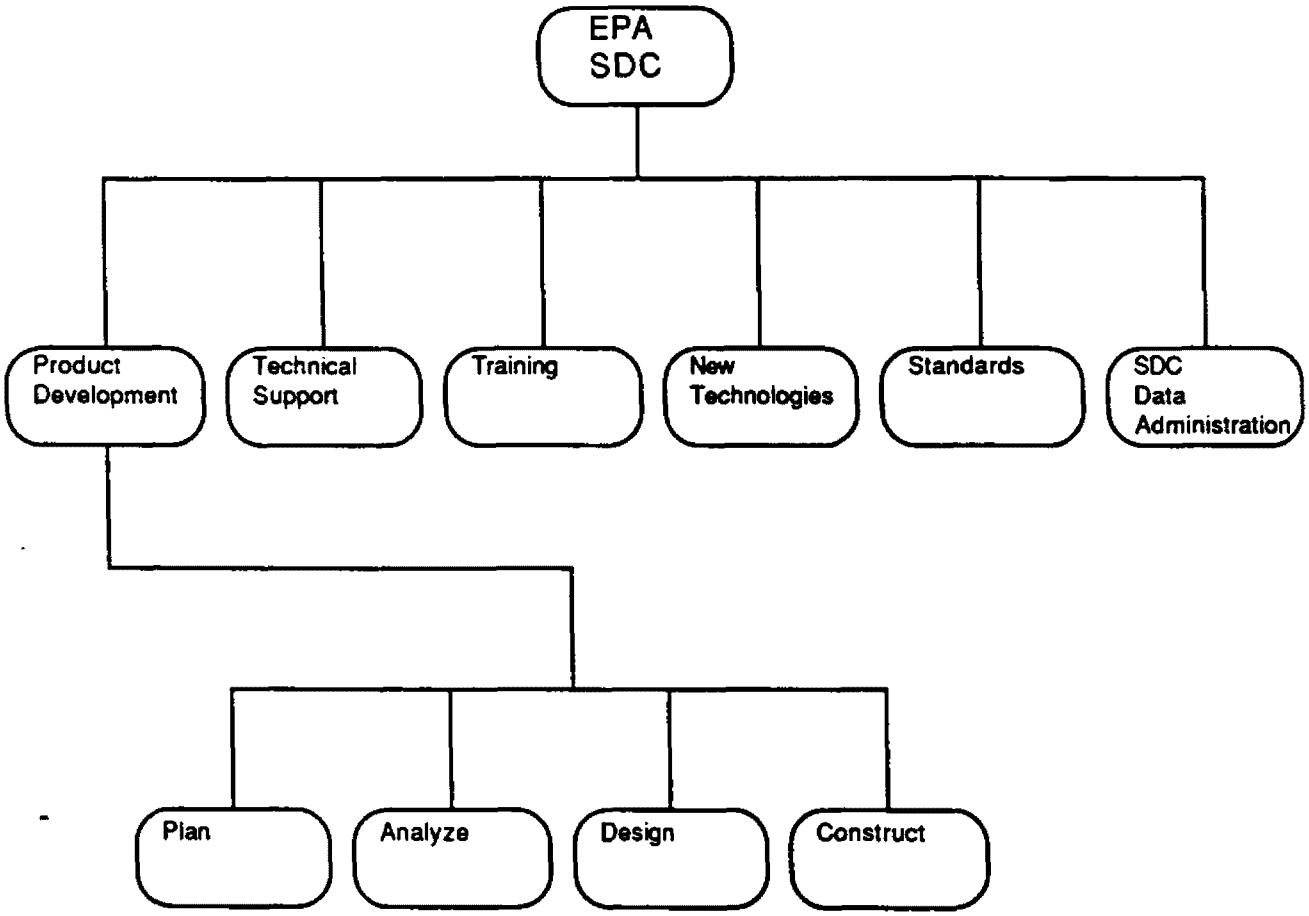
Recommendations to EPA

The recommendations, as determined from the implementation of the SDC prototype and associated pilot studies, are as follows.

The SDC should continue to pursue the use of the Information Engineering Methodology, as it provides an information model applicable to the EPA mission and business areas; it implements and enforces the full system life cycle tasks; and it provides a strong framework for the SDC to standardize the EPA development environment.

FIGURE 4

THE SDC FUNCTIONS



The SDC should continue to search for the "best fit" set of automated CASE tools for their needs. Although IEF is very strong in maintaining and enforcing the methodology structure and consistency rules, it may not be adaptable enough to handle integrating the needed prototyping and lower-end (coding and testing) tools needed to support EPA's current systems environment. Alternative CASE tools that support Information Engineering should be piloted and compared with IEF. In conjunction with the CASE tool, automated project management alternatives should be evaluated as an external workstation component. A combination of tools should be identified and implemented within the workstation. At the same time, advances in new technology, continued CASE tool integration, and alternative target languages, as developed within the current IEM CASE tools, should be monitored and evaluated for use in the SDC as they become available.

The initial findings of the pilot projects show that the implementation of the structured methodology at UPPER (planning, analysis and design stages) CASE levels has the potential for building a better, more usable system. The development projects should continue to be monitored for quality assessment based on testing, maintainability with change, and productivity resulting from the front-end effort.