ORDER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

1370.68

9/11/89

SUBJ: AUTOMATED DATA PROCESSING INFORMATION TECHNOLOGY FACILITY (HOST RESOURCE) SELECTION

1. PURPOSE. This order prescribes procedures for selection of an information technology facility to process an information system. It also implements the automated data processing selection direction in OMB Circular A–130, Management of Federal Information Resources.

2. DISTRIBUTION. This order is distributed to the division level in Washington, regions, and centers.

3. BACKGROUND.

a. The Brooks Act of 1965, Public Law 89–306, the Paperwork Reduction Act of 1980, Public Law 96–511, and the Competition in Contracting Act of 1984, Public Law 98–369, establish the statutory considerations with respect to information resources management, including assignment of specific responsibilities and authority to the General Services Administration (GSA), the Office of Management and Budget (OMB) and the National Institute of Standards and Technology (NIST).

b. In the Federal Information Resources Management Regulations (FIRMR), GSA publishes and codifies uniform policies and procedures pertaining to information resources activities by Federal agencies and by Government contractors as directed by agencies. The FIRMR provides regulations for acquiring, using, and managing automated data processing resources and requires that the benefits and costs be documented. This requirement includes showing that the proposed general purpose automation processing resource is the most cost effective.

c. Within FAA, requirements for using automated data processing (ADP) resources must be justified on a total life cycle basis. Further, the justification must be documented as specified in paragraphs 90 through 94 of Order 1370.52B, Information Resources Management—Policies and Procedures. Order 1810.1D, Major Systems Acquisition, contains a discussion on developing and documenting life cycle costs.

d. Appendix II of OMB Circular A–130, contains specific direction for establishing automated data processing selection management control procedures. Section 5 of appendix II, titled: "Selection of Information Technology Facilities to Support New Applications," describes the criteria to be used in the information technology facility selection process as shown below.

"In selecting information technology facilities to support new applications, agencies shall establish a management control procedure for determining which facility will be used to support each significant application. This procedure shall ensure that:

(1) all alternative facilities are considered, including other Federal agency and non–Federal facilities and services;

(2) agency rules do not require that priority be given to the use of in–house facilities; and

(3) the project manager or the OPI of the application system has primary responsibility for selecting the facility."

4. DEFINITIONS. The following definitions are applicable to this order:

a. The FAA Senior Management Official (SMO) is the Associate Administrator for Administration. He is responsible for agency information management activities as described in the Paperwork Reduction Act (PRA). Some of his activities include IRM related management as it pertains to P.L. 96–511, policy and oversight responsibilities on behalf of the Administrator, and ensuring all requirements of the PRA, OMB circulars, FIRMR, and FAA policies are implemented and followed within FAA.

b. A user organization is an organizational element that receives data processing services from an information technology facility or common system facility. A user organization may be either internal or external to the FAA organization responsible for maintaining the common system facility, but normally does not report either to the manager of the facility or to the same immediate supervisor.

c. An office of primary interest (OPI) is a user organization that is responsible for managing and administering an application system.

d. A common system facility is the shared pool of general purpose information technology facilities consisting of hardware, software, technical support, and physical facilities used to meet the agency's administrative and program processing needs in support of the FAA mission. An example of current common system elements is the IBM 3084 host at the Aeronautical Center; the Data General MV 15000 Super Minicomputer hosts at the FAA regional headquarters. Such resources are acquired and operated for the use of more than one user organization.

e. An information technology facility is an ADP system facility which is dedicated to serving multiple applications, purposes, and programs with minimum cost and maximum efficiency.

f. Federal Information Processing Standards (FIPS) were established by NIST to provide Federal standards and guidance for specifications and documentation. The FIPS publications apply to any organization supplying computer hardware, software, and/or computer services to Federal Government agencies and for any business doing ADP work under a Federal contract.

g. An information area is defined in the Information Resources Management Plan (IRMP).

h. A major modification is a system change, costing $50,000 or more, that revises basic system processing, e.g., replacing batch processing with interactive processing, or expands the user organization base beyond a single information area.

5. SCOPE. This order applies to all OPI's selecting information technology facilities for new application systems or for existing systems undergoing a major modification.

6. RESPONSIBILITIES. The following responsibilities in this paragraph supplement the responsibilities assigned in order 1370.52B.

a. The SMO is responsible for assuring that information technology facilities are appropriately acquired and used in an effective manner. The SMO will make the final decision when disputes arise between user organizations concerning the selection of hosting arrangements. Finally, the SMO will submit selection documentation to the Office of the Secretary of Transportation, as required when acquisition thresholds are reached.

b. A center director, regional administrator, associate administrator, assistant administrator, or office head reporting to the Administrator, is the approving official responsible for information technology facility selection within their organizations. This responsibility may be redelegated to the next lower organizational level.

(1) The approving official will select the information technology facility meeting critical requirements and having the lowest total cost to the Government.

(2) The approving official makes a final decision for projects that affect only his/her user organization(s) and have a total cost less than $300,000.

(3) The approving official will coordinate the selection documentation with the SMO for projects that have a total cost of $300,000 or more.

(4) The approving official must forward the selection documentation to the SMO for final decision for projects that cause a dispute between user organizations, regardless of total cost.

(5) The approving official shall ensure that complete documentation supporting the information technology facility selection is retained in accordance with Order 1350.14A, Records Management.

c. **An OPI** is responsible for:

(1) Coordinating ADP processing resource requirements with their respective information resource managers (IRM).

(2) Obtaining processing resources needed to support approved automated application systems, including submission of information technology facility selection documentation to the approving official.

(3) Designating a project manager to conduct, oversee, and document application system information technology facility selection analyses.

(4) Ensuring that all affected organizations are involved in the project to select processing resources.

(5) Conducting the information technology facility selection procedures and coordination of the conclusions and recommendations with other affected organizations.

(6) Considering the total workload requirements of the information area, and requirements for integration and interface with other information areas, in the information technology facility selection procedures and reflect these data in the cost versus benefits computations.

(7) Completing the information technology facility selection procedures before prototype or pilot processes are established. If the system development schedule indicates that the new software will be ready for prototype or pilot tests before the host can be available, the system software may be developed on an alternate resource. The software shall be configured, however, to optimize transfer to the selected information technology facility.

d. **The project manager** is responsible for:

(1) Complying with the application system information technology facility selection process as appropriate to the system development project.

(2) Providing documentation for all aspects of the project, including the information technology facility selection documentation specified in this order.

(3) Coordinating the project work with:

(a) The Office of Management Systems (AMS–300).

(b) Affected offices, including organizations having a need for similar data.

(c) The applicable Automated Information System (AIS) Security Program office, i.e., regional, center, or national headquarters.

(d) The Logistics organization when an acquisition is contemplated.

(4) Preparing, coordinating, and subsequently retaining for audit, all information technology facility selection documentation resulting from factor analyses and cost/benefit studies.

e. **The Office of Management Systems (AMS)** is responsible for:

(1) Ensuring integration of application data systems and coordination of resources in the common system.

(2) Reviewing proposals for application systems development and documentation supporting information technology facility selection.

(3) Notifying user organizations and the SMO when hosting arrangements do not meet FAA policy guidance or do not support planning goals.

7. PROCEDURES FOR SELECTING INFORMATION TECHNOLOGY FACILITIES.

a. Explanation. To devise the most appropriate strategy for distribution of information systems workload to information technology facilities, numerous tradeoffs must be weighed. Selecting the appropriate ADP support resource is a complex process, requiring the collection of many data variables and the application of ADP experience in analyzing these data to design a workable solution. User organizations should avail themselves of advice from the local information systems organizations. Because of an increased number of application systems being developed, however, experienced ADP staff may not be available to assist in all aspects of this effort. User organizations must, therefore, do the bulk of the work in collecting and structuring the information to be reviewed and analyzed by appropriate technology advisors. The procedures outlined in paragraphs 7b through 7d(4) provide an orderly approach for this effort.

b. Automated Choices. It is assumed that in reaching this point, the user organization has discarded non–automated solutions. Thus, the existing choices for information technology facilities are:

(1) Mainframe Processors.

(a) The FAA common system facilities.

(b) Departmental general purpose computers at Transportation Computer Center or Transportation Systems Center.

(c) Either Government–provided or commercially–available time share computers.

(2) Minicomputer distributed processor (special use).

(3) The FAA office automation microprocessor (special use).

c. General Rules. There are several factors that must be taken into account in selecting a processing resource for supporting an application system. They are directly related to processing cost trade–offs, benefits to be accrued, and to the sensitivity of the mainline applications that must be maintained as part of long–range organizational strategy.

(1) Mainframe Processors. Normally, centralization and consolidation on a large computer is advisable for complex application systems. Despite advances in small computer capabilities, the productivity factor of mainframe processors, e.g., cost per computation performed or cost per data element maintained, remains an important objective for FAA. Further, because uniformity and integration of information is a significant agency concern, when mainframe processing capability is needed, use of ADP resources other than those provided by the FAA's Computer Resources Nucleus (CORN) program will require a compelling justification. A mainframe computer should be given primary consideration when:

(a) Exerting stringent security, quality, and restart recovery control over input–output actions, where highly expert ADP interaction, or data integrity is a paramount requirement.

(b) Responding to requests for consolidated agencywide information.

(c) Collecting and consolidating data is cost effective to support a single customer–account information master file.

(d) Large volumes of historical data collection and retrieval are paramount for the end user analysis in supporting the agency's need for accurate and timely decisions based on data trends.

(e) Interfaces with a large volume of data exchange.

(f) Timeframes for batch interface and processing are critical.

(g) Sharing system and application files/tables among integrated but separate user organizations.

(h) Seeking the benefits of economies of scale.

(i) Designing an application system that is highly complex or that has a high volume of transactions and/or users.

(j) Processing is required for complex algorithms or to support a high volume of mathematical computations.

(2) Microprocessor. The benefits of microprocessors are most evident when human factors are a key issue. Factors such as job enrichment and personnel productivity may argue for placing processing operations under the direct control of personnel who contribute to the processing. Further, user satisfaction may be enhanced if data bases are on–site to facilitate responding to customer requests, rather than located at a remote computer facility where the data bases are not under the control of the user. Accuracy in entering data and maintaining data bases is usually improved when there is immediate interaction and feedback between personnel and computer, without the delays that are generally associated with remote batch processing of locally–entered source data. Finally, if managerial accountability is to be a requirement, it can best be achieved by directly associating the operation with the responsible user or manager. A microprocessor should be given primary consideration when:

(a) There is urgency in locally obtaining system output results.

(b) There is a single dominant file that does not have to be shared with others beyond the local office.

(c) Judgmental values must be applied by users in working with system inputs and outputs.

(d) There are high local inquiry rates.

(e) There is need for heavy clerical involvement that can be most effectively achieved at the worksite, rather than in a large remote central processing facility.

(3) System Design Rules. The criteria shown below must be followed when designing an information system in FAA.

(a) Data must be entered only once.

(b) Edit and validation of data must occur as close as possible to its point of origin.

(c) Store data as close as possible to its originator and/or user.

(d) Store data only as many times as absolutely necessary to make its use more cost effective.

(e) System design must include all related information requirements in addition to those of the OPI.

d. Host Selection Procedures. The project manager shall comply with the following procedural steps. Each step shall be documented as required by paragraph 6d.

(1) Describe the application system, including objectives of automation. Document benefits, quantified in dollars, for the requirements life cycle. If a system life cycle cannot be determined, apply the following guidelines:

(a) Five years for a system with implementation costs under $50,000.

(b) Eight years for a system with implementation costs from $50,000 to $300,000.

(c) Ten years for a system with implementation costs over $300,000.

(2) Compile facts about the requirement. Translate these facts into ADP terms. Figure 1, Selection Factors, provides a list (not all inclusive) of the factual information that should be contained in the narrative documentation for this step. If needed, request help from the local ADP organization. An application data flowchart is generally an appropriate narrative supplement for this step. Data flow should be charted from source of data, indicating proposed data collection methods and media, via each processing or storage point (including intermediate points) to the point of highest data consolidation. Finally, a complete flowchart should show the methods and media to be used to present the data to the end–users. Figure 2, Elementary Data Flow Diagram, contains an elementary dataflow diagram.

FIGURE 1. SELECTION FACTORS

User related items:

Number of users concurrently
Geographic distribution of users
Frequency of access
Type of output
Type of input
Type of access (real time activities compared to time trend statistics)
User expertise

Data/processing related items:

Volume of data (by location)
  on line/off line
  storage type
Complexity of processes
Edits, computations, size of programs, software package availability
Peripherals required
Time of day for processing
Level of control (max. centralized compared to less critical)
Data sensitivity
Interface requirements
Type software required
Client requirement for operational control
Storage location of related existing data bases and their relationship
Processing requirements (CPU cycles, memory needed, peak processes)
Response requirements
Technical support needs

(3) **Conduct a preliminary selection analysis.** Based on the factors in figure 1, select the resource that seems best to meet the technical requirements. Often, factors other than cost are basic to determining processing resource and whether a microprocessor or a large mainframe processor is appropriate for an application system. Figure 3, Preliminary Selection Process, contains an elementary preliminary selection–decision diagram.

(4) **Complete the costs and benefits analyses.** These analyses should be prepared for all feasible alternatives. At a minimum, they should include consideration of a "status quo" alternative and a common system resource alternative. As an example, the ADP resources provided by the CORN contract should be included as an alternative whenever mainframe processors are required. Figure 4, Cost Components, presents a list of cost components (not all inclusive) to be shown for each year of the requirement life cycle. Total costs for each year must be translated into present values by application of the present value rates shown in Figure 5, Present Values.

FIGURE 2. ELEMENTARY DATA FLOW DIAGRAM

THE FOLLOWING FLOW DIAGRAM DEPICTS THE ELEMENTARY FLOW OF DATA THROUGH A TYPICAL APPLICATION FROM ORIGIN TO FINAL USE.

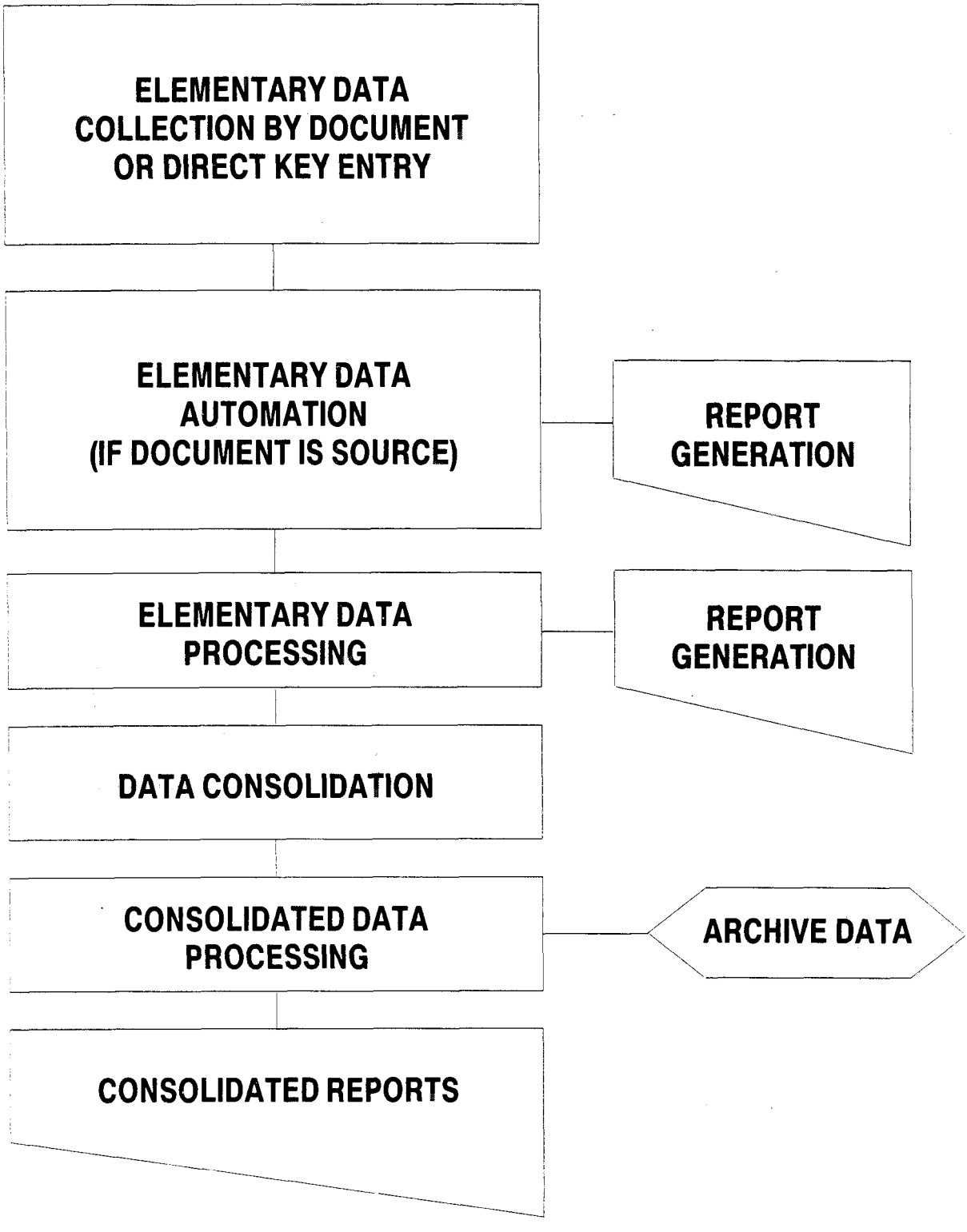

FIGURE 3. PRELIMINARY SELECTION PROCESS

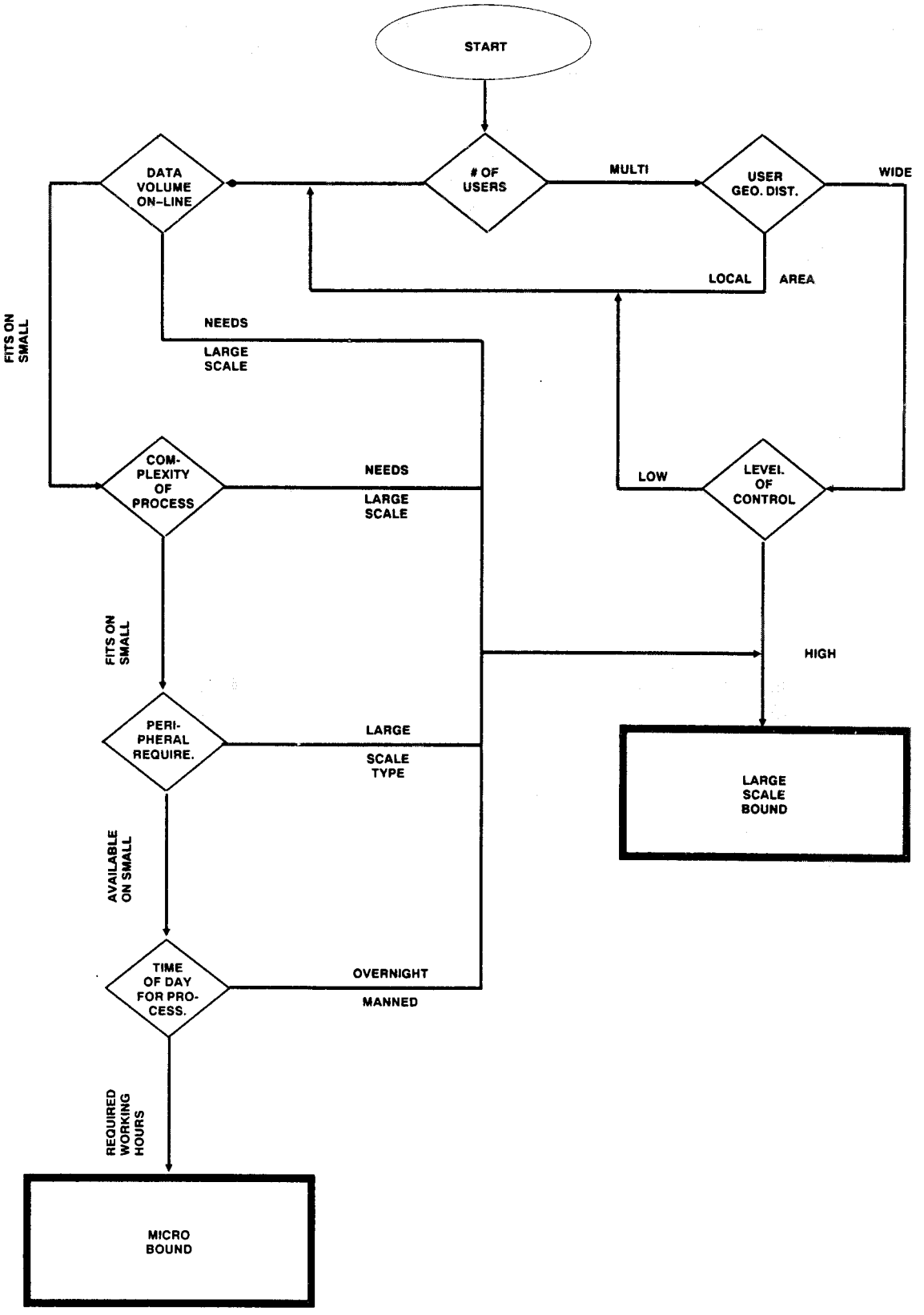

FIGURE 4. COST COMPONENTS

Hardware
Software
Communications
Space/environmental controls
Furniture
Maintenance (hardware/software, distribution of software)
Facility (management/operations, backup/recovery)
Training (managerial, technical, operational, end–user)
Ancillary equipment
Documentation (facility, training, system operations)
Consumables
Other input costs
Other output costs
Potential cost of locking users into a particular vendor

FIGURE 5. PRESENT VALUES

The present value of an alternative is the money cost required to finance it when a specified percentage could be earned from that money. This then represents the "opportunity cost" of capital. Assuming equal benefits, an alternative with a lower present value cost should be selected. Selecting an alternative with the lowest present value cost means that resources are being allocated most efficiently in the sense that the least of current resources will be diverted to satisfy the requirement.

10 PERCENT PRESENT VALUE TABLE

PROJECT YEAR	PRESENT VALUE OF $1
1	0.954
2	0.867
3	0.788
4	0.717
5	0.652
6	0.592
7	0.538
8	0.489
9	0.445
10	0.405

(5) **Complete Procedures.** The most cost effective processing resource, as determined from the foregoing analyses, should be selected. The selection approval shall be documented. If an information technology facility that is not most cost effective is selected, as a result of other factors as noted in paragraph 7d(3), proceeding, the action must be justified fully to the SMO.

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