

PART II

INFORMATION RESOURCES
MANAGEMENT
PROCEDURAL DIRECTIVE

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Left blank intentionally

Part II

Procedural Contents

Chapter 1 Information Systems Planning, Budgeting and Development

- 1-1 Information Technology Planning Process
- 1-2 Report on Major IT Systems Budgets
- 1-3 Life-Cycle Management (LCM)
- 1-4 FEMA Documentation Requirements

Chapter 2 Management and Use of Information

- 2-1 Collections of Information
- 2-2 Access to Information Technology for Individuals with Disabilities
- 2-3 Records Maintenance and Electronic Recordkeeping

Chapter 3 Management and Use of Information Systems and Services

- 3-1 Agencywide FEMA Systems
- 3-2 Telecommunications Systems and Services
- 3-3 Voice Mail
- 3-4 National Security/Emergency Preparedness Program
- 3-5 Telecommunications Networks and Network Management
- 3-6 Local Area Networks and Network Management
- 3-7 Automated Data Processing Systems and Services
- 3-8 Internet and Intranet
- 3-9 Electronic Mail
- 3-10 Electronic Data Interchange
- 3-11 Disposition of Excess and Surplus Hardware
- 3-12 Telecommuting

Chapter 4 Information Systems Safeguards

- 4-1 Information Systems Safeguards
- 4-2 System User Security Requirements
- 4-3 General Support Systems Safeguards
- 4-4 Application Systems Life-Cycle Security Requirements

Chapter 5 Information Systems Standards

- 5-1 Standardization Programs
- 5-2 Office Automation Software Standards
- 5-3 Application Software Standards
- 5-4 Office Automation Hardware Standards
- 5-5 Hardware Standards for Servers and Central Processors
- 5-6 Geographical Information Systems (GIS) Standards

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Appendices

Appendix to 3-8	Writing Accessible HTML Documents
Appendix to 3-9	Electronic Mail Naming Convention Standard
Appendix to 4-3.A	Firewall Management and Administration Guidelines
Appendix to 4-3.B	Remote Access Using Hardware Tokens and TACACS
Appendix to 4-3.C	Disaster Field Office's Network Administrators Guide
Appendix to 5-2	Office Automation Software Baseline Configuration Standard
Appendix to 5-3	Application Software Standard
Appendix to 5-4	Office Automation Hardware Baseline Configuration Standard
Appendix to 5-5	Office Automation Standards for Servers and Central Processors
Appendix A-1	Authorities
Appendix A-2	References
Appendix B-1	Definitions
Appendix C-1	Acronyms

Chapter 1

Information Systems Planning, Budgeting and Development

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Left blank intentionally

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

1-1 Information Technology Planning Process

Overview

1. This chapter implements the procedures for the Federal Emergency Management Agency's (FEMA's) management of planning for strategic information resources management.
2. The purpose of the FEMA planning process is to ensure information technology (IT) resources are focused on providing the services needed to accomplish FEMA's goals and priorities; funding for individual program objectives is commensurate with the value delivered to the Agency in meeting those objectives; funding is provided to mission critical programs; and coherent, cohesive planning is performed to meet future Agency needs.
3. In addition to the responsibilities identified in Part I of the FIRMPD, the responsibilities below apply for information resource management planning.

Responsibility

1. The Information Resources Board (IRB) is responsible for reviewing and approving IT plans, standards, proposed IT projects, and policies. The IRB is responsible for the development of the IRM plans.
2. The Chief Information Officer (CIO) is responsible for ensuring that the regulatory requirements mandated in the Information Technology Management Reform Act of 1996 (ITMRA) and the Paper Work Reduction Act of 1995 (PRA) are supported by the planning processes identified in the Office of Management and Budget (OMB) Circular No. A-130. These planning processes include the creation and implementation of the Strategic IRM Plan, the Information Plan, the Management and Technical Architecture Framework, and the IT Operations Plan.
3. Associate Directors, Administrators, Regional Directors, and Office Directors are responsible for:
 - Providing representation to the IRB and the Information Systems Policy Advisory Group (ISPAG). These groups provide recommendations for the development of policies, standards, and architectures of the Agency. The ISPAG provides representation for the development of the IT Operations Plan.
 - Providing the IRB with information on major IT program plans and requirements.
 - Ensuring that the IT Operations Plan and Catalogue of FEMA Information Systems properly represent program plans and budget requirements for IT systems.
4. All FEMA employees will have access to these plans. It is the responsibility of all FEMA employees to ensure that their efforts are in concert with these plans.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Strategic Information Resources Management

1. The Strategic Information Resources Management section of OMB Circular A-130 identifies four planning documents which build upon each other to meet the full range of IRM planning needs for an agency. The Strategic IRM Plan, the Information Plan, the Management and Technical Architecture Framework and the IT Operations Plan are summarized below.
2. **The Strategic IRM Plan** reflects and supports the mission, goals, and objectives of the FEMA Strategic Plan, and has a 5- to 10-year focus. The Strategic IRM Plan addresses how management of IT meets the Agency mission; reflects and anticipates changes in the Agency's mission, policy direction, technological capabilities and resource levels; and describes the parameters of the Technical Framework. It will be updated to reflect changes in mission or other significant event. Included in the Strategic IRM Plan are: FEMA's IRM Mission, FEMA's IRM Vision, Strategic IRM Goals, and Strategic IRM Objectives.
3. **The Information Plan** analyzes the information needs of the Agency. The purpose of an Information Plan is to promote efficient use of information to maximize usefulness; minimize the information collection burden on the public; preserve integrity, availability and confidentiality of information; and, support the Information Collection Budget. This is updated to reflect changes in customer requirements, mission or other significant event. Included in the Information Plan are: Identification of Users of FEMA Information, Identification of Information Collection vehicles, Identification of Information Sources and Information Requirements.
4. **Management and Technical Architectures/Frameworks** drive operational planning and describe how the Agency intends to use information and information technology. The technical framework serves as a reference for updates to new and existing information systems. The management framework assures the integration of proposed IT projects into the technical framework in a manner that will ensure progress towards achieving an open systems environment. Management and technical frameworks provide strategies to move toward an open systems environment. These strategies consist of profiles based on the NIST Application Portability Profile in order to satisfy user requirements; accommodate agency standards; promote interoperability; and provide application portability and scalability by defining interfaces, services, protocols, and data formats. Included in the technical architecture are: IT standards, interoperability requirements, target technology, services, protocols, and data formats.
5. **The Information Technology Operations Plan** is a 1- to 5-year plan which includes:
 - list of existing and planned information systems;
 - list of planned information technology acquisitions;
 - how these systems relate to each other and the Agency mission; and
 - summary of computer security planning.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

The IT Operations Plan links information technology to program and mission needs, reflects budget constraints, and forms the basis for budget requests. The IT Operations Plan serves as a mechanism for communicating to the public how the Agency's IT applications may affect them, including the vendor community, which may be interested in providing services to the Agency. Procurement information is not to be considered acquisition sensitive. The Plan identifies initiatives to reduce the information collection burden to the public, while making the public's dealing with the Government as "user-friendly" as possible. The IT Operations Plan is required to be updated and submitted annually to OMB.

Included in the IT Operations Plan are: Planned systems and upgrades; short descriptions of each system requirement and mission criticality; list of existing systems (Catalogue of Information Systems); planned budgets, including contractor support, services, operation and maintenance expenses; FEMA personnel support requirements; performance measures and implementation schedules.

Procedures

1. Program offices are responsible for identifying work processes which could be improved by creative uses of IT and that would enable the emergency management community to meet FEMA's strategic objectives. FEMA's external customers work with program offices or designated liaison officers to identify customer needs. The program office may perform a requirements analysis utilizing their own resources, or request assistance for this analysis from the Information Technology Services Directorate (ITS). ITS is available for consultation to provide consistency across the Agency. This analysis should determine whether other FEMA elements will be impacted by this effort or if information from existing FEMA systems is needed to perform the work process.
2. Once it is determined that a mission-critical process can be improved by use of IT, an analysis of alternatives is performed by the program office to determine if existing FEMA systems can support the requirement, or if a new system must be procured. The program office can make use of the Catalogue of FEMA Information Systems or ITS staff to determine if existing FEMA IT systems will meet their needs. The planned system is identified by the program office to the representative to the ISPAG for inclusion in the FEMA IT Operations Plan, which serves as a vehicle to provide input to the FEMA budget process.
3. If a new system must be developed to meet the requirement, the contract value, mission criticality, and funding availability determine the level of reviews and authorities needed to complete the implementation. Any system that will have a significant impact on other FEMA systems must be reviewed so that a determination can be made on whether the planned application is consistent with the FEMA IT architecture and whether the existing infrastructure can support the new application. Systems that are cross cutting must be presented to the Information Resources Board (IRB) for review and approval of the planned system requirement.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

4. When there is a budget shortfall between planned IT requirements and available funding, the IRB is charged with the responsibility of ensuring that the funding is commensurate with mission impact.
5. The FEMA IT Operations Plan must be reviewed, updated, and evaluated beginning each January after the receipt of the President's Budget. By that time, the IRB is aware of shortfalls between funding requests and actual funding for the current fiscal year. The loss of funding for any key agencywide system or program that affects the implementation of the target IT architecture will be evaluated and presented to the IRB. New requirements and adjustments to planned efforts are incorporated into the revised FEMA IT Operations Plan.
6. Each program office is responsible for submitting new and updated IT plans, budget and resource requirements to their representative on the ISPAG. These representatives work with Policy and Requirements Branch, Management Division, ITS, (IT-MA-PR) to integrate these requirements into the IT Operations Plan. The IT Operations Plan development schedule is as follows:

January: Receive President's Budget, program offices submit updated IT plans, budgets and resource requirements to their representatives. Initial meetings are held to begin the planning process.

April: OMB Call/Initial Draft of new IT Operations Plan. IT-MA-PR provides additional information as requested by OMB.

June: Submit to OMB.

July: Provide to the Office of Financial Management for budget submissions.

Background

The Paperwork Reduction Act (44 U.S.C. Chapter 35), the Information Technology Management Reform Act of 1996 (ITMRA) and the Office of Management and Budget (OMB) Circular No. A-130 provide the policy and planning framework for Federal Information Resources Management (IRM). This guidance is provided in a series of policy areas. It is within the context of Strategic Information Resources Management that the planning processes for IT is delineated.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

1-2 Report on Major IT Systems Budgets

Overview

1. This chapter implements the Federal Emergency Management Agency's (FEMA's) policy and procedures for meeting the budget collection and reporting requirements for obligations on data acquisition, operation, and use of information technology systems as a requirement of OMB A-130.
2. The provisions of this chapter are applicable to all FEMA's organizational elements in the headquarters, regions, and field establishments whose functions include the acquisition, operation, and use of information technology systems.
3. This chapter documents and supports compliance with the Chief Financial Officer's Act, and encompasses reporting requirements of budget estimates for information technology initiatives in any of the years (Past, Current, or Budget).

Responsibility

1. Associate Directors, Administrators, Regional Directors and Office Directors are responsible for the following:
 - Reporting actual and planned expenditures for information systems;
 - Conforming to Presidential, fiscal, and budgetary guidelines for reporting requirements for information technology systems; and
 - Submitting reports for information systems that provide information on workyears and obligations for: planning, including requirements, feasibility, and benefit-cost studies; system design, development, and acquisition; voice and data telecommunications requirements, regardless of whether or not they are associated with an information system's installation, operations, maintenance, and support.
2. The Associate Director, Information Technology Services Directorate, is responsible for implementing the reporting requirements for obligations on information technology systems FEMA-wide.
3. The Chief Financial Officer, Office of Financial Management, is responsible for verifying conformance and adherence to program estimates, appropriations, and budget submissions to Office of Management and Budget (OMB), as well as special reporting requirements for the high risk area.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Procedures

1. Submitting Reports. The Policy and Requirements Branch, Information Technology Services Directorate (IT-MA-PR) issues to each organizational element requests for submission of budget projections for each information technology acquisition with FEMA's annual strategic plan, Information Technology Operations Plan. Based on the data reported by the organizational elements, IT-MA-PR formulates and prepares, OMB Circular A-11, agencywide summary on obligations for information technology. Data not available from the plan submissions is solicited from the appropriate organizational element. Disaster funds used for information resources must be reported.

The IT-MA-PR coordinates with the Office of Financial Management to ensure consistency of the Exhibit data with the latest budget decisions and with FEMA's operating plans. The Office of Financial Management transmits the final Exhibit data to OMB as part of FEMA's budget submission.

2. Reporting Requirements. OMB requires the data reported should include all automatic data processing equipment. Amounts will be shown in thousands of dollars. The data in the Exhibit should be consistent with the FEMA Information Technology Operations Plan. Organizational elements should retain the data for subsequent budget obligation projections and reports.

1-3 Life Cycle Management

Overview

1. This chapter implements procedures for the Federal Emergency Management Agency's (FEMA's) management of information systems life cycle. The procedures in this chapter, at this time, primarily emphasize life cycle acquisition guidance. The provisions of this directive are applicable to all organizational elements in headquarters, regions, and field establishments. Local acquisition offices must adhere to the same procedures as delineated for the Acquisition Services Division, Office of Financial Management.
2. Life Cycle Management (LCM) encompasses technical, budgetary, and programmatic areas of consideration to ensure that, as information systems progress through the stages of their life cycle, these areas are integrated into a unified management strategy that best meets FEMA's mission. LCM identifies and considers the true investment of information systems by recognizing the acquisition costs of hardware, software, and services, and the overhead costs of operations and maintenance, resources, facilities, and disposition.
3. The minimum set of phases in the LCM process include decision making, strategy, acquisition, and implementation.
 - Strategic Phase describes the future direction of the information system over the next 5 years.
 - Decision making Phase defines the alignment of information systems plans and budgets; the Agency's goals and objectives; and the programmatic plans and budgets.
 - IT Acquisition Phase consists of the requirements analysis and analysis of alternatives to satisfy information needs and an assessment of the alternatives for meeting the information requirements.
 - Implementation Phase consists of a synopsis of the key activities, milestones, and resources needed to implement the selected alternative from delivery through operations to disposition of the information system.

Responsibility

1. The Chief Information Officer (CIO) provides technical guidance for the information systems LCM process, and promotes LCM practices with agencywide policies, principles, standards, and guidelines. The CIO is responsible for ensuring effective and efficient use of information technology services within FEMA. The Clinger-Cohen Act of 1996 requires agencies to apply three critical questions for IT procurement. The CIO asks the following questions for any IT investment:

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

- Should the function to be supported be performed in the private sector rather than by an agency of the Federal Government? If so, should the component of the agency performing that function be converted from a governmental organization to a private sector organization?
 - Should the function be performed by the executive agency? If so, should the function be performed by a private sector source under a contract entered into by the head of the executive agency, or should it be performed by executive agency personnel?
 - Does the function to be supported need to be appropriately redesigned to improve its efficiency, or has it been?
2. Information Resources Board (IRB) - Information systems development and enhancements in excess of FEMA's procurement threshold of \$250,000 must be presented to the IRB for conceptual review and oversight of system requirements. The IRB recommends concurrence or non-concurrence to the CIO. Submission of the Requirements Analysis, Analysis of Alternatives, and Risk Benefit Analysis documents will suffice as an alternative to a presentation to the IRB. Presentations may be scheduled with IT-MA.
 3. Procurement Review Board (PRB) - Procurement plans for major information systems in excess of \$1 million must be presented to the PRB for review. All acquisitions in excess of the FEMA threshold of \$1 million must be approved in writing by the PRB before any contract can be signed or any in-house development efforts can begin. Acquisitions of \$25,000 or greater require written approval of the Director, Acquisition Services Division, acting as the PRB Chairperson. Acquisitions costing less than \$25,000 do not require approval by the PRB. However, all documentation must be retained in the files of the requester for auditing and management review.
 4. Associate Directors, Administrators, Regional Directors, and Office Directors are responsible for the following:
 - Applying LCM concepts consistent with ITMRA, OMB Circular A-130, and FEMA regulations, policies, standards, and guidelines;
 - Appointing a Project Manager or group to apply the LCM process;
 - Providing information needed to support LCM information system planning and developing the related budget requests;
 - As part of the LCM, ensuring inclusion of the required analyses and the feasibility of reuse of information systems;
 - Ensuring determination and use of an LCM methodology early in the planning process that incorporates the full life cycle cost for the information system; and

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

- Overseeing the development of planning documents, such as Test Plan, Configuration Management Plan, etc., and updating the documents as needed throughout the LCM process.

Procedures

1. The information resources life cycle process begins with the determination of need for the information system and continues through the day-to-day operations of the installed system to the planning for its replacement. The requester is responsible for preparing a Requirements Analysis and Analysis of Alternatives for all information systems prior to the acquisition. The amount of documentation varies with the system size and complexity and is described in Chapter 1-4, Documentation Requirements. The format for these two documents is shown in figures 1 and 2.
2. OMB issues a data call annually for all Federal agencies to submit their strategic plans for information systems and technology. Strategic plans generally contain the following kinds of information: a description of the organization's program priorities and a discussion of how information technology is used to meet those priorities; a list of the organization's major information systems and the costs budgeted over a 5-year period; and a description of significant information technology initiatives.
3. Each organizational element must prepare and submit to IT-MA-PR its annual update of the 5-year IT Operations Plan that reflects the funding needed to support the investment decisions for the information systems. It is the requesting organization's responsibility to assure that the plan agrees with its budget submission. IT-MA-PR will review, analyze, and develop a consolidated 5-year Agency IT Operations Plan for reporting to the Office of Management and Budget. Whenever possible, all major procurements are reported in the plan.
4. Based on approved plans, organizational elements or program offices prepare and submit the Requirements Analysis, Analysis of Alternatives, and the Project Information Sheet or Form 40-19, Acquisition Strategy/Milestones, to IT-MA-PR and to the appropriate local acquisition office. For unplanned procurements, the Requirements Analysis, Analysis of Alternatives and Form 40-1, Requisition Commitment for Services/Supplies, or Form 60-1, Requisition for Supplies, Equipment and/or Services, must be submitted concurrently to IT-MA-PR and to the appropriate local acquisition office.
5. IT-MA-PR will assist program offices by coordinating information systems technical reviews, including any required computer security reviews. The requisition documents will be reviewed according to the type of information system and the dollar thresholds stated below. Selected identifying data from the documentation will be entered into a repository database to catalogue mission critical application systems. To encourage use of available resources to meet new requirements and to avoid duplication, the database will be made accessible for query throughout FEMA.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Information Systems Procurement Thresholds Effective October 1999

Threshold Dollar Value

Review/Approval Responsibility

\$0 - \$10,000

Associate Directors, Administrators, Office
Directors, Regional Directors

Greater than \$10,000

CIO or Information Resources Board

Requirements Analysis Format

1. **Project Title:** Give the title and a short descriptive sentence of the information systems needed (rather than the end product).
2. **Overview:** Brief description of requirements for resources as to the information systems and services needed by FEMA. Tailor this item and all others to the specific needs of this procurement.
3. **Mission Needs:** Description of FEMA and IRM mandates for emergency management services and support.
4. **Information Needs:** Provide a general description of information systems needs and the requirements to support those systems and their service flows. It is not the systems, but the flow of services in support of emergency management that is critical. This item should be more specific in terms of type, quantity, geographic coverage, security, et al.
5. **Current Systems and Operations:** Describe needs met and unmet by current operations, including personnel.
6. **Requirements and Anticipated Unmet Needs:** Describe the expected need that will not be met for defined system requirements, such as:

System Life
Workload
Compatibility, interoperability, integration of systems
Interagency coordination
Training
NSEP functions
Security/privacy
Federal regulations and standards, et al.

7. **Legislative and Executive Mandates for IRM:** Such as PRA, OMB Circular A-130, ITMRA, et al.
8. **Formal Aggregation and Analysis of Requirements:** List the specific functions that are required to meet those requirements defined above. Also, give the deficit in resources (including personnel and expertise) these functions will rectify. There must be a timeframe for the services.

Figure 1

Analysis of Alternatives Format

1. **Restatement of Needs/Specific Functions:** Write a brief description of the specific functions defined in the requirements analysis.
2. **Preliminary Conclusion:** The workload cannot be done with existing resources, expertise, and personnel levels. Describe why not. Issues that must be considered:

- GSA Mandatory Programs
- Reuse of Existing Resources
- Sharing of Existing Resources
- Contracting for New Resources

3. **Select 3 Economical, Viable Alternatives:** To fulfill these requirements, the proposed contract cannot be the only solution; therefore, evaluations of other possibilities must be provided that document an awareness of the aspects of the information systems contracted for and how those services might be delivered. For example:

- Combine engineering and development with procurement
- Hire individual consultants as needed
- Compete each task separately
- Use other agencies' services

4. **Evaluate Factors in Each Alternative:** List and price the benefits and costs for each proposal and how they differ by which alternative is selected. Benefits should include but not be limited to service flows, personnel skills, mission needs, timeliness, economies of scale, etc. Costs include price, risks, delays in implementation, responsiveness, turnaround, security, regulatory constraints, etc.
5. **Select Most Advantageous Alternative:** In procurement, as in the rest of life, cheapest is not always best; we get what we pay for. Therefore, analyze the full ramifications of prompt, secure, reliable services that are cost-efficient. FEMA must be concerned with procurements that are on-time, work effectively, and improve service, as well as, getting the lowest price; although the latter is never to be discounted.

Figure 2

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

1-4 FEMA Documentation Requirements

Overview

1. The Federal Emergency Management Agency (FEMA) has established policy and procedures for developing documentation for information technology (IT) systems. Documentation complexity should reflect the complexity of the system and the needs of the users, operators, programmers, and system administrators who utilize the system. Documentation should support the life-cycle stages of system development including functional and data requirements; design, building, testing, and implementation stages; and operational and maintenance stages.
2. The quality of documentation should be such that at any time, a new development group could be brought in and immediately pick-up where the first group left off. Documentation of less quality will generate long term life-cycle problems as systems are upgraded and personnel change.
3. FEMA will often utilize system development models such as Spiral Development or Rapid System Prototyping, that differ from the classical model outlined below. However, these models have the same final documentation requirements as the classical model. They may occur in slightly different sequences as developers “refine requirements, build a little, test a little, and begin the cycle anew to refine requirements . . .” until the full development is completed.

Responsibility

It is the responsibility of FEMA program managers to ensure that system documentation is completed as appropriate per this procedure.

Procedures

1. Requirements and Planning Stage.

The objective of the requirements and planning stage is to define the user’s need for automated systems processing. During this phase, a Requirements Analysis and Analysis of Alternatives are developed. The Agency will then know the system capabilities and features it needs and the technical environment in which the system will operate (e.g., hardware, system software, telecommunications). The Agency will also have an estimate of the cost of the system, and will have entered this information into the budgeting cycle. The Agency may have already awarded a contract for a vendor to work with the government to develop the system, or the Agency may be developing the system. However, the documents developed in this phase act as a blue print for system objectives and requirements, which will be met and expanded upon in all subsequent stages.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

2. Functional and Data Requirements Stage.

The developer defines in detail the system requirements, including both the automated software and related manual activities and procedures. This phase is sometimes referred to as systems concept, conceptual design or logical design. There are two primary classes of requirements that must be documented.

Functional requirements describe aspects such as:

- the flows of data to, from and within the software or system
- the sources and recipients of data
- how the software manipulates or transforms the data
- the workload volumes for data flows
- performance requirements such as response times, for specific functional processes
- the data contained in user interface/data entry screens and output reports, potentially including their physical layout.

The functional requirements can be described by narrative, graphics such as dataflow or process flow diagrams, structured flowcharts, matrices or combinations.

Data Requirements describe the data that the system will maintain. Data models may be developed and data normalized to eliminate unnecessary elements. Data dictionaries should be created, defining each element in terms of name, attributes (e.g. alphanumeric, logical), length, format, permissible values, ownership (i.e., who can create the data element, who can modify it).

3. Design Stage.

In the General Design Stage, the developer defines how the system will achieve the requirements identified in earlier phases. The developer defines programs to carry out specific system functions and divides the data into data stores, files or databases. This information can be documented graphically using data or process flow diagrams or flowcharts.

As the Detail Design Stage begins, the specifications are written for program and data files, providing the level of detail programmers need for coding. The documentation can take the form of hierarchical input-process-output (HIPO) charts, process action diagrams, Structured English, pseudo code or Warnier-Orr diagrams. Computer-Aided Software Engineering (CASE) tools can automate much of the general and detailed design activities.

Written documentation should be developed to identify, goals and objectives, procedures, testing criteria and schedules for the Test Plan. A Requirements Traceability Matrix (RTM) that maps functional requirements to physical configuration items such as databases or programs should be developed. Then, whenever a software component is reviewed, audited or tested, the Agency can use the RTM to identify the related functional requirements.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

4. Building Stage.

During this phase, programmers write or generate the software code. These coded instructions control the various hardware, systems software, and telecommunications components. The programmers usually develop the software components in sections from smallest to largest: first program units, then modules supporting major processes, then interfaces among modules and with external systems. The programs are debugged and documented. Finally, the entire software system is made ready for testing.

During this phase, training manuals for end users through system administrators are finalized. Step-by-step procedures should be developed to allow users and system administrators to perform any function on the system.

5. Testing Stage.

Testing takes place in two major stages. First, the developers conduct their own test of the software. The developer conducts unit tests, integration tests and system tests, correcting errors as they are found. Regression testing should also be performed to ensure that the correction of a particular part of the software did not cause problems in other areas of the software. These test results and corrections should be documented.

Secondly, FEMA will conduct an acceptance test of the software according to an acceptance test plan and procedures. The acceptance test plan and procedures may be prepared and performed by Agency personnel or an independent testing group then conducts tests according to the Test Plan. After these have been successfully completed, the Agency may bring in users to participate in the acceptance test to ensure that the system is ready for production. Those performing the acceptance testing should utilize the user manuals to demonstrate their effectiveness.

6. Implementation Stage.

The implementation stage includes pre-installation activities such as site preparation and user training, installation of the software and hardware, and post installation activities such as converting data from old systems to the new.

7. Operation and Maintenance Stages.

During this phase, gaps in documentation should be corrected, upgrades and modifications that are made to the software need to be documented.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

8. ITMRA Evaluation Procedures.

The 1996 Information Technology Management Reform Act requires that any information technology project be planned and have quantifiable goals, objectives and performance measures identified before procurement or implementation. Once the system is delivered and becomes operational, the system is to be judged on actual versus projected performance. Performance management systems are to be put in place that will insure that cost, schedules, and technical aspects of the project are truly integrated. These management control systems provide a framework for defining work, assigning work responsibilities, establishing budgets, controlling costs, and summarizing, with respect to planned versus actual accomplishments, the detailed cost, schedule and related technical achievement information for management review. These issues have been defined in the Planning and Requirements Stages of the project. At completion of the development and through-out the life-cycle of the system, periodic reviews will be held to ensure that:

- Performance of the projects work scope, schedule, and cost objectives are met;
- Comparisons of actual resources used versus what were projected are measured; and
- Reliable reports of life-cycle performance versus projected performance are created for management review.

9. Documentation Examples for Systems of Four Levels of Complexity.

Level I. COTS Packages

Commercial-off-the-shelf (COTS) software packages often meet user requirements. Even those applications developed utilizing FEMA's standard suite of office automation software require documentation. The more complex the requirement being met, the more extensive the documentation required to support the system.

- Requirements and Planning Documentation.
- This high level document should describe the overall program office requirements for achieving mission objectives, and why this solution was reached, as opposed to any other approach, such as using existing FEMA systems or other already developed FEMA applications. Generally, for small or uncomplicated requirements, this should be a 1 - 2 page document.
- Functional and Requirements Documentation.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

- This should clearly describe functional activities of the work to be automated. This document should be written in layman's terms to be readily understood by anyone wishing to understand what the system is to functionally perform. This document may be as short as one page for uncomplicated requirements.
- Standard vendor documentation:
 - User Guides
 - Quick Reference Guides
 - System Administrator and or Database Administrator Guides
- For applications developed around the COTS package.
- Descriptions of the data base design and structure, forms layouts and design, interfaces between data bases, and data maintenance procedures required for the application's data files.
- User Guides or User Procedures for the users of the application if the standard COTS documentation isn't sufficient for the users of the application.

Level II. Customized COTS

- All of the documentation listed above for using COTS packages.
- Source Code Document - A listing of the code for any software developed to augment the COTS software.
- Design Document - Documentation needed for any software developed to augment the COTS software that describes the modules of the software, the functions of each module and interfaces between modules.
- Interface Description - Describes interfaces between the COTS software and the user software developed to augment the COTS package.
- Test Plans and Test Procedures - Describes plans and procedures to be used to perform validation and verification testing of the software developed to augment the COTS package.

Level III. Major Projects

Major projects are systems with one basic application software system developed for FEMA such as the Teleregistration System.

- Requirements and Planning Documentation.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

- A full Requirements Analysis and Analysis of Alternatives/ Business Case must be completed prior to any other activity. This document must answer questions required by the Information Technology Management Reform Act (ITMRA) such as: Should this function be performed by the Agency or outsourced? Is FEMA the right Agency to perform this function as opposed to other Agencies? Have we explored use of existing FEMA systems? and, Does the system comply with Government-wide regulatory requirements?
- User (FEMA) Requirements Document for the software system.
- MILSTD documents relating to the requirements specification phase of the software development:
 - Functional Requirements Description
 - Data Requirements Documents
 - Interface Control Documents
- MILSTD documents relating to the software design phase of the software development:
 - System Specifications
 - Software Requirements Specifications
 - Program Specifications
 - Test Specifications
 - Software Design Specifications
 - Database Specifications
 - Interface Design Specification
- Documents at the completion of the software development (after it has been 'built'):
 - Source Code for all Program Modules
 - 'As Built' Detail Design specifications
 - 'As Built' Database Specifications
 - 'As Built' Interface Design Specification
 - Users Manual(s)
 - Program (System) Maintenance Manual
 - Operations (System Administrator's) manual
 - Installation Procedures
 - Test Plan & Procedures for Validation and Verification testing
 - Training Plan

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Level IV. Major Projects Requiring Parallel Modular Development and Integration

Documentation for large projects apply a minimum of the level III complexity. Interface Control documents must address the interfacing of the software systems (modules) as well as the interfacing of the various components of each software system in detail.

INFORMATION RESOURCES MANAGEMENT PROCEDURAL DIRECTIVE

Left blank intentionally