FEDERAL EMERGENCY MANAGEMENT AGENCY

INFORMATION TECHNOLOGY

ARCHITECTURE

VERSION 2.0

THE ROAD TO e-FEMA

VOLUME 2

MAY 2001

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LIST OF APPENDICES

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APPENDIX A.

ACRONYMS, TERMS, AND DEFINITIONS

Acronyms

ACH	Automated Clearing House
ADA	*Americans with Disabilities Act*
ADAMS	Automated Disaster Assistance Management System
ADD	Automated Deployment Data Base
ADP	Automated Data Processing
ALE	Automatic Link Establishment
ANSI	American National Standards Institute
API	Application Program Interface
APP	Application Portability Profile
ARC	American Red Cross
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
AVI	Audio-Visual Interleave
BCCP	Business Continuity and Contingency Planning
BMP	Bitmap Format
CAD	Computer-Aided Design
CAM	Computer-Aided Manufacturing
CAR	Capability Assessment for Readiness
CASE	Computer Aided Software Engineering
CBT	Computer Based Training
CCB	Configuration Control Board
CCITT	Consultative Committee for International Telephony and Telegraphy
CDRG	Catastrophic Disaster Response Group
CD-ROM	Compact Disk Read-Only Memory
CEM	Comprehensive Emergency Management
CERCLA	*Comprehensive Environmental, Response, Compensation, and Liability Act*
CFO	Chief Financial Office
CFR	Code of Federal Regulations
CGI	Common Gateway Interface
CGM	Computer Graphics Metafile
CIAO	Chief Infrastructure Assurance Officer
CIMS	Correspondence and Issues Management System
CIO	Chief Information Officer
CIP	Critical Infrastructure Protection
CIS	Community Information System
CM	Configuration Management
CMS	Call Management System
CN	Communications Network
COG	Continuity of Government
COOP	Continuity of Operations
COTS	Commercial-Off-The-Shelf
CPIC	Capital Planning and Investment Control Process

CPIG	*Capital Planning and Investment Guide*
CSEPP	Chemical Stockpile Emergency Preparedness Program
CTI	Computer Telephony Integration
CWSI	Cisco Works for Switched Networks
DA	Department of the Army
DAE	Disaster Assistance Employee
DARIS	Disaster Automated Reporting and Information System
DARPA	Defense Advanced Research Projects Agency
DFIRM	Digital Flood Insurance Rate Map
DFIRM-DLG	Digital Flood Insurance Rate Map - Digital Line Graph
DFO	Disaster Field Office
DGSA	DOD Goal Security Architecture
DIS	Distributed Interactive Simulation
DLG	Digital Line Graph
DMS	Document Management System
DOD	Department of Defense
DOS	Disk Operating System
DRP	Disaster Recovery Plan
DSA	Digital Standard Algorithm
DSL	Digital Subscribe Line
DSR	Disaster Survey Report
DSS	Digital Signature Standard
DTD	Document Type Definition
DVD	Digital Versatile Disk
DXF	Drawing Exchange Format
e	Electronic
EA	Enterprise Architecture
EC	Emergency Coordination; or Electronic Commerce
EDI	Electronic Data Interchange
EDIFACT	EDI for Administration, Commerce, and Transport
EDPP	Electronic Design and Pre-Press
EEI	Essential Elements of Information
EENET	Emergency Education Network
EEO	Equal Employment Opportunity
EEOC	Equal Employment Opportunity Commission
EFT	Electronic Funds Transfer
EICC	Emergency Information Coordination Center
EIGRP	Enhanced Interior Gateway Routing Protocol
EIMA	Emergency Information and Media Affairs
EIS	Emergency Information System
EMI	Emergency Management Institute
EMS	Emergency Medical Services
EMT	Emergency Management Training
EO	Executive Order

EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPS	Encapsulated Postscript
ERT	Emergency Response Team
ERT-A	Emergency response Team – Advance Element
ES	Emergency Support; or End System
ESF	Emergency Support Function
EST	Emergency Support Team
FACMAN	Facilities Management System
FCO	Federal Coordinating Officer
(F)EDI	Financial EDI
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
FIA	Federal Insurance Administration
FIPS	Federal Information Processing Standard
FIRM	Flood Insurance Rate Map
FIRMPD	FEMA Information Resources Management Procedural Directive
FOC	FEMA Operations Center
FOIA	*Freedom of Information Act*
FRERP	Federal Radiological Emergency Response Plan
FRP	*Federal Response Plan*
FSN	FEMA Switched Network
FTS	Federal Telecommunications System
FY	Fiscal Year
GAO	Government Accounting Office
GIF	Graphics Interchange Format
GIS	Geographic Information System
GPEA	*Government Paperwork Elimination Act*
GPRA	*Government Performance and Results Act*
GPS	Global Positioning System
GSA	General Services Administration
HF	High Frequency
HHS	Health and Human Services
HPCC	High-performance computing and communications
HQ	Headquarters
HR	Human Resources
HS	Human Services
HTML	Hypertext Markup Language
http	Hypertext Transfer Protocol
HVAC	Heating, Ventilation, and Air Conditioning
I/O	Input/Output
IAEGC	Interagency Electronic Grants Working Group
ICPAE	Interagency Committee on Public Affairs in Emergencies

IC&V	Intelligent Collaboration and Visualization
ICD	Interface Control Document
ID	Identification
IETF	Internet Engineering Task Force
IFMIS	Integrated Financial Management Information System
IFSAR	Interferometric Synthetic Aperture Radar
IGES	Initial Graphics Exchange Specification
IGRP	Interior Gateway Routing Protocol
IMAP	Interactive Mail Access Protocol
IMS	Image Management System
IP	Internet Protocol
IPX	Internetwork Packet Exchange
IRB	Information Resources Board
IRS	Internal Revenue Service
IS	Information System; or Infrastructure Support
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Internet Service Provider
ISPAG	Information Systems Policy Advisory Group
IT	Information Technology
ITMRA	*Information Technology Management Reform Act*
ITS	Information Technology Services
ITU	International Telegraphic Union
IVR	Interactive Voice Response
JAD	Joint Application Development
JPEG	Joint Photographic Experts Group
LAN	Local Area Network
LCS	Local Communications System
LDAP	Light Directory Access Protocol
LIDAR	Light Detection and Ranging
LIMS	Logistics Information Management System
LISTSERV	List Server
LMI	Logistics Management Institute
LSE	Local Subscriber Environment
MAC	Map Analysis Center
MATTS	Mobile Air Transportable Telecommunications System
MERS	Mobile Emergency Response Support
MIDI	Musical Instrument Device Interface
MIME	Multi-purpose Internet Mail Extensions
MIS	Management Information System
M-JPEG	Motion JPEG
MOA	Memorandum of Agreement
MOC	MERS Operations Center

MOU	Memorandum of Understanding
MS	Microsoft
MSC	Map Service Center
MSDS	Material Safety Data Sheet
MT	Mitigation Directorate
MWEAC	Mount Weather Emergency Action Center
NACHA	National Automated Clearing House Association
NARA	National Archives and Records Administration
NAWAS	National Warning System
NCP	*National Oil and Hazardous Substances Pollution Contingency Plan*
NCS	National Communications System
NECC	National Emergency Coordination Center
NEHRP	National Earthquake Hazards Reduction Program
NEMA	National Emergency Management Association
NEMIS	National Emergency Management Information System
NETC	National Emergency Training Center
NFA	National Fire Academy
NFC	National Finance Center
NFIP	National Flood Insurance Program
NFIR	National Fire Incident Reports
NFIRA	*National Flood Insurance Reform Act*
NFIRS	National Fire Incident Reporting System
NGI	Next Generation Internet
NII/GII	National Information Infrastructure/Global Information Infrastructure Initiatives
NIST	National Institute of Standards and Technology
NMD	National Mapping Division (of USGS)
NNOB	National Network Operations Branch
NOAA	National Oceanic and Atmospheric Agency
NPSC	National Processing Service Center
NRC	Nuclear Regulatory Commission
NS	Office of National Security Affairs
NSA	National Security Agency
NT	Network technology; or Windows NT operating system
NTA	Network Technology Architecture
O&M	Operations and Maintenance
OCR	Optical Character Recognition
OFM	Office of Financial Management
OGC	Office of the General Counsel
OHRM	Office of Human Resources Management
OIG	Office of the Inspector General
OLAP	On-Line Analytical Processing
OLE	Object Linking and Embedding
OLTP	On-Line Transaction Processing

OMB	Office of Management and Budget
OPM	Office of Personnel Management
OSD	Operations Support Directorate
OSI	Open Systems Interconnect
OSPF	Open Shortest Path First
PA	Public Assistance
PBX	Private Branch Exchange
PC	Personal Computer
PCS	Personal Communications System
PDA	Preliminary Damage Assessment
PDD	Presidential Decision Directive
PDF	Portable Document Format
PGP	Pretty Good Privacy
PKI	Public Key Infrastructure
PMG	Program Management Group
PNG	Portable Network Graphics
POP-3	Post Office Protocol (Version 3)
PPA	Performance Partnership Agreement
PSN	Public Switched Network
PT&E	Preparedness, Training, and Exercises Directorate
PVC	Permanent Virtual Circuits
Q3	Quality Level 3
QoS	Quality of Service
R&R	Response and Recovery
RCS	Routing Control System
RDBMS	Relational Data Base Management System
REP	Radiological Emergency Preparedness
RFP	Request for Proposals
RIP	Routing Information Protocol
RLE	Run Length Encoding
ROC	Regional Operations Center
RS	Relay System
RSA	Rivest-Shamir-Adelman
RTM	Requirements Traceability Matrix
SAR	Search and Rescue
SARA	*Superfund Amendments and Reauthorization Act of 1986*
SATCOM	Satellite Communications
SBA	Small Business Administration
SDTS	Spatial Data Transfer Standard
SEI	Software Engineering Institute
SFHA	Special Flood Hazard Area
SGML	Standard Generalized Markup Language

SIMLAB	Simulation and Training Network Project
SITREP	Situation Report
SLA	Service Level Agreement
S/MIME	Secure MIME
SMTP	Simple Mail Transfer Protocol
SONET	Synchronous Optical Network
SPM	System Programming and Maintenance
SQL	Structured Query Language
SSL	Secure Sockets Layer
SVC	Switched Virtual Circuits
TAFIM	Technical Architecture Framework for Information Management
TAP	*Technical Approach Plan*
TBD	To Be Determined
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing
3-D	Three-Dimensional
TIFF	Tagged Image File Format
TIN	Tax Identification Number
TRM	Technical Reference Model
TS	Transfer System
UHF	Ultra High Frequency
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFA	United States Fire Administration
USGS	United States Geological Survey
VHF	Very High Frequency
VLAN	Virtual LAN
VLSM	Variable Length Subnet Masking
VoIP	Voice Over IP
VOLAG	Voluntary Agency
VPN	Virtual Private Network
VR	Virtual Reality
VRML	Virtual Reality Modeling Language
VTC	Video Tele-conferencing
WAN	Wide Area Network
WMF	Windows Metafile
WYO	Write Your Own
WYOP	Write Your Own Program
WYSIWYG	What You See Is What You Get
XML	Extensible Markup Language
Y2K	Year 2000

Terms and Definitions

Architecture
In general, the design underlying computer hardware or software. In terms of networks, *architecture* covers the infrastructure, functionality, protocols, and standards implemented in a particular network design.

Architectural Component
A high-level building block or piece of a larger system that can be used and re-used across multiple systems in a cost effective and standardized manner. Architectural components are sometimes referred to as *middleware* or the basic building blocks of IT systems. Architectural components make up the basic FEMA IT and network infrastructure. Architectural components broadly include IT standards, hardware, networks, software, processes, environmental factors, partnerships and relationships, data stores, documents, common business function requirements, technologies, and tools which are used to build systems or are used within a system.

Asynchronous
A reference to something that is not dependent on timing, for example, asynchronous communications can start and stop at any time instead of having to match the timing governed by a clock.

ATM
A high-speed networking technology designed to deliver transmissions consisting of many different kinds of information including text, voice, audio, and video. By relying on small, fixed-length packets that it multiplexes onto the carrier, ATM achieves speeds as high as 622 Mbps (over fiberoptic cable). The basic unit of ATM transmission is known as a cell, a packet consisting of 5 bytes routing information and a 48-byte payload (data).

Backbone
The communications path that carries the majority of traffic within a network. A backbone is often a high-speed transmissions medium and can be used to link network segments, small networks, or (in the case of the Internet) multiple networks spread out over vast geographic distances.

Bandwidth
In the analog world, the range between the highest and lowest frequencies for a given segment of the electromagnetic spectrum, measured in Hertz (cycles per second); for example, FM radio operates between 88 MHZ and 108 MHZ, for a bandwidth of 20 MHZ. In the digital world, however, bandwidth refers to speed of transmission, measured in bits per second (bps).

bps
Stands for bits per second, the measure of transmission speed used in relation to networks and communications lines. Although bps represents the basic unit of measure, networks and communications devices, such as modems, are so fast that speeds are usually given in multiples of bps: Kbps (kilobits, or thousands of bits, per second), Mbps (megabits, or millions of bits, per second), and Gbps (gigabits, or billions of bits, per second).

Broadband ISDN Next-generation ISDN based ATM technology. Broadband ISDN divides information into two categories: interactive services, which are controlled by the user, and distributed (or distribution) services that can be broadcast to the user.

Digital A reference to something based on digits (numbers) or their representation. PCs are digital computers because they deal with information of all types as different combinations of the binary digits 0 and 1.

Digital Signature A secure mechanism used on the Internet that relies on two keys, one public and one private, that are used to encrypt messages before transmission and to decrypt them on receipt.

DS Stands for Digital Services or Digital Signal, a category used in referencing the speed, number of channels, and transmission characteristics of T1, T2, T3, and T4 communications lines. The basic DS unit, or level, is known as DS-0, which corresponds to the 64 Kbps speed of a single T1 channel. Higher levels are made up of multiple DS-0 levels. DS-1 represents a single T1 line that transmits at 1.544 Mbps. For higher rates, T1 lines are multiplexed to create DS-2 (a T2 line consisting of four T1 channels that transmits at 6.313 Mbps), DS-3 (a T3 line consisting of 28 T1 channels that transmits at 44.736 Mbps), and DS-4 (a T4 line consisting of 168 T1 channels that transmits at 274.176 Mbps).

DSL Stands for Digital Subscriber Line, a recently developed (late 1990s) digital communications technology that can provide high-speed technology that can provide high-speed transmissions over standard copper telephone wiring.

Fiberoptic Cable A form of network cabling that transmits signals optically, rather than electrically, as do coaxial and twisted-pair cable. The light-conducting heart of a fiberoptic cable is a fine glass or plastic fiber called the core. This core is surrounded by a refractive layer called the cladding that effectively traps the light and keeps it bouncing along the central fiber. Outside both the core and the cladding is a final layer of plastic or plastic-like material called the coat, or jacket. Fiberoptic cable can transmit clean signals at speeds as high as 2 Gbps. Because it transmits light, not electricity, it is also immune to eavesdropping.

Frame Relay A digital packet switching technology that transmits variable-length data packets at speeds up to 2 Mbps over predetermined, set paths known as permanent virtual circuits, or PVCs.

FTP Stands for File Transfer Protocol, a fast, application-level TCP/IP widely used for transferring both text-based and binary files to and from remote systems, especially over the Internet.

Gateway	On a network, a device – often a specialized computer – that enables communications between networks based on different architectures and using different protocols. A gateway converts information being transmitted to a form in which it can be understood by the receiving network.
Gigabit Ethernet	A recently developed form of Ethernet that operates at 1000 Mbps (1 gigabit per second). Gigabit Ethernet is expected to be used primarily as a high-speed LAN backbone.
Groupware	A relatively vague term used to describe the various types of software applications that enable network users to interact or work together. Groupware typically includes such applications as e-mail and scheduling software.
IP	Stands for Internet Protocol, the TCP/IP responsible for routing packets. IP runs at the internetwork layer in the TCP/IP model, equivalent to the network layer in the ISO/OSI Reference Model.
ISDN	Stands for Integrated Services Digital Network, a high-speed communications network developed to provide all-digital service over the existing telephone network. ISDN was designed to carry not only voice, but data, images, and video.
Key	In encryption and digital signatures, a string of bits used for encrypting and decrypting information to be transmitted. Encryption commonly relies on two different types of keys: a public key known to more than one person (say, both sender and receiver) and a private key known only to one person (typically, the sender).
Multiplexing	The process of weaving multiple signals onto a single channel or communications line. In multiplexing, segments of information from each signal are interleaved and generally separated by time, frequency, or space.
Packet	The fundamental message unit transmitted over a network. A packet consists of a header that contains addressing information, a block of data (the largest portion of the packet), and a trailer that often contains error-checking information. Packet size and makeup vary with the network and protocols in use.
Protocol	A set of rules governing the way in which computers communicate, either with one another or with attached devices. Networking is filled with a bewildering variety and number of protocols, many of which perform the same, or similar, services. All, however, are designed to enable reliable communications.
QoS	Stands for Quality of Service, a term used generally to refer to performance at or above a certain standard. More specifically, QoS refers to the maximum amount of delay and data loss considered acceptable for transmissions on an ATM network.

Router	A network device that transmits message packets, routing them over the best route available at the time. Routers are used to connect multiple network segments, including those based on differing architectures and protocols.
TCP	Stands for Transmission Control Protocol, the TCP/IP responsible for creating and re-assembling packets and ensuring that information is delivered correctly. TCP runs at the transport layer and relies on IP (Internet Protocol) for delivery. It is a connection-oriented, reliable protocol (reliable in the sense of ensuring error-free delivery).
TCP/IP	Stands for Transmission Control Protocol/Internet Protocol, a protocol suite (set of protocols) designed for enabling communications over interconnected, sometimes dissimilar, networks. TCP/IP is supported by almost all networks. It lies at the heart of Internet communications.
Technical Reference Model (TRM)	A model that provides the basic ground rules, set of standards, or *building code* for designing, developing, implementing, testing, and integrating IT systems. The TRM identifies and describes the basic information services (such as data base services, document management services, security services, etc.) at a high level and how they ought to be designed and constructed in a uniform and standardized manner.
Standards Profile	Defines how a particular standard such as an open systems standard, an industry standard, or a standard tool needs to be customized or tailored to support interchange or interoperability. A standards profile recognizes that all major standards generally need to be customized or profiled through establishment of user conventions. These profiles or user conventions are frequently referred to as *Application Portability Profiles (APPs)*.
Standards Profiles (plural)	Refers to more than one standards profile; generally a set of standards.
Standard Tool	An IT tool, system, or application which FEMA has determined to meet operational requirements in a standardized and appropriate manner and is mandated for use in IT systems. A standard tool is part of the IT architecture.
Security Services Model	The Technical Reference Model for security services (such as access controls, confidentiality, fault tolerance, originator authentication, etc.).
Security Standards Profile	The same profile as a standards profile except that it refers to security standards.
Virtual Circuit	A connection between communicating computers that provides the computers with what appears to be a direct link but can actually involve routing data over a defined, but longer path.
Virtual Private Network	A network that uses encryption and other technologies, including tunneling, to provide secure communications over the Internet. A Virtual Private Network essentially provides users with an inexpensive, Internet-based equivalent of a network connected by private communications lines.

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APPENDIX B.

REFERENCES

THIS APPENDIX LISTS references that were consulted during the development of the *FEMA IT Architecture*. Appendix C provides additional specific references to FEMA in public law, rules and regulations, and Directives. Appendix I provides additional references to Executive Directives, public law, and judicial guidance impacting the development of the *FEMA IT Architecture* (in general).

1. *Strategic Plan, FY 1998 through FY 2007, With Operational Objectives through FY 2003, Partnership for a Safer Future*, FEMA, September 30, 1997.

2. *Financial Management Status Report and Five-Year Plan*, FEMA, September 1997.

3. *Facility Management & Campus/Course Administration Alternative Analysis*, FEMA, December 30, 1997.

4. *Technical Approach Plan (TAP) for Federal Emergency Management Agency Information Technology Architecture*, FEMA, March 30, 1998.

5. *Strategic Plan*, CIO Council, January 1998.

6. *Information Technology Architectural Framework*, FEMA, October 31, 1994.

7. *National Emergency Management Information System (NEMIS), Initial Version 2, Analysis and Plan*, FEMA, July 3, 1997.

8. *Annual Performance Plan, Fiscal Year 1999*, FEMA, February 26, 1998.

9. *National Mitigation Strategy*, FEMA, available at http://www.fema.gov.

10. *Federal Response Plan*, FEMA, available at http://www.fema.gov.

11. *Federal Response Planning Guidance, FRPG 02-95, Framework for Interagency Federal Response Planning*, FEMA, September 1995.

12. *Information Resources Management Policy and Procedural Directive (FIRMPD), Information Systems Safeguards*, FEMA, January 30, 1998.

13. *Information Technology (IT) Capital Planning and Investment Guide*, Version 1.1, FEMA, August 12, 1997.

14. *FEMA Missions and Functions Manual 1010.1*, July 27, 1995.

15. *Draft NEMIS Concept of Operations (Operations and Maintenance)*, FEMA Information Technology Services Directorate, Operations Division, April 25, 1997.

16. *NEMIS Human Services System, Individual and Family Grant and Disaster Housing Programs, Business Rules*, FEMA, February 27, 1998.

17. *NEMIS Data Dictionary Naming Standards and NEMIS Conceptual Data Model*, FEMA Information Technology Services Directorate, September 24, 1996.

18. *NEMIS Functional Description*, FEMA Information Technology Services Directorate, February 9, 1996.

19. *NEMIS Project Plan*, FEMA Information Technology Services Directorate, July 10, 1997.

20. *NEMIS Data Model,* FEMA Information Technology Services Directorate, January 31, 1996.

21. *NEMIS System-Subsystem Specification,* FEMA Information Technology Services Directorate, September 6, 1996.

22. *NEMIS System Alternative Analysis,* FEMA Information Technology Services Directorate, November 25, 1996.

23. *Information Management Directions: The Integration Challenge,* NIST Special Publication 500-167, September 1989.

24. Life Cycle Management for Automated Information Systems, Patent and Trademark Office, December 1997.

25. *Strategic Information Technology Plan for Fiscal Years 1997 – 2002, Executive Overview,* Patent and Trademark Office, April 1997.

26. *Technical Reference Model,* Version 3.0, Patent and Trademark Office, October 28, 1997.

27. *C4ISR Architecture Framework,* Version 2.0, C4ISR Architecture Working Group, Department of Defense, December 18, 1997.

28. *Cultivating Successful Software Development,* Scott E. Donaldson and Stanley G. Siegel, Prentice Hall PTR, 1997.

29. *Capability Maturity Model for Software,* Version 1.1, Software Engineering Institute, February 1993.

30. *Department of Defense (DOD) Technical Architecture Framework for Information Management (TAFIM).*

Working Papers

Legislative Authority for Civil Emergency Management, FEMA, undated.
Emergency Mobilization Preparedness, The White House, July 22, 1982.
History of FEMA Responsibility for Response to National Security Emergencies, FEMA, undated.
Concept – A FEMA Enterprise Architecture Called NEMIS, ITS Directorate, undated.

APPENDIX C.

FEMA AND COMPREHENSIVE EMERGENCY MANAGEMENT REFERENCES IN PUBLIC LAW, REGULATIONS, AND DIRECTIVES

THIS APPENDIX IDENTIFIES THE major references to FEMA and comprehensive emergency management in public law, regulations, and Directives. In general, IT systems must be developed and implemented to support the information flow requirements implicit in these references. This appendix is organized as follows:

◗ Statutes referencing FEMA
◗ Statutory roles for FEMA pursuant to an Executive Order (E.O.) or Memorandum of Understanding (MOU), where the statute does not mention FEMA
◗ Executive Orders referencing FEMA
◗ Other statutes and orders impacting Comprehensive Emergency Management (CEM)
◗ Regulations and agreements.

Statutes Referencing FEMA

1. *Reorganization Plan No. 3 of 1978*, 3 CFR 1978 Com. p. 329, 5 U.S.C. App.1, note. (Authority for FEMA.)

2. Section 101, *Defense Production Act of 1950*, Public Law 81-774, as amended, 50 U.S.C. App. §2061, et seq. (See E.O. 12742, E.O. 12919, and 15 CFR Part 700 and 44 CFR Parts 320-336.)

    This provision authorizes the President to establish performance priorities and to allocate materials and facilities to promote the national defense.

3. *Department of Defense Authorization Act for 1986*, §1412 (Public Law 99-145; 99 Stat. 747), as amended by Public Law 101-510, both codified as 50 U.S.C. §1521. (Authority for CSEPP. See MOU between FEMA and DA signed October 8, 1997.)

4. Section 5, *Earthquake Hazards Reduction Act of 1977*, Public Law 95-124, as amended most recently by Public Law 105-47 (October 1, 1997), 42 U.S.C. §7701 et seq. (See E.O. 12699 and E.O. 12941 and 44 CFR Parts 361 and 362.)

    The *Earthquake Hazards Reduction Act of 1977* provides for the establishment of the National Earthquake Hazards Reduction Program (NEHRP) to reduce the risk to life and property from future earthquakes in the United States. FEMA is designated as the agency with primary responsibilities to plan and coordinate the NEHRP, which has five major elements: Hazards Delineation and Assessment, Earthquake Prediction Research, Seismic Design and Engineering Research, Preparedness Planning and Hazards Awareness, and Fundamental Seismological Studies. Planning for the Federal response to a catastrophic earthquake is a major aspect of Preparedness Planning and Hazard Awareness under the NEHRP.

5. *Emergency Planning and Community Right to Know Act of 1986*, as amended, 42 U.S.C. §11001 et seq.

    Authority for hazard materials planning and disclosure and contains statutory exemption for FEMA programs, e.g., REP and CSEPP. (See 40 CFR Part 355.)

6. *Federal Fire Prevention and Control Act of 1974,* as further amended by the *Hotel and Motel Fire Safety Act of 1990* (Public Law 101-391) and the *Arson Prevention Act of 1994* (Public Law 103-254) and *Firefighters' Safety Study Act* (Public Law 101-446) all codified at 15 U.S.C. §2201 et seq., all re-authorized by the *United States Fire Administration Authorization Act for Fiscal Years 1998 and 1999* (Public Law 105-108). (See also 44 CFR Parts 150-152.)

7. *Great Lakes Planning Assistance Act of 1988,* Title II of Public Law 100-707, 33 U.S.C. §426 note. (See 44 CFR Part 207.)

8. *Hazardous Materials Transportation Authorization Act of 1995,* Public Law 103-311, codified at 49 U.S.C. §5101 et seq.

    Hazardous materials response planning and training including reference to FEMA in §5115.

9. Section 301, *Multi-hazard Research, Planning, and Mitigation Act,* Public Law 96-472, 45 U.S.C. §5195 note (no regulations).

    Authorizes FEMA Director to conduct programs of multi-hazard research, planning, and mitigation of natural and man-made hazards, particularly with respect to research and training.

10. *National Dam Safety Program Act,* 33 U.S.C. §467 et seq. (no regulations).

11. National Security Act of 1947, as amended, 50 U.S.C. §§ 404, 405, and 411. (See E.O. 12656.) See 44 CFR Parts 320-337, 47 CFR Part 201 et seq.

    This Act establishes the Department of Defense, Central Intelligence Agency, and National Security Council, and authorizes the President to conduct certain operations and activities to promote national security.

12. *Robert T. Stafford Disaster Relief and Emergency Assistance Act,* Public Law 93-288, as amended, 42 U.S.C. §5121 et seq. (See E.O. 12673 and 44 CFR Parts 206 and 300.)

    The *Robert T. Stafford Disaster Relief and Emergency Assistance Act* provides an orderly and continuing means of assistance by the Federal government to State and local governments in carrying out their responsibilities before, during, and after disasters and emergencies to alleviate the suffering and damage which result from disasters. The President, in response to a State Governor's request, may declare an emergency or major disaster, in order to provide Federal assistance under the Act.

    Public Law 106-390, the *Disaster Mitigation Act of 2000,* amended the *Stafford Act* authorizing more Federal assistance for State and local disaster mitigation activities to reduce losses in future disasters or, to the extent possible, prevent them entirely.

Title III was amended by creating a pre-disaster mitigation authority. Title III was amended by modifying the formula for management cost assistance to State and local governments. Title IV was amended by (1) consolidating the temporary housing and individual and family grant authorities, (2) requiring private, nonprofit facilities to apply to the Small Business Administration (SBA) for disaster loans before applying to FEMA for disaster grants, and (3) authorizing disaster assistance based on estimated rather than actual costs.

13. Section 301-322, *Stewart B. McKinney Homeless Assistance Act*, Public Law 100-71, as amended, 42 U.S.C. §11311 et seq.

    Establishes the Federal Emergency Management Food and Shelter Program.

14. *National Flood Insurance Act of 1968*, Public Law 90-48, as further amended by *Flood Disaster Protection Act of 1973*, Public Law 93-234, and *National Flood Insurance Reform Act of 1994*, all codified at 42 U.S.C. §4001 et seq. (See 44 CFR Parts 59-79.)

15. *Codification in the United States Code of Defense Against Weapons of Mass Destruction Act*, Title XIV of Public Law 104-201.

Statutory Roles for FEMA Pursuant to Executive Order or Memorandum of Understanding, Where the Statute Does Not Mention FEMA

1. *Atomic Energy Act of 1954*, as amended, 42 U.S.C. §2011 et seq. (Authority for Radiological Preparedness Program. See E.O. 12241 and 10 CFR Part 50 and 44 CFR Parts 350-354.)

2. Section 309(f), *Communications Act of 1934*, as amended, 47 U.S.C.§§151 et seq.

    Establishes authority for interoperable emergency communications systems – Federal, State, local, and private. (See E.O. 12046 and E.O. 12472 and 47 CFR Parts 64 and 201.)

3. Section 104(I), *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)*, Public Law 96-510, as further amended by *Superfund Amendments and Reauthorization Act of 1986 (SARA)*, 42 U.S.C. §9615 et seq. (See E.O. 12580 and NCP at 40 CFR Part 300.)

    Provides authority for Federal and State governments to respond directly to hazardous substances instances.

4. *National Emergencies Act*, as amended, 50 U.S.C. §1601 et seq.

    Statutory process for declaration of national emergencies.

Executive Orders Referencing FEMA

1. Executive Order 11988 of May 24, 1977, as amended, *Floodplain Management*, 3 CFR, 1977 Comp., p. 117, 42 U.S.C. §4321 note p. 191. (See 44 CFR Part 9.)

This Order was designed to establish that Federal agencies give floodplains special consideration in the agencies' operations and activities. Under the order, FEMA and the Corps of Engineers are required to provide leadership and take actions to:

◗ Avoid development in the base floodplain unless it is the only practicable alternative
◗ Reduce the hazard and risk associated with floods
◗ Minimize impact of floods on human safety, health, and welfare
◗ Restore and preserve the natural and beneficial values of the base floodplain.
Note: See *National Flood Insurance Act of 1968.*

2. Executive Order 10421 of December 31, 1952, *Physical Security of Defense Facilities.*

3. Executive Order 12046 of March 27, 1978, as amended, *Relating to the Transfer of Telecommunications Functions,* 3 CFR, 1978 Comp., p. 158. (See 47 CFR Part 201.)

4. Executive Order 12127 of March 31, 1979, *Federal Emergency Management Agency,* 3 CFR, 1979 Comp., p. 376. (Implements *Reorganization Plan No. 3 of 1978.*)

5. Executive Order 12148 of July 20, 1979, as amended, Federal Emergency Management, 3 CFR, 1979 Comp., p. 412 (Implements *Reorganization Plan No. 3 of 1978.*)

    Executive Order 12148 transferred functions and responsibilities associated with Federal emergency management to the Director, FEMA. Assigns the Director, FEMA, the responsibility to establish Federal policies for and to coordinate all civil defense and civil emergency planning, management, mitigation, and assistance functions of Executive Agencies. This E.O. also implements Reorganization Plan No. 3 of 1978.

    "For purposes of this Order, 'civil emergency' means any accidental, natural, man-caused, or wartime emergency or threat thereof, which causes or may cause substantial injury or harm to the population or substantial damage to or loss of property."

6. Executive Order 12241 of September 29, 1980, *National Contingency Plan [Radiological Emergencies],* 3 CFR, 1980 Comp., p. 282. (Note: source of Federal Radiological Emergency Response Plan [FRERP].)

7. Executive Order 12472 of April 3, 1984, *Assignment of National Security and Emergency Preparedness Telecommunications Functions*, 3 CFR, 1984 Comp., p. 193. (See 47 CFR Part 201.)

    Executive Order 12472 establishes the National Communications System (NCS). The NCS consists of the telecommunications assets of the entities represented on the NCS Committee of Principals and an administrative structure consisting of the Executive Agent, the NCS Committee of Principals and an administrative structure consisting of the Executive Agent, the NCS Committee of Principals, and the Manager. The NCS Committee of Principals consists of representatives from those Federal departments, agencies, or entities, designated

by the President, which lease or own telecommunications facilities or services or significance to national security or emergency preparedness.

8. Executive Order 12580 of January 23, 1987, as amended, *Superfund Implementation*, 3 CFR, 1987 Comp., p. 193. (Note: Amended by E.O. 12777 of October 18, 1991, and further amended by E.O. 13016 of August 28, 1996.) (See 40 CFR Part 300.)

9. Executive Order 12656 of November 18, 1988, *Assignment of Emergency Preparedness Responsibilities*, 3 CFR, 1988 Comp., p. 585, amended by E.O. 13074, February 9, 1998 (63 Federal Register 7277).

   Assigns emergency preparedness responsibilities to Federal departments and agencies.

10. Executive Order 12657 of November 18, 1988, *Federal Emergency Management Agency Assistance in Emergency Preparedness Planning at Commercial Nuclear Power Plants*, 3 CFR, 1988 Comp., p. 611. (See 44 CFR Part 352.)

    Assigns FEMA and other Federal agencies certain emergency planning responsibilities related to commercial nuclear power plants.

11. Executive Order 12673 of March 23, 1989, *Delegation of Disaster Relief and Emergency Assistance Functions*, 3 CFR, 1989 Comp., p. 308. (See 44 CFR Part 206.)

12. Executive Order 12699 of January 5, 1990, *Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction*, 3 CFR, 1990 Comp., p. 269.

13. Executive Order 12742 of January 8, 1991, *National Security Industrial Responsiveness*, 3 CFR, 1991Comp., p. 309.

14. Executive Order 12919 of June 3, 1994, *National Defense Industrial Resources Preparedness*, 3 CFR, 1994 Comp., p. 901. (See 15 CFR Part 700, 44 CFR Parts 321-336.)

    This document delegates authorities and addresses national defense resource policies and programs under the *Defense Production Act of 1950*, as amended.

15. Executive Order 12941 of December 1, 1994, S*eismic Safety of Existing Federally Owned or Leased Buildings*, 3 CFR, 1994 Comp., p. 955.

16. Executive Order 12958 of April 17, 1995, *Classified National Security Information*.

17. Executive Order 13010 of July 15, 1996, *Critical Infrastructure Protection*.

18. Executive Order 13704 of February 9, 1998, *Amending Executive Order 12656*.

Other Statutes and Orders Impacting Comprehensive Emergency Management

1. Section 5(h), *Food Stamp Act of 1977*, Public Law 93-113, as amended (7 U.S.C. 2014(h)).

   Authorizes the U.S. Department of Agriculture (USDA) to make food stamps available to low income households in any disaster situation in which normal channels of retail food distribution have been restored and the existing Food Stamp Program cannot handle applications from affected households. Food stamp assistance must be requested by a State.

2. *Urban Property Protection and Reinsurance Act of 1968*, Public Law 90-448, as amended (12 U.S.C. 1749b et seq.).

   This Act provides crime insurance at affordable rates in urban areas to small businesses and individuals.

3. Section 7(b), *Small Business Act*, Public Law 85-536, as amended (15 U.S.C. 636(b)).

   When physical disasters are declared by the President or the Administrator of SBA, this Act authorizes SBA to make long-term, low interest loans to victims to repair or replace uninsured disaster damaged property. SBA's disaster loans are the primary form of Federal recovery assistance for non-farm, private sector disaster losses. The disaster loan program is the only form of SBA assistance not limited to small businesses. Disaster loans are direct loans available to homeowners, renters, businesses of all sizes, and nonprofit organizations. The interest rate on most loans cannot exceed 4 percent, and the term can be as long as 30 years. The maximum amount to individuals is $200,000 for real estate, and $40,000 for personal property. Loans can be increased by 20 percent for mitigation purposes, and some existing liens can be refinanced. For businesses, the maximum loan is $1,500,000, which can be waived for major sources of employment.

4. Section 7, *Cooperative Forestry Assistance Act of 1978*, Public Law 95-313, as amended (16 U.S.C. 2106).

   This Act authorizes the Secretary of Agriculture to assist in the prevention and control of rural fires through coordination among Federal, State, and local agencies and to provide prompt and adequate assistance whenever a rural fire emergency overwhelms, or threatens to overwhelm, the fire-fighting capability of the affected State or rural area.

5. Section 125, Title 23 U.S.C., *Highways*, Public Law 85-767, as amended (23 U.S.C. 125).

   This provision authorizes the Secretary of Transportation to provide funding assistance for the repair of Federal-aid highways or roads on Federal lands that have been seriously damaged by natural disasters or catastrophic failures from an external cause. Congress had created a special emergency relief fund within the Federal-aid highway account for these repairs. Federal funding assistance is intended to supplement the commitment of resources by State, counties and cities or other Federal agencies to help pay for usually heavy expenses resulting from extraordinary conditions.

6. *Flood and Coastal Storms Emergencies Act*, Public Law 84-99, as amended (33 U.S.C. 701n).

   Authorizes an emergency fund to be used "…in preparation for emergency response to any natural disaster, in flood fighting and secure operations, or in the repair or restoration of any

flood control work threatened or destroyed by flood…" and "emergency drinking water and for emergency dredging for restoration of authorized projects for Federal navigable channels and waterways made necessary by flood, drought, earthquake, or other natural disasters."

7. *Act of January 5, 1905*, as amended (36 U.S.C. 1 et seq.).

   Assigns the American National Red Cross Congressional Charter the authority and responsibility for the American Red Cross to undertake activities for the relief of individuals suffering from a disaster.

8. Section 216, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 217).

   This provision authorizes the President, in time of war or upon Presidential proclamation of an emergency, to utilize the Public Health Service to the extent and in the manner that in his judgment will promote the public interest.

9. Section 311, *Clean Water Act*, as amended by Section 4201 of the *Oil Pollution Act of 1990*, Public Law 101-380 (33 U.S.C. 2701 Note).

   This statute provides authority for Federal planning, preparedness, and response activities for addressing oil and, to a lesser extent, hazardous substance release or discharges.

10. Section 311, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 243).

    This provision authorizes the Secretary of Health and Human Services to develop (and take such action as may be necessary to implement) a plan under which personnel, equipment, medical services, and other resources of the Public Health Service and other agencies under the jurisdiction of the Secretary may be effectively used to control epidemics of any disease or condition and to meet other health emergencies or problems involving or resulting from disasters or any such disease.

11. Section 319, *Public Health Service Act*, Public Law 78-410, as amended (42 U.S.C. 247D).

    This provision authorizes the Secretary of Health and Human Services to take appropriate action to respond to a *public health emergency* resulting from disease, disorder, or other cause. The Secretary must consult with the Director of the National Institute of Health, Administrator of the Alcohol, Drug Abuse, and Mental Health Administration, Commissioner of the Food and Drug Administration, or the Director of the Center for Disease Control before determining that an emergency exists, and he must act through the official in responding to the emergency.

12. Section 310, *Older Americans Act of 1965*, Public Law 89-73, as amended (42 U.S.C. 3030).

    This provision authorizes the Commissioner of the Administration on Aging to reimburse States for social services provided to older Americans following a Presidentially-declared disaster.

13. Section 10724 (Emergency Rates) and Subchapter II (Car Service), *Interstate Commerce Act*, Public Law 95-473, as amended (949 U.S.C. 10724, 11121-11128).

These authorities allow the Interstate Commerce Commission (ICC) to authorize a common carrier to give reduced rates for service and transportation in an emergency. Further, these authorities permit the ICC to suspend any car service rule or practice; take action during emergencies to promote car service in the interest of the public and commerce; to require joint or common use of facilities when that action will best meet the emergency; to direct preferences or priorities in transportation, embargoes, or movement of traffic under permits; and to reroute traffic.

14. Executive Order 12777 of October 18,1991, *Implementation of Section 311 of the Federal Water Pollution Act of October 18, 1972, as amended, and the Oil Pollution Act of 1990*, (3 CFR 1991 Comp., p. 351).

This document was published to re-delegate authority granted to the President under the *Oil Pollution Act of 1990*. The *Oil Pollution Act* in particular, assigns to Interior (re-delegated to the Minerals Management Service) and other Federal agencies (U.S. Coast Guard and the Environmental Protection Agency) emergency planning responsibilities for oil spills and hazardous substances.

Regulations and Agreements

1. 7 CFR, Part 251, *The Emergency Food Assistance Program*.

These regulations, which implement Sections 409 and 410(b) of the *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, allow any person/household temporarily displaced by a disaster to obtain USDA foods in congregate feeding provided by volunteer organizations such as the American Red Cross and the Salvation Army; no formal approval is required from USDA. Additionally, low income families can receive household distributions of food in situations where the Food Stamp Program is not available (e.g., commercial channels of trade are disrupted); formal USDA approval is required.

The *Stafford Act* provides: "The Secretary of Agriculture shall utilize funds appropriated under Section 32 of the Act of August 1935 (7 U.S.C. 612 c) to purchase food commodities necessary to provide adequate supplies for use in any area of the United States in the event of a major disaster or emergency in such area."

2. 7 CFR, Part 280, *Emergency Food Assistance for Victims of Disaster*.

This provides for issuance of food stamps to victims of disaster when their households have lost food in the disaster or are otherwise in temporary need and commercial channels of distribution have been disrupted and later restored.

3. 28 CFR, Part 65, *Emergency Federal Law Enforcement Assistance*.

These Department of Justice regulations implement the Emergency Federal Law Enforcement Assistance functions vested in the Attorney General by the *Justice Assistance Act of 1984* (Public Law 98-473). Those functions were established to assist State and/or

local units of government in responding to a *law enforcement emergency*. The Act defines the term *law enforcement emergency* as an uncommon situation which requires law enforcement, which threatens to become of serious or epidemic proportions, and with respect to which State and local resources are inadequate to protect the lives and property of citizens, or to enforce the criminal law.

Emergencies which are not of an ongoing or chronic nature, such as the Mount Saint Helens volcanic eruption, are eligible for Federal law enforcement assistance. Such assistance is defined as funds, equipment, training, intelligence information, and personnel. Requests for assistance must be submitted in writing to the Attorney General by the chief executive officer of a State. The Plan does not cover the provision of law enforcement assistance. Such assistance will be provided in accordance with the regulations referred to in this paragraph [28 CFR Part 65, implementing the *Justice Assistance Act of 1984*] or pursuant to any other applicable authority of the Department of Justice.

4. 40 CFR, Part 300, *National Oil and Hazardous Substances Pollution Contingency Plan (NCP)*.

    The purpose of the NCP is to effectuate the powers and responsibilities for responding to non-radiological oil and hazardous substance discharges, releases, or substantial threats of releases as specified in the *Comprehensive Environmental Response, Compensation and Liability Act*, as amended, (CERCLA) and the authorities established by Section 311 of the *Clean Water Act*, as amended, Section 105 of CERCLA, 42 U.S.C. 9605, and Section 311c(2) of the *Clean Water Act*, as amended, 33 U.S.C. 1321c(2).

5. 44 CFR 1.1, *Emergency Management and Assistance*, October 1, 1997.

    Provides the overall set of rules for FEMA.

6. DOD Directive 3025.1, *Military Support to Civil Authorities (MSCA)*, 1992.

    This Directive outlines Department of Defense (DOD) policy on assistance to the civilian sector during disasters and other emergencies. Use of DOD military resources in civil emergency relief operations will be limited to those resources not immediately required for the execution of the primary defense mission. Normally, DOD military resources will be committed as a supplement to non-DOD resources, which are required to cope with the humanitarian and property protection requirement caused by the emergency. In any emergency, commanders are authorized to employ DOD resources to save lives, prevent human suffering, or mitigate great property loss.

    Upon declaration of a major disaster under the provisions of Public Law 93-288, as amended, the Secretary of the Army is the DOD Executive Agent, and the Director of Military Support is the action agent for civil emergency relief operations. Military personnel will be under command of and directly responsible to their military superiors and will not be used to enforce or execute civil law in violation of 18 U.S.C. 1385 except as otherwise authorized by law. Military resources shall not be procured, stockpiled, or developed solely to provide assistance to civil authorities during emergencies.

7. *Federal Communications Commission Report and Order of August 4, 1981.*

    This Order modified Parts 2, 90, and 99 of the Commission Rules and Regulations to establish a disaster radio response capability for local government and State radio services.

8. *Federal Radiological Emergency Response Plan.*

    This document is to be used by Federal agencies in peacetime radiological emergencies. It primarily concerns the off-site Federal response in support of State and local governments with jurisdiction for the emergency. The *Federal Radiological Emergency Response Plan (FRERP)* provides the Federal government's concept of operations based on specific authorities for responding to radiological emergencies, outlines Federal policies and planning assumptions that underlie this concept of operations, and specifies authorities and responsibilities of each Federal agency that may have a significant role in such emergencies.

9. *National Plan for Telecommunications Support in Non-Wartime Emergencies,* January 1992.

    This plan provides guidance in planning for and providing telecommunications support for Federal agencies involved in emergencies, major disasters, and other exigencies, excluding war.

10. Federal Preparedness Circular 8, *Public Affairs in Emergencies.*

    This circular establishes the Interagency Committee on Public Affairs in Emergencies (ICPAE) as coordination of public information planning and operations for management of emergency information. The Circular was reviewed in draft by the ICPAE and will receive formal department and agency review.

11. American Red Cross Disaster Services Program, *Foundations of the Disaster Services Program*, ARC 3003, October 1994.

    This document provides an overview of the American Red Cross Disaster Services Program including policy and mission statements.

12. American Red Cross Disaster Services Regulations and Procedures, *Mass Care – Preparedness and Operations*, ARC 3031, April 1987.

    This document details the American Red Cross mass care preparedness and operating regulations and procedures.

13. American Red Cross Disaster Services Regulations and Procedures, *Disaster Welfare Inquiry*, ARC 3035, September 1990.

    This document details the American Red Cross disaster welfare inquiry preparedness and operating regulations and procedures.

14. American Red Cross Disaster Services Regulations and Procedures, *Disaster Health Services – Preparedness and Operations*, ARC 3050, April 1988.

    This document details the American Red Cross disaster health services preparedness and operating regulations and procedures.

15. American Red Cross Disaster Services Regulations and Procedures, *Disaster Mental Health Services*, ARC 3050M, November 1991.

    This document details the American Red Cross disaster mental health services preparedness and operating regulations and procedures.

16. *American National Red Cross National Board of Governors Disaster Services Policy Statements*, February 1994.

    This document outlines the basic policies of the American Red Cross disaster services program, and the disaster relief services to be provided by units of the American Red Cross on a uniform and nationwide basis.

17. *Statement of Understanding Between the Federal Emergency Management Agency and the American National Red Cross,* January 22, 1982.

    The statement of understanding between FEMA and the American National Red Cross describes major responsibilities in disaster preparedness planning and operations in the event of a war-caused national emergency or a peacetime disaster. It also outlines areas of mutual support and cooperation and provides a frame of reference for similar cooperative agreements between State and local governments and the operations headquarters and chapters of the American Red Cross.

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APPENDIX D.

CATALOG OF FEMA PROGRAM-CENTRIC SYSTEMS

THIS APPENDIX PROVIDES a listing of current and near-term program-centric IT systems at FEMA. For completeness purposes, some modules or sub-systems of enterprise-wide systems have been included in the listing. This is particularly the case for modules that have not yet been fully integrated. As the *FEMA IT Architecture* is implemented, it is envisioned that a number of the program-centric systems listed below may be consolidated, retired, and/or re-engineered. In the target *FEMA IT Architecture*, the ITS Directorate will support the program office (or owner of the system) in the development of the project by providing technical and engineering services. The program office will manage the programmatic aspects including funding and contracts if the program office chooses not to use existing IT contracts.

In general, program-centric systems will be able to use common, standardized, and accepted architectural components. Program-centric systems are effectively the *complement* of an enterprise-wide system. In the target *FEMA IT Architecture*, program-centric systems are characterized by one or more of the following features:

◗ Narrow scope
◗ Single user or few users with a common purpose
◗ A system that does not require extensive business process or administrative process interaction with other systems and/or processes. For example, program-centric systems would be largely standalone and require no complex interfaces with enterprise-wide systems
◗ Minimal data sharing with other systems, typically through a straightforward data exchange rather than as an integrated part of the business processes
◗ A system that is able to use common architectural components and is consistent with an enterprise-wide data dictionary
◗ Consistent with *FEMA IT Architecture* and accepted IT standards without duplication of effort.

Acronym	AACS
Title	Automated Access Control System
Owner	OS-SY-FS
Description	Provides an automated system for tracking and controlling access to FEMA Headquarters facilities.

Acronym	AAMS
Title	Automated Acquisition Management System
Owner	FM-SR
Description	An automated procurement system which includes a document generation module (ProDoc); a procurement data collection, tracking, and reporting module (ProTrac); procurement regulation search module (RegSearch); and bidders mailing list module (ProBid). AAMS supports Headquarters, satellite, and Regional procurement personnel in the acquisition of goods and services.

Acronym	AdmSys
Title	Admissions System
Owner	FA-OP-TS
Description	Contains the records of all resident and field students attending the National Fire Academy (NFA) and the records on Emergency Management Institute (EMI) resident courses and housing assignment and utilization. This system also supports the EMI training activities conducted at Mt. Weather as well as direct deliveries in other parts of the country. It is in the process of being updated and will be able to handle the lodging for Mt. Weather. This system is also critical in the management of related student services. Several modules make up this system and perform and manage the following activities:

❿ Selects students geographically and assigns them to valid course offerings
❿ Housing module to assign student names for housing at the National Emergency Training Campus (NETC)
❿ Module to manage special groups
❿ Module that automates the stipend program from the receipt of payment vouchers to their electronic transfer to the Department of the Treasury for reimbursement to the student
❿ Interface with the Procurement system that automates room assignments for contract instructors and the reporting of their 1099 information for the Internal Revenue Service (IRS)
❿ Module that manages student ground transportation
❿ Module that administers student services including food service, course certificates, transcripts, and recreational activities.

Acronym	AFMS
Title	Automated Forms Management System
Owner	OS-PS-RM
Description	An automated system for developing, filling out, and routing forms electronically throughout FEMA. This system has been purchased from a software vendor to automate the use of forms within FEMA. The electronic forms are stored on a Windows NT server. These forms can be accessed and filled out on the client PC. If desired they can be e-mailed. Future initiatives are to encrypt sensitive data such as electronic signature and social security number. Also there is the need to sequentially route or use multiple addresses at Headquarters or the Regions. The software is Y2K compliant.

Acronym	APERMAN
Title	Automated Personnel Management System
Owner	HR
Description	A local area network (LAN) that is connected to the FEMA wide area network (WAN) and provides controlled access to the National Finance Center's (NFC's) personnel/payroll system for the Office of Human Resources Management (OHRM) staff and Agency timekeepers. It also includes a variety of data bases in Access and Excel to record performance data, maintain and transfer nation Emergency Response Team (ERT) rosters, download and transfer human resources management information reports, several document tracking systems, etc. The system also hosts proprietary commerical off-the-shelf (COTS) software including a personnel reference library (PERSONNET), COHO, and CHINOOK.

Acronym	APSS
Title	Automated Personnel Security System
Owner	OS-SY-PI
Description	Provides for an automated system of control of all personnel security records.

Acronym	ARTS
Title	Audit Report Tracking System
Owner	IG-AU
Description	A standalone system that maintains, tracks, and reports on all audit reports issued by the Office of Inspector General's Audit Division and audit reports issued by other Federal and non-Federal auditors on FEMA activities that are processed by the Audit Division.

Acronym	BIIDB
Title	Badge Imaging Information Data Base
Owner	OS-SY-FS
Description	PC-based, standalone system in Headquarters, Regions, and Field Offices with digital cameras and printers used to create FEMA ID badges.

Acronym	BTS
Title	Budget Tracking System
Owner	Region VII
Description	A Region VII initiative to increase the availability of financial information to Regional management staff.

Acronym	BudSys(PT)
Title	PT Budget System
Owner	PT
Description	A series of interlinked spreadsheets used by the Preparedness, Training, and Exercises (PT&E) Directorate to track internal budget numbers.

Acronym	CAPSS
Title	Corrective Action Program Support System
Owner	PT-EX
Description	An automated system integrating several COTS software products (Microsoft Windows operating system, Microsoft Access data base, SmarText hypertext, and WordPerfect for Windows word processing). The main feature of the system is a data base of issues and corrective actions generated by evaluations of disaster response and recovery efforts and exercises. CAPSS is being developed to supply a corrective action process of validation and improvement for planning and operational readiness capabilities of the Federal government.

Acronym	CATS
Title	Consequences Assessment Tool Set
Owner	MT
Description	Modeling package to assess risk exposure and plan immediate response.

Acronym	CIS
Title	Community Information System
Owner	MT and IA
Description	Provides community-specific information regarding activities and operations related to floodplain management, mapping, and insurance for the National Flood Insurance Program (NFIP) communities. The NFIP-CIS supersedes the FIAMIS and the NFIPS.

Acronym	CLS
Title	Central Locator System
Owner	NS
Description	Maintains a current list of key government officials.

Acronym	DCAS
Title	Document Control and Accountability System
Owner	OS-SY-PI
Description	A data base management system used to store and retrieve information on all FEMA classified documents processed through the Document Control Center.

Acronym	DON
Title	Donations
Owner	FA-OP
Description	A computerized data base that maintains and reports on all donations accepted in accordance with the *Federal Fire Prevention and Control Act.*

Acronym	ECSLRM
Title	Electronic Catalog System for Library Records and Materials
Owner	OS-PS-RM
Description	A system to catalog and manage library bibliographic records, to provide an on-line catalog, and to provide access to FEMA Headquarters library materials.

Acronym	EMERS
Title	Emergency Management Exercise Reporting System
Owner	PT-EX
Description	Provides FEMA with the data needed to assess the effectiveness of emergency management capabilities at the State and local levels.

Acronym	ESDP
Title	Engineering Studies Data Package
Owner	MT-HZ-ID
Description	A fee charge system, which provides access to engineering studies, models, and applications for mitigation purposes.

Acronym	FANMAP
Title	FEMA Automated Network Management Program
Owner	IT-MA-CM
Description	A program that creates a file of frequencies to load into identified high frequency (HF) radios. It is being re-engineered.

Acronym	FNAPS
Title	FEMA National Paging System
Owner	IT-OP
Description	A 24-hour commercial nationwide paging system available to selected personnel.

Acronym	FNARS
Title	FEMA National Radio System
Owner	IT-OM-TL
Description	An HF single sideband radio system designed to back up landline-based systems and ensure continued connectivity between the Federal, State, and territorial governments. The mode of operations is secure and non-secure voice and data, and each of the FNARS stations in the 10 Federal Regions and each State Emergency Operations Center (EOC) is equipped with a telephone patch. Each station is equipped with a telephone to operate in the Automatic Link Establishment (ALE) mode in accordance with Federal Standard 1045, as well as the conventional mode. The FNARS is the primary backup communications system for the *Federal Response Plan*.

Acronym	GCCS
Title	Global Command and Control System
Owner	RR-OP-OC, NECC
Description	An information processing and exchange system sponsored by the Department of Defense (DOD) and authorized to process data up to Top Secret.

Acronym	HAZUS
Title	Loss Estimation (HAZUS)
Owner	MT-HZ-RA
Description	Provides capability to estimate losses and damages from natural hazards. Available in two versions: the original MapInfo version and an ArcView version. HAZUS is being expanded into a multi-hazard methodology with new models for estimating potential losses from wind (hurricanes, thunderstorms, tornadoes, extra tropical cyclones, and hail) and flood (riverine and coastal) hazards.

Acronym	HMGPDB
Title	Hazard Mitigation Grant Program (HMGP) National Data Base
Owner	MT-PI
Description	Used to capture data on projects submitted to FEMA by States for funding through the HMGP. Contains information on key aspects of program implementation, such as project type, cost, cost-share, environmental review, and benefit/cost analysis. Has a significant reporting function to allow for effective program monitoring and evaluation at both Regional and Headquarters levels.

Acronym	ICIMPP
Title	Integrated Civilian Industrial Mobilization Planning Process
Owner	PT-RP
Description	Integrated set of economic models that trace capital labor and material shortfalls for an emergency. It was retired in March 1999.

Acronym	IMIS
Title	Investigations Management Information System
Owner	IG-ID
Description	A system that maintains, tracks, and provides statistical information on investigations conducted by the Office of Inspector General, Investigations Division.

Acronym	IMIS-CtlSys
Title	Investigations Management Information System – Control System
Owner	IG-IV
Description	A subsystem of the IMIS that maintains, tracks, and reports allegations received from the Office of Inspector General Hotline.

Acronym	ISDBS
Title	Independent Study Data Base System
Owner	PT-TR
Description	Used to capture and maintain the names, addresses, and course information for all students who have taken an independent study course.

Acronym	ITS
Title	Action Items Tracking System
Owner	FA-OP-TS
Description	A computerized system that maintains, tracks, and reports on all actions assigned to the U.S. Fire Administration.

Acronym	JobTr
Title	Job Track
Owner	FA-OP-TS
Description	A computerized system that documents, maintains, tracks, and reports on all work orders related to the maintenance of the NETC facility. This system tracks and schedules preventive maintenance tasks for all installed electrical/ mechanical equipment and building and grounds maintenance. It is a DOS-based system.

Acronym	JSMS
Title	Joint Spectrum Management System
Owner	IT-OM-TL
Description	A computerized system designed for spectrum management by NTIA. It provides unique functions for the Federal government to assign, manage, and apply for frequencies. It replaces FFMS.

Acronym	LARS
Title	Logo Authorization Reporting System
Owner	FA-OP
Description	A computerized system that maintains and reports on activities authorized to sell, use, or distribute the FEMA Seal and/or the Fire Programs Logo.

Acronym	LIBSYS
Title	FEMA Library System
Owner	MT
Description	Electronic data base used by Technical Evaluation Contractors to achieve flood insurance back-up data including, but not limited to, parcels (boxes) that contain hardcopy printouts of hydraulic and hydrologic modeling, mapping, reports, and aerial photographs.

Acronym	LIMS
Title	Logistics Information Management System
Owner	OS-LE-LS-LM
Description	The Agency's single property management database system used to account for and track Agency property.

Acronym	LODR
Title	Letters of Determination Review System
Owner	MT-HZ-ID
Description	Provides the ability to track Letters of Map Determination.

Acronym	LOMA
Title	Letters of Map Amendment System
Owner	Region VII
Description	A data base application that is used to keep track of and respond to requests for floodplain determinations to individuals.

Acronym	MERS
Title	Mobile Emergency Response Support Detachments
Owner	RR-MO
Description	Five self-contained Detachments designed to provide telecommunications, operations, logistical, and life support for emergency responders in support of FEMA's All-Hazards mission.

Acronym	MERS-ALPHA
Title	MERS ALPHA System
Owner	RR-MO
Description	A subsystem of the secure LAN that will be replaced with the FEMA secure LAN.

Acronym	MERS-FSL
Title	FEMA Secure LAN
Owner	RR-MO
Description	A system that will replace both MERS ALPHA and SLAN.

Acronym	MERS-MRV
Title	Mobile Response Vehicle
Owner	RR-MO
Description	Multiple radio Ku band satellite system for long range telecommunications.

Acronym	MMS
Title	Mail Management System (under development)
Owner	OS-PS-RM
Description	An automated system that links mail operation units in FEMA, Regional Offices, MWEAC, NETC, Disaster Field Sites, and Disaster Field Offices to FEMA Headquarters Mail Management Operations. The system formulates and identifies postage costs and provides monthly costs status reports.

Acronym	MNUSS
Title	Mapping Needs Update Support System
Owner	
Description	A data base to house the National Inventory of Mapping Needs and to assist in analyzing and prioritizing mapping needs.

Acronym	MSCIMS
Title	Map Service Center Inventory Management System
Owner	MT and IA
Description	A system to track and control the distribution of Flood Insurance Rate Maps that are required by 18,000 participating NFIP communities and by all lending institutions for administering the statutory requirements of the NFIP. Used by insurance agents nationwide for the sale and servicing of Federal flood insurance policies.

Acronym	NAWAS
Title	National Warning System
Owner	IT-EN
Description	Presently a leased land-line communication system. The United States developed the NAWAS for civil defense purposes under the authority of the *Federal Civil Defense Act of 1950*. The government designed it primarily for warning of nuclear attack to Federal, State, and local governments and to the military and civilian population.

Acronym	NDER
Title	National Defense Executive Reserve System
Owner	PT-RP
Description	Central data base on individual status of National Defense Executive Reservists government-wide. The system generates Congressional and management reports.

Acronym	NETCCS
Title	NETC Copier System
Owner	FA-OP-TS
Description	A computerized data base that contains and reports rental and maintenance information related to campus copiers.

Acronym	NETCLAN
Title	NETC Local Area Network
Owner	FA-OP-TS
Description	A system of workstations and file servers serving the Emmitsburg facility. Included on this LAN are the NETC Admissions System, the NETC Procurement System, and various other systems and data bases.

Acronym	NETCLRC
Title	NETC Learning Resource Center
Owner	FA-OP-TS
Description	Software which provides a catalog of items in the collection of the Learning Resource Center.

Acronym	NETCMGT
Title	NETC Management
Owner	FA-OP-SA
Description	A computerized system that contains and reports information on Agency Senior Staff assignments and major organization changes at NETC.

Acronym	NETCPMS
Title	NETC Property Management System
Owner	FA-OP-SA
Description	A computerized system that contains and generates hand receipts, contains records, and provides reports of all the personal property on the NETC campus.

Acronym	NETCPS
Title	NETC Procurement System
Owner	FA-OP-SA
Description	A computerized system that tracks the 40-1s generated at NETC and the 40-19s related to those 40-1s and produces the related purchase orders.

Acronym	NETCScS
Title	NETC Security System
Owner	FA-OP-SA
Description	A computerized system that contains records of the daily activities of the security force and reports of incidents at NETC.

Acronym	NETCStS
Title	NETC Staffing System
Owner	FA-OP-OS
Description	A computerized system that contains and reports information related to all personnel duty stationed at the NETC.

Acronym	NETCVRS
Title	NETC Vehicle Registration System
Owner	FA-OP-SA
Description	A computerized system that contains records of all vehicles authorized to park on the NETC campus and information relative to individuals who have received parking violations on the campus.

Acronym	NFIP-AIS
Title	National Flood Insurance Program - Actuarial Information System
Owner	IA
Description	Analyzes the National Flood Insurance Program (NFIP), provides loss projections, establishes rates, facilitates access, and increases market penetration of actuarial analysis.

Acronym	NFIP-WYO
Title	National Flood Insurance Program - Write Your Own
Owner	IA
Description	Designed as a tool for maintaining financial and program control of the Federal Insurance Administration (FIA) Write Your Own program.

Acronym	NFIRS
Title	National Fire Incident Reporting System
Owner	FA-MT
Description	A standard package of forms, elements, codes, software, procedures, and manuals used for uniform data reporting methods by States to develop and report fire data to the National Fire Data Center (NFDC).

Acronym	NID
Title	National Inventory of Dams
Owner	MT-HZ-RA
Description	Provides information in support of Federal, State, and local water resource and emergency management planning. Provides management guidance to State and Federal agencies for the safety inspection of dams.

Acronym	OFW
Title	OSHALOG for Windows Manager Plus
Owner	HR
Description	Software used to track and report on-the-job injuries within FEMA.

Acronym	OTRS
Title	Official Time Reporting System
Owner	FA-OP
Description	A computerized data base that maintains and reports on official time used by Union officials as authorized by appropriate authority.

Acronym	PROTRAC
Title	Procurement Tracking System
Owner	FM-SR
Description	Automated system used to track purchase requests and purchase orders.

Acronym	RWS
Title	Revised Work Schedule
Owner	FA-OP
Description	A computerized system for the U.S. Fire Administration that maintains and reports on staff who are authorized to work a work schedule other than the standard work schedule.

Acronym	S&L
Title	Status of Studies and Letters
Owner	MT-HZ-ID
Description	Modules within the Community Information System (CIS) that track the status of flooding source re-studies and letter actions by community.

Acronym	SimLab
Title	Simulation Laboratory
Owner	FA-AC-TP
Description	A diverse set of simulation and distance education initiatives at the National Fire Academy accessible to firefighters nationwide via FEMA WAN. It will also be used at NETC as part of the program of instruction to provide interactive simulations of various incidents.

Acronym	SVIS
Title	Secure Video System
Owner	PT-TR-SS
Description	Provides secure video to users over the FEMA Switched Network (FSN) using 384 kbps of bandwidth. It is provided upon request by the National Network Operations Center (NNOC).

Acronym	SVOS
Title	Secure Voice System
Owner	IT-SP-OV
Description	Consists of various types of encryption devices approved by the National Security Agency for the purpose of providing secure voice communications.

Acronym	TAMS
Title	Time Audit Management System
Owner	OIG
Description	Time and attendance auditing system used by the Office of Inspector General.

Acronym	TIAS
Title	Training Information Access System: FEMA Bulletin
Owner	PT-TR
Description	Provides user access to EMI resident course schedules, rosters, IS statistics, and other data maintained on the NETC campus.

Acronym	TIMACS
Title	Telecommunications Information Management and Control System
Owner	IT-EN
Description	Provides user access for ordering all telecommunications service and equipment, tracks all services on order or in use, provides consolidated billing for services ordered, and provides for the canceling of service when no longer required. The system also provides the full range of management services used by FEMA, including the status of pending orders, cost/benefit analysis, requirements analysis, and standardized services at all FEMA locations.

Acronym	TMS
Title	Training Management System
Owner	PT
Description	Used to capture and monitor emergency management training data. It includes integration of CSEPP and SARA training requirements.

Acronym	Travel Manager
Title	Travel Manager
Owner	FM-SR
Description	A COTS package that currently is being used in FEMA for preparation of travel vouchers. It is a document preparation package, withgovernment travel regulations and related data, e.g., rates for reimbursement,built into it. Updates sometimes are received electronically from the vendor (GELCO), other times on diskette. The software runs on standalone PCs and on LANs, particularly at Disaster Field Offices. During FY 1999, Travel Manager was to be interfaced with IFMIS so travel vouchers could be imported and paid directly without rekeying of the data.

Acronym	USRAS
Title	Urban Search and Rescue (US&R) Automated System
Owner	RR-OP-EC
Description	Computerized data base that includes civilian US&R task forces, individual US&R experts, canines, and equipment.

Acronym	VAR
Title	Visit Authorization Requests
Owner	OS-SY-PI
Description	Tracks requests for classified visits.

Acronym	WFM
Title	Workforce Management System
Owner	FM-SR
Description	Provides salary and payroll data for all non-disaster employees, including fiscal year-to-date pay and FTE usage data and projections to the end of the year.

Acronym	WMS/Thoroughbred
Title	Open Workshop Warehouse Management System
Owner	OS-PS-PP
Description	A Windows NT-based warehousing inventory and order control system that has the capability of accepting orders from anyone via the FEMA LAN, modem, fax, or Internet.

APPENDIX E.

FEMA IT ARCHITECTURE REQUIREMENTS

TRACEABILITY MATRIX (RTM)

THIS APPENDIX PROVIDES the *FEMA IT Architecture* Requirements Traceability Matrix (RTM). The table below maps the requirements for an IT architecture as defined in OMB M-97-16 to various sections of the *FEMA IT Architecture*. Consistent with the development of an initial architecture, the *FEMA IT Architecture*, Version 2.0, has been developed to comply with the requirements of OMB Circular A-130, revised, November 28, 2000, which incorporated the provisions of OMB M-97-16.

FEMA IT Architecture Requirements Traceability Matrix

Item	Present/Absent/Comment
1. Enterprise architecture: Explicit description of the current *and desired* relationships among business and management process and information technology (italics added)	Section 1
a. Components of the National Institute of Standards and Technology (NIST) model:	Sections 1.11 and 1.12
i. Business processes	Section 1.12.2
ii. Information flows and relationships	Section 1.12.3
iii. Applications	Section 1.12.4
iv. Data descriptions	Section 1.12.5
v. Technology infrastructure	Section 1.12.6
b. Components:	Section 1
i. OMB prescribes interrelationships among and priorities of these components only for business processes.	Section 1 (general)
ii. Aside from business processes, no hierarchy is implied.	Section 1 (general)
iii. For each component, document:	Sections 1.9 and 1.10
(1) Current environment	Section 1.9
(2) Target environment	Section 1.10
c. Business processes: The foundation of the IT architecture:	Section 1.12.2
i. Should be developed by senior program managers in conjunction with IT managers.	Section 1.12.2
ii. Decompose into derivative business activities. Keep at high level to allow broad Agency focus, yet detailed enough to be useful in decision-making.	Section 1.12.2
iii. Avoid excessive emphasis on modeling business processes.	Section 1.12.2
d. Information flows and relationships:	Section 1.12.3
i. Describe relationships among various flows.	Section 1.12.3
ii. Where is information needed, how is it shared to support missions functions?	Section 1.12.3
e. Applications component:	Section 1.12.4
i. Identifies, defines, and organizes activities that capture, manipulate, and manage the business information to support *mission* operations.	Section 1.12.4
ii. Describes logical dependencies and relationships among business activities.	Section 1.12.4

FEMA IT Architecture Requirements Traceability Matrix (Continued)

Item	Present/Absent/Comment
f. Data descriptions and relationships:	Section 1.12.5
i. Can include data models.	Section 1.12.5
ii. Identify data that can be shared corporately, for minimizing redundancy, and for supporting new applications.	Section 1.12.5
g. Technology infrastructure – physical layer, wiring diagram. Includes functional characteristics, capabilities, and interconnections of:	Section 1.12.6
i. Hardware	Section 1.12.6
ii. Software	Section 1.12.6
iii. Communications (including networks, protocols, nodes)	Section 3
2. Technical Reference Model (TRM) and standards profiles	Section 2
a. Standards:	Section 2
i. Enable interoperability, portability, and scalability in systems throughout Agency.	Section 2
ii. Must be consistent throughout Agency.	Section 2
iii. Basis of development of components of Enterprise Architecture, guide and constrain IT asset acquisitions.	Section 2
b. TRM identifies and describes information services (e.g., data base, communications, security services) used throughout the Agency. OMB does not identify the services but gives one example, Information Interchange Services.	Section 2.2
c. Standards profile:	Section 2.3
i. Defines a set of IT standards that support the services articulated in the TRM.	Section 2.3
ii. Published set of standards or source references for standards that prescribe interfaces between those services that will be standards-based.	Section 2.3
iii. May contain specifications that describe technical standards that enable a service.	Section 2.3
d. Agencies are expected to adopt minimum standards necessary to support all components of the desired Enterprise Architecture.	Section 2.3
e. Standards should address:	Sections 2 and 3
i. Hardware	Sections 2 and 3
ii. Software	Sections 2 and 3
iii. Communications	Sections 2 and 3
iv. Data management	Sections 2 and 3
v. User interfaces	Sections 2 and 3
vi. Implementation approaches	Sections 2 and 3
f. Security standards profiles:	Section 2.4
i. Important. Need not be separate component of Enterprise Architecture or TRM.	Section 2.4

FEMA IT Architecture Requirements Traceability Matrix (Continued)

Item	Present/Absent/Comment
ii. Security standards profiles are standards profiles specific to security services specified in the Enterprise Architecture and cover services, e.g.:	Section 2.4.3
(1) Identification	Section 2.4.3
(2) Authentication	Section 2.4.3
(3) Non-repudiation	Section 2.4.3
(4) Audit trail creation and analysis	Section 2.4.3
(5) Access controls	Section 2.4.3
(6) Cryptography management	Section 2.4.3
(7) Virus prevention	Section 2.4.3
(8) Fraud prevention	Section 2.4.3
(9) Detection and mitigation	Section 2.4.3
(10) Intrusion, prevention, and detection	Section 2.4.3
iii. Must be consistent with requirements of OMB Circular A-130, Appendix III.	Section 2.4
3. Maintaining and implementing IT architecture	Section 4
a. *Clinger-Cohen Act* calls for implementation, not development.	Section 4
b. Prioritize areas of high incremental benefits for early implementation.	Section 4
c. Areas to give particular attention to are:	Section 4
i. Change management:	Section 4.2.1
(1) IT architecture development iterative, dynamic.	Section 4.2.1
(2) Revise IT architecture periodically so it evolves as Agency's business functions evolve.	Section 4.2.1
(3) Manage IT architecture with the same change control process that governs other critical documents.	Section 4.2.1
(4) Baseline of current environment should be maintained over time.	Sectoin 4.2.1
(5) Every agency should have a mechanism for evaluating current technologies and for identifying new IT opportunities for the agency.	Section 4.2.1
(6) OMB suggests a board to act as the steward of IT architecture and to perform IT architectural development and maintenance activities.	Section 4.2.1
ii. Legacy systems integration:	Sections 4.2.3 and 4.2.4
(1) Architectural strategy for dealing with legacy systems should focus on their interfaces with new systems.	Sections 4.2.3 and 4.2.4
(2) Don't compromise the ability of a new system to conform completely to the target architecture and standards.	Sections 4.2.3 and 4.2.4

FEMA IT Architecture **Requirements Traceability Matrix (Continued)**

Item	Present/Absent/Comment
iii. IT personnel planning:	Sections 4.2.6, 4.2.10, and 4.2.12
(1) The IT architecture should reflect the training, procedures, and staffing needed to support successful implementation.	Section 4.2.10
(2) Identify human resources and technical skills needed and available to develop, maintain, and implement the IT architecture.	Section 4.2.6
(3) Plan for remediation of deficiencies.	Section 4.2.6 and 4.2.10
iv. Compliance, waivers, and certification:	Section 4.2.13
(1) Compliance is critical.	Section 4.2.13
(2) Configuration changes should be tested and validated prior to acceptance.	Section 4.2.13
(3) Don't weaken the IT architecture via waivers. Require strong business case justifications for exceptions to the IT architecture.	Section 4.2.13
(4) Establish metrics which, if met, permit a proposed system to be termed *IT architecture compliant.*	Section 4.2.13

APPENDIX F.

HIGH-LEVEL DISCUSSION AND ANALYSIS OF

FEMA INFORMATION FLOW REQUIREMENTS

THIS APPENDIX PROVIDES a high-level discussion and analysis of FEMA's information flow requirements and provides amplification to Section 1.12.3. It is organized by directorate or administration. Where applicable, missions for subordinate divisions are included. This organization is subject to change, considering the Presidential Transition on January 20, 2001, and the new Administration.

Directorate or Administration
Office of the Director

Division (if applicable)	**Mission Statement**
	Provide leadership and direction to reduce the loss of life and property from all types of hazards through a comprehensive, risk-based, all-hazards emergency management program of mitigation, preparedness, response, and recovery.

High-Level Discussion of Information Flow Requirements

Needs data from FEMA organizational elements about disasters (such as extent of damage, casualties, etc.) to brief the President. Provides policies and directives. Submits budget and other agency documents such as the *Strategic Plan* in response to public law and other agency directives (e.g., OMB, GAO, GSA). Needs broad information about other Federal agencies, and State, Regional, and local governments and their roles, responsibilities, and capabilities as they impact FEMA. Also, needs broad information on hazards, risks, disasters, etc. as they impact major missions of mitigation, preparedness, response, and recovery. Needs broad information on flood insurance issues, fire-fighting issues, technology (e.g., GIS, IT systems, communications), risks, grants management process, and legal and regulatory issues.

Directorate or Administration
Office of Congressional and Legislative Affairs

Division (if applicable)	**Mission Statement**
	Coordinate FEMA's ongoing emergency management dialogue with the U.S. Congress, and coordinate implementation of FEMA's legislative program.

High-Level Discussion of Information Flow Requirements

Needs broad information to support all aspects of FEMA management of Congressional and legislative affairs including but not limited to:

▶ Congressional points of contact and their districts
▶ Congressional correspondence (input/output) especially from Members with active crises or disasters in their States and Districts
▶ Identification and tracking of pertinent FEMA Congressional legislation and legislative issues
▶ Briefings as they relate to Congress
▶ FEMA grants information as it relates to grants in a Member's District or State.

Directorate or Administration
Office of Public Affairs

Division (if applicable)	**Mission Statement**
	Disseminate response and recovery information to the public and news media during and after natural disasters and other emergencies, inform and educate the public about emergency preparedness, and inform the public and constituent groups about FEMA's activities.

Directorate or Administration
Office of Public Affairs (Continued)
High-Level Discussion of Information Flow Requirements

Needs to maintain close liaison with Mitigation, R&R, and PT&E Directorates (especially) to receive and process information about the scope and extent of disasters, response and recovery efforts, grants, and mitigation activities. Scans nationwide newspapers, and clips items of interest for FEMA. Provides information to the media and the public including:

◗ Press releases, advisories, fact sheets, and *backgrounders*
◗ Emergency information (e.g., audio, video, photographic, television, radio, Internet streaming of multimedia)
◗ *Recovery Channel* and *Recovery Times*.

Directorate or Administration
Office of Policy and Regional Operations

Division (if applicable)	Mission Statement
	Support the Director and Agency managers by conducting agency-wide planning, developing policy, and implementing strategic initiatives; ensuring Regional coordination; and building partnerships with and among State and local governments, non-governmental organizations, and business and industry.

High-Level Discussion of Information Flow Requirements

Needs to maintain close liaison with Regional Offices to understand issues and requirements. Develops and promulgates plans (such as the *Annual Performance Plan*), policies, standards, and procedures. Needs information about States, Regions, local governments, other Federal agencies, voluntary organizations, etc. to establish policies and directives associated with FEMA partnerships and performance agreements. Increasingly concerned about handling of information associated with environmental and cultural issues associated with disaster and non-disaster operations. Needs to develop improved capabilities for disaster correspondence tracking. (Note: OP is gaining the FEMA Disaster Correspondence Unit.) Needs inputs on public laws, directives, and policies as they impact FEMA and the flow of information both within, and external to, FEMA. (Example: What is required structure and content of performance reports for reporting on grants to States to meet GPRA requirements?)

Directorate or Administration
Office of National Security Affairs

Division (if applicable)	Mission Statement
	Serve as the focal point for FEMA activities related to COG, COOP, and contingency programs by ensuring that these activities are (1) coordinated within the Agency and with appropriate Executive Branch organizations and (2) are uniform and consistent with national security policy and FEMA positions on all-hazards initiatives.

High-Level Discussion of Information Flow Requirements

The Office of National Security Affairs (NS) processes information in an unclassified and classified mode. NS manages the development and publication of national security-related documentation including final versions, drafts, revisions, updates, and comprehensive guidance regarding policies, operational plans, and programs in the areas of COG, COOP, and contingency programs. Additionally, NS coordinates the development and distribution of documents and comprehensive guidance to internal FEMA customers, the Regions, and other Executive Branch departments and agencies.

Directorate or Administration
Office of the Inspector General

Division (if applicable)	Mission Statement
Office of the Inspector General	Serve as an independent and objective audit, investigative, and inspection unit relating to FEMA programs and operations for the purpose of promoting economy, effectiveness, and efficiency or preventing and detecting fraud, waste, and abuse in FEMA programs and operations.
Audits Division	Supervise, conduct, coordinate, and oversee the performance of all auditing activities relating to programs and operations within FEMA.
Inspection Division	Plan and conduct inspections of FEMA policy, programs, and operations. Recommend changes and improvements for effectiveness and efficiency.
Investigations Division	Conduct investigations relating to FEMA personnel, programs, and operations consistent with the *IG Act of 1978*, as amended.

High-Level Discussion of Information Flow Requirements

The requirements for information and information flow associated with business functions of the Office of Inspector General (OIG) are broad and encompassing. In general, OIG needs access to plans, policies, procedures, public law, directives, standards, etc. that impact FEMA's operations. OIG conducts audits, inspections, and investigations as related to these type of documents. Sources of data and information for audits, inspections, and investigations include (but are not limited to) interviews, agency records, documents, budget documents, grants data, reports, personnel records, electronic records in information technology (IT) systems, correspondence, external agency requests, OIG actions, and other sources as identified by OIG. With due regard for security and privacy issues, OIG produces reports and findings associated with audits, inspections, and investigations.

Directorate or Administration
Office of Human Resources Management

Division (if applicable)	Mission Statement
Office of the Director	Plan and direct human resources programs to maintain a workforce capable of delivering the Agency's assigned mission while advancing the Agency's commitment to its employees and the public.
Headquarters Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA.
Field Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA.

Directorate or Administration
Office of Human Resources Management (Continued)

Division (if applicable)	Mission Statement
Employee and Labor Relations Division	Manage, direct, and evaluate human resources management programs in the areas of employee relations, labor relations, performance management, and employee benefits.
Disaster Personnel Operations Division	Manage, direct, and evaluate human resources management programs in the areas of position management, classification, recruitment, internal placement, pay, and leave administration for assigned organizational segments of FEMA. Manage and direct operational aspects of the Automated Deployment Data Base (ADD).

High-Level Discussion of Information Flow Requirements

The Office of Human Resources Management (OHRM) has broad and demanding information flow requirements with regard to its assigned personnel management business functions. OHRM supports both disaster- and non-disaster-related operations for Headquarters and field personnel. OHRM derives inputs from public laws, policies, and directives (especially from OPM). The representative information that must flow to/from OHRM includes, but is not limited to:

▶ Time and attendance data from employees
▶ Personnel data (includes case files on disciplinary actions and employee performance data)
▶ Availability data and rosters for Emergency Response Teams (ERTs)
▶ Library of FEMA employee duties and responsibilities and any shifts in assigned duties and responsibilities
▶ Payroll data
▶ Recruitment data
▶ Personnel logistics data.

OHRM produces plans, polices and procedures, newsletters, reports, guides, and handbooks. Using IT systems, OHRM maintains a corporate data base of human resources information as an enterprise-wide capability to support mitigation, preparedness, response, and recovery operations for other FEMA organizational elements. Please see the discussion on the OHRM corporate data base in Section 1.12.4 for other information flow aspects implicit with this data base.

Directorate or Administration
Office of Equal Rights

Division (if applicable)	Mission Statement
	Serve the Agency and the nation by promoting affirmative employment, a discrimination-free workplace, and equal access to FEMA programs and benefits.

High-Level Discussion of Information Flow Requirements

The Office of Equal Rights (ER) has significant information flow requirements associated with its assigned mission requirements. ER derives inputs from equal rights public laws, policies, and directives, especially from the Equal Employment Opportunity Commission (EEOC). ER must frequently work closely with and exchange information with OHRM, the Office of General

Directorate or Administration
Office of Equal Rights (Continued)

Counsel, and Office of the Inspector General. The representative information that must flow to/from ER includes, but is not limited to, the following:

▶ FEMA equal rights data (including complaints, actions, disputes, legal records, notes of interviews, etc.)
▶ EEOC reports and statistical data
▶ Alternative dispute resolution data.

Directorate or Administration
Office of Financial Management

Division (if applicable)	Mission Statement
Office of the Chief Financial Officer	Promote sound financial management and accountability throughout the Agency by providing financial and acquisition-related guidance, information, and services to FEMA management and the Agency's customers.
Financial Planning and Analysis Division	Provide budget services and status of resources information to Agency management and in response to external inquiries and requirements.
Financial Systems and Reports Division	Provide financial reports and systems information to FEMA management and the Agency's customers, and provide technical automated data processing (ADP) and functional support to all OFM components.
Financial Operations Division	Provide agency-wide financial operational support.
Financial Policy Division	Provide financial management policy guidance, assistance, and training to internal and external customers, and recommend improvements in the delivery of financial services.
Acquisition Services Division	Provide and evaluate acquisition policies and procedures, training, and warrant programs for procurement personnel agency-wide, and provide acquisition support services to internal and external customers.
Acquisition Operations Division	Provide agency-wide acquisition, and provide direct contracting support for the Agency's major programs.

High-Level Discussion of Information Flow Requirements

The Office of Financial Management (OFM) has a very large and demanding information flow requirement associated with its assigned mission responsibilities, especially under the *Chief Financial Officer (CFO) Act*. OFM supports all other FEMA Directorates and Administrations. Implicit in providing this support are required inputs and outputs. OFM derives inputs from public law, plans, policies, and procedures. OFM develops and promulgates financial management rules and regulations, financial reports and analyses, financial management goals and objectives, standard operating procedures, training materials, and the FEMA Five Year Financial Management Plan. OFM's primary IT system is the Integrated Financial Management Information System (IFMIS). Please see the discussion on IFMIS in Section 1.12.4 for other information flow aspects implicit

Directorate or Administration

Office of Financial Management (Continued)

with this system. Representative information that must flow to/from OFM includes, but is not limited to:

◗ Disaster Relief Fund data and expenditures
◗ Budgetary documents from FEMA organizational elements
◗ ERT and Emergency Support Team (EST) financial management data
◗ Acquisition data and documents
◗ User requirements documents
◗ Grants financial management data
◗ Agency credit card data
◗ Payment and disbursement data
◗ Accounts payable and receivable data
◗ Grant awards payment data
◗ Vendor lists
◗ Solicitations and Requests for Proposals (RFPs)
◗ Contracts, purchase orders, contract modifications, and contract tasks data.

Directorate or Administration
Office of General Counsel

Division (if applicable)	Mission Statement
General Law Division	As a staff element of FEMA, render legal advice and assistance on all matters related to Agency programs and operation.
Program Law Division	
Litigation Division	

High-Level Discussion of Information Flow Requirements

The Office of General Counsel (OGC) has significant information flow requirements associated with its assigned mission requirements. OGC derives inputs from all public laws that impact FEMA rules and regulations, policies, and directives. OGC has a particular requirement for information and data that can meet legal, regulatory, and archival standards as determined by the Department of Justice and the Courts. OGC also renders legal opinions for FEMA. Representative information that must flow to/from OGC includes, but is not limited to, the following:

◗ Legal opinions (input and output)
◗ Programmatic data for FEMA assigned programs and grants
◗ Rules and litigation dockets and data
◗ *Federal Register* inputs and data
◗ White papers (input and output)
◗ Memoranda of Understanding (MOUs)
◗ Litigation case files
◗ *Freedom of Information Act (FOIA)* requests, documents, and data
◗ Legal correspondence (input and output).

Directorate or Administration
Mitigation Directorate

Division (if applicable)	Mission Statement
Office of the Associate Director	Develop, coordinate, support, and implement policies, plans, and programs to eliminate or reduce the long-term risk to human life and property from natural and technological hazards and to support the Director in making mitigation the cornerstone of emergency management.
Program Assessment and Outreach Division	Support the Associate Director in the coordination and support of innovations that encourage and foster a multi-hazard, community-based approach to mitigation activities at the Federal, State, and local levels by both governmental and private sector entities. Develop policy guidance to support those activities and assess their success in reducing losses. Develop information dissemination and awareness efforts to educate the private sector and Federal, State, and local government officials about FEMA's mitigation principles and programs.
Program Support Division	Support the Associate Director in the implementation of policies, plans, and programs to eliminate or reduce the risk and impact of natural hazards on human life and property. Emphasize a multi-hazard approach to mitigation activities at the Federal, State, and local level, working in partnership with governmental, private sector, and volunteer entities.
Hazard Technical Service Division	In conjunction with FEMA's Regional Offices, support the Associate Director in the establishment of a nationwide, map-based Hazard Study and Mapping Program, which forms the foundation for FEMA's *National Mitigation Strategy* and supports Federal, State, and local emergency management and hazard mitigation interests through the provision of useful products and information.
National Earthquake Program Office	Increase the national capability to save lives and property, and limit the social and economic disruptions from earthquakes through inter-agency strategic planning and program coordination; improved linkages between research, technology transfer, and implementation; informing and educating the public; and improving the cross-fertilization of earthquake loss-prevention and mitigation techniques between the Federal, State, and local governments and the private sector.

Directorate or Administration
Mitigation Directorate (Continued)

High-Level Discussion of Information Flow Requirements

The Mitigation (MT) Directorate has a large and demanding information flow requirement associated with its assigned mission responsibilities. The guiding document for defining the high-level information flow requirements associated with mitigation business functions is the *National Mitigation Strategy*. MT derives inputs from public law, plans, policies, and procedures. Representative information that must flow to/from MT includes, but is not limited to:

▶ Grants management data
▶ Mitigation correspondence
▶ Mitigation training materials
▶ Scientific and technical reports, handbooks, and manuals; and special studies and reports
▶ Mitigation documents and guidance materials
▶ Geographic Information System (GIS) data
▶ Floodplain data
▶ Mapping products
▶ Building code data
▶ Hazards data
▶ Risk assessment data and documents
▶ National Flood Insurance Program data.

MT develops and promulgates mitigation inputs to the *Federal Response Plan*; the *National Mitigation Strategy*; policy, strategies, guidance, and standards relating to all hazards; mitigation training materials; and mitigation rules and regulations. Additional aspects of mitigation information flow are addressed in Section 1.12.1. MT is a major user of the Network Emergency Management Information System (NEMIS). Information flow aspects of mitigation implicit to NEMIS are addressed in Section 1.12.4.

Directorate or Administration
Preparedness, Training, and Exercises Directorate
(in the process of being re-organized)

Division (if applicable)	Mission Statement
Office of the Associate Director	Provide the leadership, policy, financial and technical assistance, training, and exercise support required to establish or enhance the emergency management capabilities of Federal, State, and local governments. Develop and implement customer service initiatives.
State and Local Preparedness Division	Develop and manage programs that provide funding assistance to State and local governments to build integrated emergency management programs.
Training Division	Provide national leadership in the development and delivery of training necessary to ensure that individuals and groups with key emergency management responsibilities, including FEMA employees, have the requisite skills to perform their jobs effectively.

Directorate or Administration
Preparedness, Training, and Exercises Directorate
(in the process of being re-organized) (Continued)

Division (if applicable)	Mission Statement
Exercises Division	Improve the ability of Federal departments and agencies, State and local governments, volunteer organizations, and the private sector to respond to emergencies through a comprehensive all-hazards, multi-scenario exercise program.
Resources Preparedness and Capabilities Division	Support the Director and Agency managers by developing and coordinating integrated policy, planning, and analysis on issues related to Federal resources preparedness and capabilities programs and activities under the *National Security Act*, the *Defense Production Act*, and international treaties.
Mt. Weather Management Division	Manage the Mt. Weather Emergency Assistance Center, which is a focal point for support of disaster response tele-registration operations and training, exercises, and simulation activities designed to improve the all-hazards capabilities of Federal, State, and local government emergency managers.

High-Level Discussion of Information Flow Requirements

The Preparedness, Training, and Exercises (PT&E) Directorate has a large and demanding information flow requirement associated with its assigned mission responsibilities. PT&E is in the process of being re-organized and has assumed the customer service function from OP. PT&E derives inputs from public law, plans, policies, and procedures. PT&E develops and promulgates standards for FEMA partners, Regions, States, and local governments relating to preparedness, training, and exercises. Representative information that must flow to/from PT&E includes, but is not limited to:

- Lessons learned on exercises and training events
- Budget requests and budgetary data
- Correspondence
- Chemical Stockpile Emergency Preparedness Program (CSEPP) data
- Radiological Emergency Preparedness (REP) data
- Inter-agency MOUs and Memoranda of Agreement (MOAs)
- Exercise plans, reports, and data packages
- Training plans and data
- Regional, State, and local disaster plans
- Exercise results and after action reports
- Grants and grant management data
- Training materials
- Customer service data and information
- Media (TV productions, tapes, etc.)
- Corrective Action Program data and reports
- Nuclear and environmental plans, policies, and procedures relating to the U.S. Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC)
- National defense preparedness data
- COG and COOP exercise documents and data.

Directorate or Administration
Response and Recovery Directorate

Division (if applicable)	Mission Statement
Office of the Associate Director	Develop and maintain an integrated operational capability to respond to and recover from the consequences of a disaster, regardless of its cause, in partnership with other Federal agencies, State and local governments, volunteer organizations, and the private sector.
Readiness Coordination Division	Manage and lead the development, coordination, and implementation of policy, standards, and disaster evaluation systems within R&R. Oversee Federal disaster declaration policy and processing. Manage disaster operations program and customer satisfaction surveying.
Operations and Planning Division	Maintain and expand the *Federal Response Plan* and provide leadership in integrating and linking all Federal disaster response and recovery plans into an integrated system to support State and local response to all disasters. Develop, maintain, and implement emergency operations procedures and procedural guidance in support of the Agency's operational role in natural, technological, and man-made disasters.
Infrastructure Division	In coordination with applicants, conduct public assistance activities related to the repair or rehabilitation of qualifying public and certain private non-profit facilities.
Human Services Division	Ensure that individuals and families that have been affected by disasters have access to the full range of FEMA Human Services programs in a timely manner and that the best possible level of service is provided to applicants in the administration of these programs. This also includes developing partnerships with the States, voluntary organizations, the private sector, and other Federal agencies that are delivering similar kinds of assistance to the same groups of individuals.
Mobile Operations Division	Maintain deployable systems, such as MERS and MATTS, needed to support the response activities called for by the FEMA all-hazards mission.

High-Level Discussion of Information Flow Requirements

The Response and Recovery (R&R) Directorate has a large and demanding information flow requirement associated with its assigned mission responsibilities. The *Federal Response Plan* is the guiding document for R&R operations. Major elements of information flow are defined within the 12 Emergency Support Functions (ESFs) in the FRP. Section 1.12.2 also describes information flow requirements. R&R is a major user of enterprise IT systems such as NEMIS. See Section 1.12.4 for R&R information flows implicit to IT systems. R&R derives inputs from public law, plans, policies,

Directorate or Administration

**Preparedness, Training, and Exercises Directorate
(in the process of being re-organized) (Continued)**

and procedures. Representative information that must flow to/from R&R includes, but is not limited to:

▶ Budget requests and budget data
▶ Grants and grant management data
▶ Correspondence
▶ *Federal Response Plan* data (e.g., ESF data)
▶ Briefings and presentation materials
▶ After action reports
▶ Presidential Disaster Declarations
▶ Response and recovery programmatic data for assigned programs
▶ Mobile Emergency Response System (MERS) and Mobile Air Transportable Telecommunications System (MATTS) readiness data
▶ Facilities and operations center readiness data
▶ Situation reports
▶ GIS data to support response and recovery
▶ Inspection reports
▶ Human services data
▶ Data contained in NEMIS
▶ List of volunteer agencies and capabilities.

Directorate or Administration

Federal Insurance Administration

Division (if applicable)	Mission Statement
Office of the Administrator	Manage a Federal program to provide consumer-oriented flood insurance in participating communities.
Operations Division	Manage contracted resources by providing technical direction to contractors supporting the National Flood Insurance Program (NFIP), the NFIP Telemarketing Center, and the NFIP Distribution Center.
Financial Division	Manage the financial processing and accounting for FIA. Prepare the budget and the financial plan for each program each fiscal year and coordinate them with the FEMA OFM.
Marketing Division	Manage a comprehensive marketing program to increase the policy base, and coordinate it with the WYO companies and lender community to increase the sale of insurance and facilitate fewer uninsured losses by the public. Provide personnel, training, and correspondence management support to FIA.

Directorate or Administration
Federal Insurance Administration (Continued)

Division (if applicable)	Mission Statement
Underwriting and Claims Division	Manage the claims and underwriting functions of the FIA controlled insurance programs. Manage the insurance rulemaking process, and develop policy and guidance for operation of the insurance programs.

High-Level Discussion of Information Flow Requirements

The Federal Insurance Administration (FIA) has all of the information flow requirements of a major insurance corporation and insurance underwriter including marketing, operations, finance, underwriting, and claims management. FIA derives inputs from public law (especially the NFIP), plans, policies, and procedures. FIA promulgates rules and regulations. Representative information that must flow to/from FIA includes, but is not limited to:

▶ Write Your Own (WYO) programmatic data
▶ Marketing materials (e.g., brochures, publications, videos, displays, advertising)
▶ Audit data and reports
▶ Budget requests and budget data
▶ Actuarial data
▶ Historical reports and data
▶ GIS floodplain data and maps (e.g., Q3 FIRM maps)
▶ Underwriting data
▶ Insurance transaction data
▶ TRRP plan statistical transaction data
▶ Community Master File information
▶ Condominium inspector data
▶ Financial statements
▶ Policy and claims data and detailed data
▶ Financial data
▶ Repetitive loss data
▶ Property address data
▶ Training materials.

Directorate or Administration
United States Fire Administration

Division (if applicable)	Mission Statement
Office of the Administrator	Provide national leadership at the Federal level to reduce losses due to fire through coordination, direction, control, and administration for the Agency's fire programs that include fire incident data collection and analysis, fire research and technology transfer, public fire safety awareness and education, and training and education for the fire service and allied professions.

Directorate or Administration
United States Fire Administration (Continued)

Division (if applicable)	Mission Statement
Fire Management and Technical Programs Division	Direct programs to determine potential solutions to the national fire problem. Update the understanding of the national fire problem through collection and analysis of incident data collected from local fire departments. Support research into fire protection solutions and technology transfer for safer building and fire-fighting operations. Direct national public education programs to assist State and local authorities in reducing fire losses and promoting personal responsibility.
Management Operations and Student Support Division	Manage and operate the National Emergency Training Center (NETC) in support of USFA, the Emergency Management Institute (EMI), and the Field Personnel Operations Division, Office of Human Resources Management. Provide all non-academic student services including library, admissions, transcript, housing, transportation, and food service.
National Fire Academy	Provide national education programs for the fire service and allied professions.

High-Level Discussion of Information Flow Requirements

The United States Fire Administration (USFA) has all of the major information flow requirements of a scientific and engineering organization (specializing in fire studies, operations, and management) as well as a college (or university) for support of the National Fire Academy. Information flow requirements can be time-critical for fire suppression operations. USFA derives inputs from public law (including specialized programs/grants), plans, policies, and procedures. USFA promulgates rules and regulations and has a significant requirement for information dissemination to the public and the fire management community. Representative information that must flow to/from USFA includes, but is not limited to:

- National Fire Incident Reports (NFIR) and data
- Training materials
- Training goals and objectives
- Fire-related technical library materials
- Technical reports and white papers
- Simulation and multimedia materials
- Facilities management data
- Building codes and standards
- Admissions and enrollment data
- Curriculum materials
- Fire-related standards
- Public information materials
- Grants and grant management data
- Correspondence.

Directorate or Administration
Operations Support Directorate

Division (if applicable)	Mission Statement
Office of the Associate Director	Provide logistics, security, health and safety, and other mission support services essential to the accomplishment of the Agency's all-hazards emergency management program.
Occupational Safety and Health Program Office	Plan, develop, implement, and administer an agency-wide safety and occupational health program.
Program Services Division	Provide operational services support and service to all FEMA employees, the emergency management community, and the public to ensure successful accomplishment of FEMA's all-hazards mission.
Logistics Division	Provide logistics support in the areas of property management, logistics systems, and disaster operations for FEMA and its emergency management partners.
Security Division	Provide protection for personnel, facilities, and equipment to ensure a secure environment for FEMA and its emergency management partners.

High-Level Discussion of Information Flow Requirements

The Operations Support Directorate (OSD) has a large and demanding information flow requirement associated with its assigned mission responsibilities including logistics management and operations, occupational safety and health, Agency legal and archival records management, and security operations. OSD is a major user and developer of the Logistics Information Management System (LIMS). See Section 1.12.4 for information flows implicit to LIMS. OSD derives inputs from public law, plans, policies, procedures, and directives (e.g., OMB, NARA, GSA, GPO). Representative information that must flow to/from OSD includes, but is not limited to:

◗ Occupational safety and health data
◗ Agency electronic records
◗ Agency publications in electronic format
◗ Agency publications (hardcopy) maintained in warehouse and data on availability
◗ Agency logistics readiness data and LIMS data
◗ Personnel security information and data
◗ Facilities security data
◗ Budget requests and budget data
◗ Correspondence
◗ Data associated with:
  – Transit Subsidy Program
  – Federal Ride Sharing Program
  – Committee Management Program
  – Records Management Program
◗ Facilities engineering drawings
◗ Resource tracking
◗ National security data.
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Directorate or Administration
Information Technology Services Directorate

Division (if applicable)	Mission Statement
Office of the Chief Information Officer	Provide agency-wide support for information technology (IT) services and systems for routine operations and in all-hazards emergency and disaster situations. Provide leadership and direction for management of IT resources, ADP, telecommunications, and information services and systems necessary to support and accomplish FEMA's mission.
Program Management Group	Provide leadership and direction for the management, development, acquisition, and implementation of designated major agency-wide IT programs. Define and coordinate requirements, then research the technology for the most effective solutions to satisfy those major program requirements. Provide leadership and direction for major program efforts having cross-cutting implications for ITS.
Management Division	Provide leadership and direction for administration, policy-making, planning, contracting, configuration, and resources management of FEMA's IT. Serve as the central point for the Agency's Information Resources Management program.
Operations Division	Provide IT capabilities to FEMA, other Federal agencies, and State and local governments in support of FEMA's all-hazards mission by managing, operating, and maintaining FEMA's information systems, networks, and IT services centers.
Engineering Division	Provide integrated information systems analysis, design, development, test and implementation, re-engineering of existing information systems, IT investigation and engineering, LAN/WAN engineering, and information systems security leadership for the Agency, and design, develop, deploy, and implement disaster IT systems at FEMA fixed locations and disaster facilities.

High-Level Discussion of Information Flow Requirements

The Information Technology Services (ITS) Directorate has a large and demanding information flow requirement associated with its assigned mission responsibilities. These include development and integration of NEMIS and other IT systems, program support for IT systems, IT and network systems engineering, configuration management (CM), and IT systems and network operation. ITS derives inputs from public law (especially the ITMRA and GPRA), plans, policies, procedures, and directives. Representative information that must flow to/from ITS includes, but is not limited to:

- Budget requests and budget data
- Correspondence
- IT systems documents

Directorate or Administration
Information Technology Services Directorate (Continued)

◗ IT systems and network CM data
◗ Data dictionary standards and models
◗ Help desk materials and trouble ticket data
◗ Interface Control Documents (ICDs)
◗ Year 2000 compliance data
◗ Information Resource Board (IRB) documents
◗ GPRA reporting data
◗ Procurement data
◗ Capital plans, budgeting, and investment data
◗ IT systems technical reports
◗ RF spectrum management and call sign data
◗ TIMACS data
◗ On-line FEMA Telephone Directory
◗ ITS requirements documents
◗ IT systems test and evaluation reports and data
◗ Engineering studies and analyses
◗ Cryptographic equipment data
◗ Electronic key management data
◗ Equipment inventory data
◗ Security architecture data
◗ Enterprise security management data/documents.

Directorate or Administration
Regional Offices

Division (if applicable)	Mission Statement
Mitigation Division	Accomplish within the Region, the national program objectives established for the Agency by the Director. Establish an all-hazards approach to emergency management throughout the Region through close working relationships with other Federal agencies, State and local governments, private industry, and local volunteer organizations in the implementation of FEMA policies and programs.
Preparedness, Training, and Exercises Division	
Response and Recovery Division	
Operations Support Division	

High-Level Discussion of Information Flow Requirements

In general, the 10 Regional Offices have many of the same information flow requirements as the major Directorates and Administrations already identified. This largely reflects an organizational structure within the individual Regional Offices that mirrors FEMA Headquarters. In particular, the Regional Offices have divisions for:

◗ Mitigation
◗ Preparedness, Training, and Exercises
◗ Response and Recovery
◗ Operations Support.

FEDERAL EMERGENCY MANAGEMENT AGENCY
INFORMATION TECHNOLOGY ARCHITECTURE

Directorate or Administration
Regional Offices (Continued)

The reader is referred to the discussions of these Directorates in this appendix for a description of the major information flow requirements broadly applicable to the Regions.

For the Regional Offices, the information flows must be:
- Upward back to FEMA Headquarters
- Out to Disaster Field Offices and field personnel within the Region
- Out to States and local government serviced by the Regional Office
- Among each other for sharing lessons learned and especially for mutual mitigation support
- Out to external partners and agencies operating within the Region.

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APPENDIX G.

FEMA ENTERPRISE DOCUMENTS AND DATA STORES

THIS APPENDIX IDENTIFIES the major document and data stores maintained by various FEMA organizational elements. It is organized by Directorate or Administration and provides amplification to Section 1.12.4.

FEMA Organization	Documents and Data Maintained
Office of the Director	▶ Policies and Directives ▶ Presidential Briefings ▶ White Papers ▶ Budgetary Documents ▶ Instructions
Office of Congressional and Legislative Affairs	▶ Congressional Points of Contact and District Locations ▶ Congressional Correspondence ▶ Pertinent FEMA Congressional Legislation ▶ Briefings ▶ Legislative Issues ▶ Legislative Tracking Data

Office of Public Affairs	▶ Press Releases
	▶ Emergency Information:
	  – Audio
	  – Video
	  – Photographic
	  – Television
	  – Radio
	  – Internet Streaming of Multimedia
	▶ *Recovery Channel* Archives
	▶ *Recovery Times* (Newspaper Archives)
	▶ Advisories, Fact Sheets, and *Backgrounders*
	▶ Library of Audiovisual Materials
	▶ Newsletters
	▶ Nationwide News Clippings

Office of Policy and Regional Operations	▶ Plans and Policies ▶ Standards ▶ *Government Performance and Results Act (GPRA)* Reporting Policies ▶ Correspondence (per Disaster Correspondence Unit) ▶ Cooperative Agreements ▶ Regional Views and Issues Documents ▶ Performance Plans and Agreements ▶ Partnership Memoranda of Understanding (MOUs)
Office of National Security Affairs	▶ Plans, Policies, and Procedures ▶ National Security Briefings ▶ Budgetary Documents and Reports ▶ Contingency Programs, Policies, and Operational Plans ▶ Continuity of Government (COG), and Continuity of Operations (COOP) Documents and Plans

FEMA Organization	Documents and Data Maintained
Office of National Security Affairs (Continued)	◗ Correspondence ◗ White Papers
Office of Inspector General	◗ Audit Reports and Data ◗ Investigation Reports ◗ Inspection Reports ◗ Office of Inspector General (OIG) Budget ◗ OIG Policies and Procedures ◗ Audit Proceedings and Guide ◗ Financial Statements ◗ Inspections Policies, Procedures, and Guide ◗ Investigations Policies, Procedures, and Guide ◗ Correspondence
Office of Human Resources Management	◗ Time and Attendance Data ◗ Personnel Data (Includes Case Files on Disciplinary Actions) ◗ Plans, Policies, and Procedures ◗ Rosters for Emergency Response Teams (ERTs) ◗ Availability Data for ERTs ◗ Employee Performance Data ◗ Correspondence ◗ Library of FEMA Employee Duties and Responsibilities ◗ Payroll Data ◗ Recruitment Data ◗ Personnel Logistics Data ◗ Newsletters, Reports, Guides, and Handbooks
Office of Equal Rights	◗ Equal Rights Legislation, Policies, and Procedures ◗ Correspondence ◗ FEMA Equal Rights Data ◗ Equal Employment Opportunity Commission (EEOC) Reports ◗ Alternative Dispute Resolution Data
Office of Financial Management	◗ Plans, Policies, and Procedures ◗ Disaster Relief Fund Data ◗ Budgetary Documents ◗ Correspondence ◗ Financial Management Rules and Regulations ◗ ERT and Emergency Support Team (EST) Financial Management Data ◗ Acquisition Data and Documents ◗ Financial Reports and Analyses ◗ Financial Management Information System Goals and Objectives ◗ Training Materials ◗ Inventory of Financial Management Systems ◗ User Requirements Documents ◗ Grants Financial Management Data

FEMA Organization	Documents and Data Maintained
Office of Financial Management (Continued)	◗ Agency Credit Card Data ◗ Standard Operating Procedures for Financial Management ◗ Payment and Disbursement Data ◗ Accounts Payable and Receivable Data ◗ Grant Awards Payment Data ◗ Vendor Lists ◗ Five Year Financial Management Plan ◗ Solicitations and Requests for Proposals ◗ Contracts ◗ Purchase Orders ◗ Contract Modifications ◗ Contract Tasks Data
Office of General Counsel	◗ Plans, Policies, and Procedures ◗ Rules and Regulations ◗ Legal Opinions ◗ Rules and Litigation Dockets ◗ *Federal Register* Inputs and Data ◗ White Papers ◗ Legislation and Directives ◗ MOUs ◗ Litigation Case Files ◗ *Freedom of Information Act (FOIA)* Requests, Documents, and Data ◗ External Directives and Instructions ◗ Legal Correspondence

Mitigation Directorate	◗ Plans, Policies, and Procedures
	◗ Grants Management Data
	◗ Mitigation Correspondence
	◗ Mitigation Training Materials
	◗ Technical Reports, Handbooks, and Manuals
	◗ Mitigation Documents and Guidance Materials
	◗ Geographic Information System (GIS) Data:
	  – Floodplain Data
	  – Mapping Products
	◗ Building Code Data
	◗ Hazards Data Base
	◗ *National Mitigation Strategy*
	◗ Mitigation's Input to the *Federal Response Plan (FRP)*
	◗ Policy, Strategies, Guidance, and Standards Relating to All Hazards
	◗ Mitigation Rules and Regulations
	◗ Risk Assessment Data and Documents
	◗ National Flood Insurance Program Data
	◗ Library of Special Studies and Reports

FEMA Organization	Documents and Data Maintained
Response and Recovery Directorate	▶ Plans, Policies, and Procedures ▶ Budget Requests and Budget Data ▶ Grants and Grant Management Data ▶ Correspondence ▶ Standards for Response and Recovery ▶ FRP Data (e.g., Emergency Support Function [ESF] Data) ▶ Briefings and Presentation Materials ▶ After Action Reports ▶ Presidential Disaster Declarations ▶ Response and Recovery Programmatic Data ▶ Mobile Emergency Response Support (MERS) Readiness Data ▶ Facilities and Operations Center Readiness Data ▶ Situation Reports ▶ Response and Recovery GIS Data ▶ Inspection Reports ▶ Human Services Data ▶ Data Contained in the Network Emergency Management Information System (NEMIS) ▶ List of Volunteer Agencies and Capabilities
Preparedness, Training, and Exercises Directorate	▶ Plans, Policies, and Procedures ▶ Lessons Learned ▶ Budget Requests and Budget Data ▶ Correspondence ▶ Chemical Stockpile Emergency Preparedness Program (CSEPP) Data ▶ Radiological Emergency Preparedness (REP) Data ▶ Inter-agency MOUs and Memoranda of Agreement (MOAs) ▶ Exercise Plans, Reports, and Data Packages ▶ Training Plans and Data ▶ Regional, State, and Local Disaster Plans ▶ Exercise Results and After Action Reports ▶ Grants and Grant Management Data ▶ Training Materials ▶ Library of Media (TV Productions, Tapes, etc.) ▶ Corrective Action Program Data and Reports ▶ Standards Relating to Preparedness, Training, and Exercises ▶ Nuclear and Environmental Plans, Policies, and Procedures Relating to the U.S. Environmental Protection Agency (EPA) and the Nuclear Regulatory Commission (NRC) ▶ National Defense Preparedness Data ▶ COG and COOP Exercise Documents and Data ▶ Capability Assessment for Readiness (CAR) Documents and Data ▶ Customer Service Initiative Documents and Data

FEMA Organization	Documents and Data Maintained
United States Fire Administration	◗ Plans, Policies, and Procedures ◗ National Fire Incident Reporting Data ◗ Training Materials ◗ Training Goals and Objectives ◗ Fire-Related Technical Library ◗ Technical Reports and White Papers ◗ Simulation and Multimedia Materials ◗ Facilities Management Data ◗ Library of Building Codes and Standards ◗ Admissions and Enrollment Data ◗ Fire-Related Standards ◗ Public Information Materials ◗ Grants and Grant Management Data ◗ Correspondence

Federal Insurance Administration	◗ Plans, Policies, and Procedures
	◗ Rules and Regulations
	◗ Correspondence
	◗ Write Your Own (WYO) Programmatic Data
	◗ Audit Reports
	◗ Budget Requests
	◗ Actuarial Data and Master File
	◗ Historical Reports and Data
	◗ GIS Floodplain Data and Maps
	◗ Marketing Materials:
	  – Brochures
	  – Publications
	  – Videos
	  – Displays
	  – Advertising
	◗ Claims Data Bases
	◗ Underwriting Data Base
	◗ Insurance Transaction Data
	◗ TRRP Plan Statistical Transactions
	◗ Community Master File and Information
	◗ Condominium Inspector Data
	◗ Q3 FIRM Maps
	◗ Financial Statements
	◗ Policy Data
	◗ Claims Data
	◗ Financial Data and Master File
	◗ Repetitive Loss Data and Master File
	◗ Property Address Master File
	◗ Policy and Claims Detail Data
	◗ Policy Master File
	◗ Claims Master File
	◗ Submit for Rate Master File

FEMA Organization	Documents and Data Maintained

Operations Support Directorate	◗ Plans, Policies, and Procedures
	◗ Occupational Safety and Health Data
	◗ Agency Electronic Records
	◗ Agency Publications
	◗ Agency Logistics Readiness Data Bases
	◗ Personnel Security Information Data Bases
	◗ Facilities Security Data Bases
	◗ Budget Requests
	◗ Correspondence
	◗ Data Associated With:
	  – Transit Subsidy Program
	  – Federal Ride Sharing Program
	  – Committee Management Program
	  – Records Management Program
	◗ Facilities Engineering Drawings
	◗ National Security Data Bases

Information Technology Services Directorate	◗ Information Technology (IT) Architecture ◗ Plans, Policies, and Procedures ◗ Budget Requests ◗ Correspondence ◗ Library of IT Systems Documents ◗ IT Configuration Management (CM) Data (Includes Network CM) ◗ Data Dictionary and Models ◗ Help Desk Materials and Trouble Ticket Data Base ◗ Interface Control Documents ◗ Year 2000 Compliance Data ◗ Information Resource Board (IRB) Documents ◗ GPRA Reporting Data ◗ Procurement Data ◗ Capital Plans, Budgeting, and Investment Data ◗ IT Reports ◗ Radio Frequency Spectrum Management and Call Sign Data ◗ TIMACS Data ◗ On-Line FEMA Telephone Directory ◗ Information Technology Services (ITS) Requirements Documents ◗ IT Systems Test and Evaluation Reports ◗ Engineering Studies and Analyses ◗ Cryptographic Equipment Data ◗ Electronic Key Management Data ◗ IT Systems Software Library ◗ Equipment Inventories ◗ Security Architecture Data ◗ Enterprise Security Management Data and Documents

APPENDIX H.

FEMA IT ARCHITECTURAL PRINCIPLES

AND SUPPORTING RATIONALE

THIS APPENDIX ESTABLISHES the basic architectural principles upon which future FEMA information technology (IT) systems will be designed, built, and acquired and upon which legacy IT systems will be systematically re-engineered. The architectural principles provide the basic ground rules for building and re-engineering IT systems. They are intended to provide a stable foundation upon which FEMA developers, engineers, and integrators can make important IT systems design and implementation decisions. These principles can be expected to evolve as FEMA's mission and business functions evolve.

The architectural principles defined below are mandatory for compliance. Except as indicated, the principles apply to new systems and any new development, interfacing, re-engineering, re-hosting, or integration of legacy systems.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
To the maximum extent practicable, FEMA IT systems shall be designed, developed, implemented, interfaced, and integrated in accordance with internationally-accepted open systems standards as profiled and accepted in this *FEMA IT Architecture*. This principle shall apply to new systems as well as to any re-engineering, re-hosting, future integration, or interfaces with legacy systems.	▶ Needed to ensure interoperability and cost effectiveness across the enterprise and throughout the life cycle of the IT system.
The FEMA Chief Information Officer (CIO) has cognizance of all IT systems development projects. The FEMA CIO shall have the authority to challenge, review, re-direct, and/or terminate any FEMA IT systems project that violates policies and the *FEMA IT Architecture*.	▶ Needed to maintain adequate controls in accordance with the *Information Technology Management Reform Act (ITMRA)* and the *Government Performance and Results Act (GPRA)*.
Closed, proprietary approaches to IT systems shall be strongly proscribed against unless justified to the CIO and Information Resources Board (IRB) for extraordinary circumstances including but not limited to cost/benefit factors and other pressing operational factors.	▶ Needed to ensure interoperability and cost effectiveness across the life cycle of the IT system. ▶ Provides an *escape* route, should no open systems approach be effective.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
Industry standard approaches (as opposed to closed, proprietary approaches) are acceptable but must be fully documented and profiled to the satisfaction of the CIO and IRB to ensure long-term data usability and integrity.	▶ Allows for industry standard approaches as long as FEMA developers, engineers, and integrators are aware of the requirements to be able to read and process the data/document should industry standard tools become scarce. ▶ Responsive to Directives of the National Archives and Records Administration (NARA) and the *Federal Records Act*.
The practice of declaring a particular IT tool, system, or application as a FEMA enterprise-wide standard is supported but shall not be considered a routine, standard, or automatic occurrence. The declaration of a standard tool must consider other factors such as compliance of the tool, system, or application to open systems standards and/or industry standards. A critical factor is the potential archival longevity of FEMA corporate data maintained by the tool and the potential to migrate the data to a new system, tool, or application.	▶ Recognizes that standardizing data is more important from an archival perspective than standardizing a tool. ▶ Recognizes that FEMA as well as other Federal agencies have little control over defining functional capabilities of tools. ▶ Responsive to Directives of NARA and the *Federal Records Act*.
All new IT systems and re-engineered systems shall be compliant with legal and regulatory documents and plans identified in Sections 1.3 and 1.5 (and associated appendices) of this *FEMA IT Architecture*. This shall be a checklist item for compliance in reviews.	▶ Required to maintain compliance with public law, Directives, court cases, and high-level plans.
For a tool, application, or system to be declared a FEMA enterprise-wide standard, the proposing activity must prove to the satisfaction of the CIO and the IRB that the vendor or distributor is solvent and reliable. This does not relieve the proposing activity of the responsibility to demonstrate that the data maintained by the tool, application, or system is long-lived from an archival perspective and can be migrated.	▶ Considered necessary for the declaration of a tool, application, or system as a standard. ▶ The CIO and FEMA IRB want to be sure that the declared standard has some measure of longevity and to properly consider whether the recommendation should be accepted. ▶ Standard tools from vendors that are considered potentially insolvent or unreliable will be rejected.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
IT systems shall be designed, implemented, and integrated in due consideration of the following requirements: security, interoperability, flexibility, affordability, scalability, portability, and extensibility. Detailed requirements will be promulgated and tailored by the CIO in collaboration with the IRB.	▶ Establishes the stated requirements as important architectural considerations for the design and development of IT systems.
IT systems shall be designed to be responsive to operational environmental factors for the business functions that they support. See Section 1.6.6 and Appendix J.	▶ Recognizes the importance of operational environmental factors in the design of IT systems in support of business functions and raises the level of visibility of these factors to the CIO and the IRB.
When fully developed and determined by the CIO in coordination with the IRB, IT systems shall conform to a FEMA enterprise-wide data dictionary and/or provide for alias mechanisms which preserve semantic and syntactic integrity.	▶ Recognizes the central importance of a universal data dictionary in achieving interoperability. ▶ Provides for flexibility in interfacing with legacy systems.
In the development of FEMA IT systems, a strong preference shall be given to COTS implementations that implement open systems, standardized approaches as opposed to a separate FEMA-sponsored development activity.	▶ Recognizes that COTS implementations are generally less costly than full-blown development efforts and need to be strongly considered. ▶ Provides for an *escape* mechanism if no COTS alternative is deemed effective.
In the design and development of IT systems, strong preference shall be given to approaches which implement the concept of creating data and information once in its most intelligent and searchable format, effectively managing it across its full life cycle, and gaining maximum downstream re-use. Approaches that print or *dumb-down* data (to be later electronically re-captured) are strongly proscribed against and may be denied in systems review processes.	▶ Recognizes that approaches that squander information and intelligence in the data and documents are costly. ▶ Recognizes that scanning, conversion, and optical character recognition (OCR) activities are time-consuming, are costly, and can introduce errors that are difficult and expensive to identify and correct.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
In establishing interfaces among IT systems, established IT architectural principles should not be compromised just to achieve an interface. Due consideration should be given to achieving interoperability using an open systems approach.	▶ Drives a requirement for future development activity especially for integration with legacy systems. ▶ *Two wrongs don't make a right.* ▶ Serves to move or drive toward interoperability in an open systems fashion.
Any proposed IT development activity shall consider the operational impact on existing FEMA networks and communications. By the same token, FEMA networks and telecommunications resources shall be responsive to operational requirements to provide appropriate levels of Quality of Service. The CIO in consultation with the IRB will be the adjudicating authority should conflicts arise.	▶ Recognizes that the IT systems and network systems are inextricably linked and inseparable. ▶ Provides a mechanism for FEMA organizational elements to propose higher bandwidth IT requirements or changes such as decentralization or establishment of Virtual Private Networks (VPNs) and Extranets, and places some of the burden of analysis on network operations personnel.
Any proposed IT development activity shall consider the potential impact on FEMA's business partners (i.e., the enterprise) and to the maximum extent practicable shall secure appropriate endorsements, consensus, and support.	▶ Recognizes that IT systems are a central part of the FEMA enterprise and that for interoperability and streamlined electronic information to flow, a consensus among affected business partners should be achieved.
Any proposed IT development activity shall re-use existing defined FEMA enterprise-wide IT architectural components unless the components can be demonstrated to be inadequate to the requirements to the satisfaction of the CIO and the IRB.	▶ Establishes a firm requirement for re-use of IT architectural components that can meet requirements. ▶ Provides a mechanism for highlighting any deficiencies in the definition or implementation of common architectural components.
All IT systems development activities shall conform to one of the established *FEMA IT Architecture* life-cycle models (Spiral, Waterfall, and Pilot/Prototyping).	▶ Declares the requirement that IT systems be developed in a structured and disciplined manner in accordance with the ITMRA and the GPRA.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
Strong consideration and preference will be given to IT systems life-cycle cost/benefit analyses especially in assessing the role of open systems standards. Life-cycle analyses may need to be conducted in addition to any cost/benefit analyses that might be developed as part of a particular IT system project phase.	▶ Recognizes that efficiencies and cost savings might only be achieved through proper life-cycle investment analyses. ▶ Recognizes the central importance of standards in life-cycle investment decisions.
IT systems shall employ standardized and *FEMA IT Architecture*-compliant configuration management (CM) approaches.	▶ Establishes a firm requirement for CM and control in a standardized fashion.
All design decisions on IT systems shall consider the legal and regulatory impact and the potential that the data/information in the system might be used in a court of law or other legal proceeding. This shall include maintaining adequate audit trails to support legal proceedings to the satisfaction of the Office of General Counsel. In the future, this may include provision of digital signature and secure date-time stamping services.	▶ Recognizes that FEMA IT systems must operate in a legal and regulatory environment particularly in light of recent court cases.
In design and development of IT systems, strong encouragement and support is given to establishing partnerships and collaboration with external entities including businesses and FEMA partners. Strong encouragement and support is also granted to rapid prototyping activities and demonstrations.	▶ Recognizes and endorses the opportunity for FEMA IT systems developers and integrators to achieve savings and promote increased interoperability through partnership actions. ▶ Helps set the stage for acceptance of rapid prototyping and piloting as viable methods to develop systems.
All FEMA IT systems shall be Year 2000 compliant.	▶ Required by law and recent Directives.

Architectural Principle	Rationale for Inclusion in the *FEMA IT Architecture*
Consistent with other IT architectural principles, strong preference shall be given to IT systems which maximize and exploit Internet and Intranet technologies and approaches.	▶ Recognizes the central role and direction of modern Internet technology as part of the National and Global Information Infrastructure (NII/GII). ▶ Sets the stage for acceptance and profiling of Internet-based standards recommended by various Internet standards committees.
IT systems documentation standards shall be enforced.	▶ Establishes the requirement for discipline in the documentation of IT systems.
In the development of IT systems, developers and engineers shall demonstrate an awareness that electronic documents and paper documents are different media and are governed by different IT standards. The following principles pertain: 1. Consistent with the direction of the NII/GII, a valid FEMA electronic document can legally contain complex multimedia objects that might not be renderable on paper. Electronic media may be considered *pageless* and *paperless*. 2. Where electronic documents and paper documents must be synchronized, preservation of the information content on each of these media shall be considered the essential data integrity criterion and not necessarily the *look and feel* of the electronic document as it is printed to paper.	▶ Recognizes that paper-based and electronic documents are different media, and establishes this notion as an important architectural principle. ▶ Expected to facilitate future systems development in such areas as digital libraries, document management systems, and data warehouses. ▶ Effectively removes the argument that the electronic copy and the paper-based copy must look the same and preserve page integrity to be determined to be identical. ▶ Sets the stage for IT systems developers to manage electronic documents and data to maintain robust electronic data integrity.
Mandatory policies and procedures in the *FEMA Information Resources Management Procedural Directive (FIRMPD)* and *IT Capital Planning and Investment Guide* are considered essential elements of *FEMA IT Architecture* and shall be considered a part of this document.	▶ Recognizes that these documents provide additional amplifying policy, procedures, and Directives, and incorporates them by reference into this higher level *FEMA IT Architecture* document.
Any architectural elements, components, standards, or criteria not explicitly reserved in the *FEMA IT Architecture* and supporting documents shall be the purview of the project office proposing the project.	▶ Provides systems developers and engineers with the flexibility and authority to develop systems to meet requirements as long as stated architectural principles are not violated.

FEDERAL EMERGENCY MANAGEMENT AGENCY
INFORMATION TECHNOLOGY ARCHITECTURE

APPENDIX I.

EXECUTIVE DIRECTIVES, CONGRESSIONAL ACTS, AND

JUDICIAL GUIDANCE AFFECTING THE *FEMA IT ARCHITECTURE*

THIS APPENDIX IDENTIFIES additional Executive Directives and Orders, public law, and judicial guidance that broadly impact the development of the *FEMA IT Architecture*. The reader is also referred to Appendix C , which identifies explicit references to FEMA and to comprehensive emergency management in such documents.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Executive Directive for Electronic Commerce (EC)	Closely associated with the NPR is the *Executive Directive for Electronic Commerce (EC)* (October 26, 1993, at *Federal Register*, Vol. 58, No. 207, 58095) which established policy for streamlining procurements through electronic commerce means. Historically, electronic commerce has been somewhat limited in scope and mostly procurement oriented. However, more recently with the establishment of EC working groups in the General Services Administration (GSA), Department of Defense (DOD), and the Department of Commerce, electronic commerce is rapidly evolving to also embrace standards for complex electronic document and data interchange (such as electronic grants management and specifications for products to be procured), legal and regulatory electronic filing including digital signature and secure date-time stamping, and greater use of the Internet (versus specialized Value Added Networks). These aspects of electronic commerce have important implications for development of the *FEMA IT Architecture* and should be considered.
Government Paperwork Elimination Act of 1998 (GPEA)	GPEA requires Federal agencies, by October 21, 2003, to allow individuals or entities that deal with the agencies the option to submit information or transact with the agency electronically, when practicable, and to maintain records electronically, when practicable. The Act also provides for electronic signatures.
Government Performance and Results Act (GPRA)	GPRA requires each agency to establish strategic plans and performance measures. Through a strategic planning process, FEMA's mission, goals and objectives, and strategies have been systematically defined to anticipate and adapt to expected change. In support of the GPRA, each program activity in FEMA's budget is being held accountable to established performance measures which support accomplishment of FEMA's mission. In an enterprise sense, FEMA is now also in the process of *pushing down* its requirements for GPRA reporting and accountability to FEMA's grantees. Information flow and data collection, data capture, and data analysis aspects of the GPRA are clear-cut drivers for development of an integrated *FEMA IT Architecture*.

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
Clinger-Cohen Act of 1996, also known as the Information Technology Management Reform Act	The *Clinger-Cohen Act* mandates policies and procedures for agencies to follow in the development and implementation of IT systems, including requirements for inter-agency coordination, technology transfer, performance, and business case analysis. It also established the position of Chief Information Officer (CIO) within Federal agencies as the focal point for an agency's IT architecture development and management.
Computer Security Act	The *Computer Security Act* provides security requirements and legal constraints in such areas as confidentiality, data integrity, ensured service availability, fault tolerance, etc. Elements of security under the *Computer Security Act* have been considered in the development of the *FEMA IT Architecture*. See Section 2.4.
Government Information Security Reform Act	On October 30, 2000, the President signed into law the FY 2001 *Defense Authorization Act* (P.L. 106-398) including Title X, subtitle G, "Government Information Security Reform." It amends the *Paperwork Reduction Act of 1995* by enacting a new subchapter on "Information Security." The Act primarily addresses the program management and evaluation aspects of security. It covers unclassified and national security systems and creates the same management framework for each.
Federal Records Act	The *Federal Records Act* is a collection of statutes intended to ensure accurate and complete documentation of the policies and transactions of the Federal government, the control of the quantity and quality of records produced by the Federal government, and the judicious preservation and disposal of records. To the extent that FEMA records constitute official government records to be preserved by the National Archives and Record Administration (NARA), the requirements of the *Federal Records Act* must be factored in the development of the *FEMA IT Architecture*. FEMA recognizes that standards are an important component of the Technical Reference Model (TRM), which is a part of the IT architecture according to OMB M-97-16. FEMA recognizes that these IT standards must be coordinated across multiple agencies to achieve interoperability and the long-term requirements of the *Federal Records Act*.

Legislation, Directive, or Order	Implications for Development of the FEMA IT Architecture
National Telecommunications Act	The *National Telecommunications Act* provides a framework for acceptable use, growth, future development, and tariffs for the nation's information network and telecommunications backbone. FEMA's mission critically depends on timely, robust, and secure high-bandwidth telecommunications and networking on a national and international scale. The provisions and strategic direction of the *National Telecommunications Act* have been considered in the development of the *FEMA IT Architecture*.
Paperwork Reduction Act of 1995	The *Paperwork Reduction Act of 1995* directs Federal agencies to establish processes that are sufficiently independent of program responsibilities so that they can fairly and objectively evaluate whether proposed collections of information are necessary for the performance of agency functions and should be approved by the Office of Management and Budget (OMB). The objectives of the OMB review are: ◗ To ensure that proposed collections of information have practical utility ◗ Are the least burdensome to perform the agency's business functions ◗ Comply with legal requirements and achieve program objectives ◗ Do not duplicate information otherwise accessible to FEMA ◗ Minimize the cost of collecting, processing, and using the information without shifting disproportionate costs or burdens to the public. Accordingly, the requirements of the *Paperwork Reduction Act* have clear-cut implications for defining information flow aspects of the *FEMA IT Architecture*.
High Performance Computing and Modernization Act of 1991	The *High Performance Computing and Modernization Act of 1991* established much of the existing high-performance computing and telecommunications backbone across the United States, which in no small measure has built a robust infrastructure that has untapped potential to support FEMA's mission. Particularly significant is the opportunity to leverage: ◗ Distributed digital library technology for managing petabytes (e.g., 1,000 terabytes) of Geographic Information System (GIS) data for mitigation activities ◗ Distributed interactive simulation (DIS) technology for more realistic exercise planning, reconstruction, and analysis ◗ Virtual reality modeling technology to support realistic 3-D simulations and visualization for training purposes

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
	▌ Telepresence, telerobotics, and telemedicine technologies to support response and recovery mission functions. During the development of the *FEMA IT Architecture*, a number of strategic opportunities for leveraging the high-performance computing infrastructure were identified.
Rehabilitation Act of 1973, as amended, Section 508, IT Accessibility, August 7, 1998	This Act requires that IT accessibility for the disabled must be incorporated into the design of newly developed hardware and software for operating systems and applications. Specific guidance will be followed when it is issued.
Growing *corpus* of case law	FEMA is aware of a growing *corpus* of case law in which electronic documents, data, and records are being accorded *official* records status (e.g., *Public Citizen v. Carlin* and *Armstrong v. Executive Office of the President*). FEMA with its Office of General Counsel is also aware that the electronic documents and data (themselves) are increasingly being introduced and used in legal proceedings. The requirements for long-term archival storage and retrieval of documents and data for historical and legal purposes are still under active consideration at NARA. Vital issues include digital signature and secure date-time stamping and proving irrefutably in a court of law that electronic records have not been altered. This *FEMA IT Architecture* document is aware of that activity and is consistent with it to the maximum extent practicable. FEMA understands that this needs to be a continuing active area of consideration, particularly for the development of the TRM.
Presidential Memorandum on Electronic Government, December 17, 2000	This Memorandum encourages the overall initiative of electronic government. It requires agencies to take specific actions to help citizens gain one-stop electronic access to existing government information and services and to provide better, more efficient government services and increased government accountability to its citizens.
FIPS, OMB Memoranda, NARA Directives, industry standards, NIST TRM	FEMA is also cognizant of a large number of related documents and directives including Federal Information Processing Standards (FIPS), OMB Memoranda, NARA Directives, industry standards, and the National Institute of Standards and Technology (NIST) TRM. Together, these documents and Directives: ▌ Define requirements for implementing open systems standards and architectures in Federal information systems

Legislation, Directive, or Order	Implications for Development of the *FEMA IT Architecture*
	▶ Provide technical requirements for electronic document and data interchange and reporting ▶ Provide rules for public information dissemination and information access ▶ Provide *fee for service* provisions which can lead to a *seat management* approach to provisioning IT resources at FEMA ▶ Provide requirements and constraints for digital signature and encryption technology ▶ Provide guidelines and requirements for acceptable use of networks and telecommunications resources.
OMB Memorandum M-00-10	This Memorandum requires that each agency must submit to OMB, by October 31, 2000, plans for implementing the GPEA.
OMB Circular A-130, revised November 28, 2000	This Circular establishes policy for the management of Federal information resources including procedural and analytic guidelines for implementing specific aspects of these policies and appendices. The revision modifies sections of the Circular to follow more closely provisions of the *Clinger-Cohen Act* and OMB Circular A-11. It rescinds OMB M-96-20, M-97-02, M-97-09, M-97-15, and M97-16. It incorporates the provisions of these OMB Directives in the revised Circular A-130.
FEMA's own policies and rules governed by other public laws	Lastly, FEMA has its own internal policies and rules which are governed by other public laws and which impact the development of an enterprise IT architecture. Among others, these include the *Stafford Act* and the Code of Federal Regulations (44 CFR 1.1). Section 1.6.1 and Appendix C provide additional references to FEMA in other public laws and Federal regulations.

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APPENDIX J.

OPERATIONAL ENVIRONMENTAL FACTORS

INFLUENCING FEMA IT SYSTEMS

THIS APPENDIX IDENTIFIES the major operational environmental factors that must be considered in the development of IT systems. As indicated in Section 1.6.6, these represent critical IT architectural factors. It should be clear and understood that not every FEMA business function is mission-critical and requires a robust and redundant IT support capability under the worst of the operational environmental factors.

On a day to day basis, most of FEMA's business functions are well handled in a normal business office environment. However, the potential always exists that FEMA will need to respond to contingencies that are extraordinarily severe.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Adverse weather conditions	Adverse weather conditions include rain, snow, heat, bitter cold, drought, and flood conditions among others, which have caused an emergency somewhere within the country. The major IT architectural considerations include: ▶ Potential need for portable rugged computers (mobile computing) capable of operating under extremes in weather. Any requirement for portable rugged computers would need to be traded off against the lower cost and higher availability of non-rugged commercially available laptops ▶ Potential need to establish a Disaster Field Office (DFO) to work under such circumstances ▶ Need to have messaging services and remote communications.
Local, State, and/or Regional infrastructure potentially destroyed or inoperable with the need to operate in a transportable environment (such as Mobile Emergency Response Support and Mobile Air Transportable Telecommunications System [MERS/MATTS] support to a DFO)	A number of contingencies and disasters may render a local, State, and/or Regional infrastructure potentially destroyed or inoperable. In these circumstances, FEMA must respond frequently with the establishment of a DFO (or set of DFOs) and work to restore basic infrastructure capabilities. In the interim, FEMA response and recovery assets must be self-sufficient including IT assets. In large measure, this operational environment factor places the most stress on IT systems. For this operational factor, the major IT architectural design, implementation, and integration considerations include: ▶ Need to get adequate advance warning and alert (as technically and operationally feasible). This is a matter of preparedness, and IT systems and telecommunications must be in place in advance to provide the advanced warning and alert

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	▶ Need an efficient and streamlined approach supported by IT systems and telecommunications to make timely and accurate damage assessments; to report results through local, State, and Federal sources; and to brief the President to request a Federal disaster declaration. In general, there is a need for IT systems to provide more interactivity, collaboration, real-time performance, and remote visualization capabilities. From an IT perspective, this is frequently referred to as telepresence. Can decision-makers be effectively *teleported* to the area?
	▶ Need to execute contingency plans utilizing IT systems as needed. This generally includes having tested the IT and network systems in realistic training exercises in advance of the contingency
	▶ Potential need for continuous uninterruptible power supplies for supporting IT system until local power can be restored
	▶ Need to establish voice, video, and data communications to all participants in the *Federal Response Plan* quickly and efficiently
	▶ Need for IT systems and supporting personnel to be totally self-sufficient until the infrastructure is restored
	▶ Need to potentially coordinate infrastructure repairs especially for utilities (e.g., water, fuel, electric, communications, transportation), disaster victims, businesses, etc.
	▶ Need to develop a rapid and accurate as possible situation assessment and disseminate the assessment to concerned parties
	▶ Need to capture data and information quickly, efficiently, and as accurately as possible and provide it quickly to the FEMA enterprise participants
	▶ Potential need to support FEMA deployed field personnel through portable devices (radios, messaging services, Global Positioning System [GPS], etc.)
	▶ Need to disseminate information to affected individuals and coordinate the full spectrum of human support services utilizing IT systems and networks
	▶ Need for IT systems and networks to be flexible and extensible, ranging from providing highly centralized national-level support down to local decentralized capabilities as required by the Federal Coordinating Officer (FCO). Also a need to maintain span of control over IT resources including configuration management of resources
	▶ Need for IT systems to be reliable, redundant, interoperable, transportable, flexible, and secure.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Need for operations in a remote or rural environment (perhaps requiring a DFO)	In general, FEMA needs to consider and plan for the complete scope of locations where disasters and emergencies can occur. The potential clearly exists for operations in a remote or rural environment such as a forest or wildfire area, remote islands and territories of the United States, agricultural areas, mountainous areas, forested areas, etc.
	In this environment, there may also be a need to preserve natural resources such as indigenous flora and fauna as well as historical and cultural sites. Compared to the urban environment, this environment is characterized as not having much of an infrastructure to start with. It is also characterized by low population density.
	In this environment, FEMA may set up a remote DFO. The major IT architectural design, implementation, and integration considerations include:
	◗ Need for transportability and portability of IT systems and associated telecommunications support
	◗ Need for IT systems to create, manage, and use environmental information and information on historical and cultural sites
	◗ Need for remote geo-sensing and distributed Geographic Information System (GIS) applications
	◗ Need for FEMA field sources to be completely or nearly completely self-sufficient from an IT systems perspective including power sources
	◗ Need for wide-area telecommunications support where there is generally no existing infrastructure. Generally, this implies the need for long-haul communications such as HF and/or satellite.
Need for operations in a large destroyed urban environment (e.g., earthquake) other than at FEMA Head-quarters or a Regional Office	FEMA emergency operations in a large destroyed urban environment (such as due to an earthquake) are essentially the opposite of operations in a remote and rural environment. This operational factor is similar to the operational factor for the situation where local, State, and Regional infrastructure is destroyed but with a few additional important IT considerations which need to be addressed.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	Most notably, the sheer numbers of individuals that may be affected may place additional stress on IT systems from a scalability perspective. On the other hand, if a significant portion of the urban power, communications, transportation, housing, health services, local government, and business infrastructure has survived the potential exists that FEMA can use this remaining infrastructure to respond to the disaster. A chemical or biological attack might leave a physical infrastructure intact but with no personnel to support it. The major additional IT architectural design, implementation, and integration considerations include: ◗ Need for IT systems to be scalable to adapt to large numbers of affected persons in a human friendly manner ◗ Need for rapid situation assessment in an urban environment ◗ Need to develop effective plans for exploiting local existing infrastructure such as establishing automated information interfaces to the media, schools, businesses, shelters, government buildings, and utilities ◗ Need to exploit indigenous IT and network technology resources that survive including cellular and wireless services; local media, telephone, and cable; and Internet to support mass information dissemination.
Virtual/synthetic environment (for training, exercises, and simulations)	This *FEMA IT Architecture* recommends establishing a comparatively new operational environment in which FEMA IT systems and network technology must potentially operate. This operational environment is termed a virtual or synthetic environment and can be used for training, exercises, and distributed interactive simulations. The major characteristic of this environment is that it needs to be as realistic as possible for training, exercise, and simulation purposes. An important ancillary benefit of developing IT systems that operate in this environment is that the capabilities can be readily re-used in real-world operational contingencies. In this virtual or synthetic environment, the major IT architectural design, implementation, and integration considerations include: ◗ Need for distributed and uniform data bases and common models distributed among event participants ◗ Need for a scenario generation capability including feeding data to the IT systems

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	◗ Critical need for the real-world IT systems and networks to be designed, developed, implemented, and integrated up-front with a training or exercise mode of operation ◗ Critical need to standardize and distribute data and metadata as well as models and IT tools ◗ Need for provisioning an adequate volume of *realistic* data for training and simulation purposes ◗ Need for preserving document and data integrity across the simulation ◗ Need to support automated data capture for reconstruction and analysis purposes ◗ Generally a need for higher bandwidth telecommunications to maintain control of the simulation or exercise ◗ Need for distributed intelligent collaboration and visualization to support planning, operations, and reconstruction and analysis of the training, simulation, or exercise event ◗ Need to seamlessly integrate the virtual and synthetic environment with IT systems designed for real-world operations to support the notion of *practicing and training as though it were real* ◗ Need to provide search and retrieval access to enterprise-wide documents and data bases through digital library technology ◗ Need to establish automated standardized electronic interfaces with Regions, States, local government, and FEMA partners that want to participate in the exercise.
Continuity, contingency, and disaster recovery planning	FEMA has fully complied with PDD-67 on Continuity of Operations Planning (COOP). A separate COOP document is maintained by the Agency. FEMA is also keenly aware of the need to conduct Business Continuity and Contingency Planning (BCCP) for all its core business processes. A considerable BCCP baseline was established, as a result of the Agency's Y2K efforts. This baseline will be updated for ongoing BCCP activities. FEMA is also aware of the need to develop and document formal Disaster Recovery Plans (DRPs) for all its major systems and applications. The Agency will follow all the appropriate guidance to ensure effective DRPs are developed and documented. All of these above contingency planning activities will integrate the appropriate sections of this IT architecture.

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
Office environment (e.g., FEMA Headquarters and Regional Offices including National Flood Insurance Program [NFIP] Regional Offices and Emmitsburg)	The normal operational environment in which FEMA IT systems must operate is the day-to-day office environment at FEMA Headquarters, the 10 Regional Offices, the NFIP Regional Offices, Emmitsburg, and other offices. While the operational environment may be quiescent, the operational impact as well as opportunities for improved IT systems engineering is significant. Most FEMA business is currently transacted in an office environment, and the potential exists for additional streamlining through better integration of IT and network resources. Additionally, most IT systems development, engineering, and integration are currently performed in an office environment, and there is a real need to improve this capability. In the office environment, the major IT architectural design, implementation, and integration considerations include: ◗ Need for discipline in adherence to IT policies and procedures ◗ Need for tighter integration of enterprise systems such as NEMIS, IFMIS, LIMS, Facilities Management System, OHRM corporate data base; NFIP data bases; etc. ◗ Need to critically look at the large number of IT systems across FEMA and identify which are candidates for retirement, consolidation, and/or further development and refinement ◗ Need for business process re-engineering for improved efficiencies ◗ Need for planning, test, and evaluation of Continuity of Operations (COOP) responsibilities for critical business functions ◗ Need for improved standardization of enterprise-wide configuration management practices ◗ Need to establish and enforce an enterprise-wide IT data dictionary and enterprise-wide systems engineering standards ◗ Need to implement appropriate security architecture provisions in such areas as access controls, digital signature, secure date-time stamping, audit trails, monitoring, etc. ◗ Need to implement open systems document and data standards to address long-term archival storage requirements

Representative Operational Environmental Factors	Major Architectural Implications for Design, Development, and Integration of FEMA IT Systems
	❱ Need to recognize the legal and regulatory impact of decisions regarding electronic records. Electronic records are increasingly being introduced in a court of law, and most of the records are being generated and produced in common office environments
	❱ Need for increased enterprise-wide standardization and adherence to established architectural components such as:
	– Enterprise-wide correspondence and action tracking system
	– Enterprise-wide document management system
	– Enterprise-wide text search capability
	– Enterprise-wide approach to digital library technology
	– Enterprise-wide approach to use of groupware or distributed collaboration and visualization tools.
	❱ Need for more enterprise-wide exploitation and integration of FEMA GIS
	❱ Need to achieve consensus on standards for more structured document and data interchange with FEMA business partners
	❱ Need for better utilization of office automation tools including enterprise-wide adoption of a more viable e-mail system
	❱ Increased need to collaborate with other Federal agencies to address IT problems of mutual concern and interest.

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APPENDIX K.

CROSS-CUTTING ISSUES ASSOCIATED WITH DEVELOPMENT OF

THE TECHNICAL REFERENCE MODEL AND STANDARDS PROFILE

THIS APPENDIX SUMMARIZES the key standards-related issues associated with the creation, management, and use of electronic documents and data sets across the emergency management community. Some of these issues are still unsettled across the IT community, the National Archives and Records Administration (NARA), and the courts.

These are issues that affect multiple Federal agencies and should be addressed in a coordinated fashion across the Federal government:

1. **Longevity of File Formats and Archival Storage Requirements.** For FEMA, an important issue associated with electronic documents and data sets is the longevity of the file formats and the long-term archival storage and retrieval requirements of the emergency management community and the public. This issue is closely related to the concern regarding internationally-accepted open systems standards for document and data interchange as opposed to acceptance of industry-standard or proprietary approaches. Specifically, FEMA is concerned about the anticipated lifetime of the particular file format within FEMA's IT systems. In general, any migration of data, including translation, risks loss of document and data integrity. FEMA is also concerned with the long-term availability of software/viewers to render the files to support information dissemination activities as well as perhaps downstream legal proceedings.

   In an open systems environment, the issue of longevity can (in principle) be addressed by formally and rigorously defining the allowable file and data formats. As indicated in OMB Circular M-97-16, it is necessary to develop formal standards profiles (e.g., Application Portability Profiles [APPs]). Standards profiles are the detailed set of rules, guidelines, implementation conventions, data elements, and entities which fully define the allowable file formats for graphics, text, and other complex objects (e.g., math and chemical expressions, multimedia, etc.). For any community, such as the emergency management community, the profile then provides the formal rules for tailoring and/or using a given information interchange standard to enhance portability and interoperability of the file. This activity is essentially a time-consuming, consensus-building (as well as, frequently, educational) process. For this approach to work, it must cut across multiple Federal agencies (each of which has its own constituents), FEMA's business partners in industry, voluntary organizations, as well as FEMA's customers: the States and local governments. Achieving this level of consensus is problematic.

   FEMA understands that documentation of the electronic file and data formats is required by NARA to support long-term archival storage and retrieval requirements of the Federal government. FEMA also appreciates that by having a formal and standardized definition of the file and data formats, as technology changes and evolves, it should be possible to develop new software/viewers to read and render the archival documents and data in the future, thereby mitigating any need for translation. However, there are no guarantees that consensus can be achieved across the broad and diverse enterprise.

2. *Subsets vs. Supersets* **and the Availability of Well-Defined APPs/Standards and Viewers/Tools.** Closely related to the issue of *longevity of file formats and archival storage requirements* is an important architectural issue associated with potential *subsets* and *supersets* of the data file formats. An ancillary concern is the availability of (and commercial

viability of) viewers and tools to create, manage, and use the files. This issue is one of the more complex issues associated with maintaining data integrity while interchanging electronic documents and data across an enterprise.

Most of the current file and data formats for graphics and complex objects support *subset* implementations, where perhaps not all of the features of the file format may be incorporated in a commercial product. By the same token, vendors are also normally free to develop and integrate *superset* features in their products, which may or may not be well documented as part of the file definition. The current concern about Hypertext Markup Language (HTML) and Web browsers and their lack of interoperability is an excellent example of this problem. *The real problem for interoperability occurs when there is a mismatch between the capabilities of the tool(s) used by the sender of the file and the tool(s) used by the receiver of the file, resulting in files/data that cannot be read or rendered at all.*

Within the scope of the *FEMA IT Architecture*, one way for FEMA to address this problem is by potentially identifying a set of standard tools to be used across the enterprise. The difficulty of achieving consensus across the enterprise on standards and standard tools is discussed above. Across the broad and diverse emergency management community, there is currently little consensus on standard tools.

3. **Potential for Misuse of Standard Tools.** FEMA recognizes that even with a designated standard tool, there is a significant potential for misuse of the tool within the scope of the *FEMA IT Architecture*. For example, many commercial products support *Save As…* functions or configuration *Options…* which can *flavor* the file which is produced and/or incorporate features which may not be formally defined. Another problem is that one standard tool may depend upon another. For example, using a standard word processor may also require standardization on printers and print drivers so that the sender and receiver can print out pages which look identical. Then again, the versions of the tools (and print drivers) may need to be the same. Achieving consensus and standardization across the enterprise at that level of detail is extraordinarily difficult.

FEMA is also concerned that many commercial off-the-shelf (COTS) products, which are potential candidates for designation as a standard tool, can also display and handle more features than might be formally defined in a standards profile. In other words, they support *supersets* of the formal file definition. The potential risks are that an electronic file may be produced with extra *features* or *entities* which (1) cannot be accurately rendered in otherwise compatible tools used by the enterprise or (2) can lie outside the formal file definition in the standard profile. The latter problem is perhaps worse from a downstream archival storage perspective. An archival storage issue or a legal issue which may arise several years from now is: "What are the undocumented features and entities in this archival file? What do they mean? and How were they used from an agency business perspective at the time the file was created?"

FEMA appreciates that this concern is far from being resolved and is a major issue for NARA. This issue is a cross-cutting issue, which impacts multiple Federal agencies, their partners, and their customers.

4. **Handling of Metadata, Hidden Text, Macros, Executables, and/or Attributes.** In an electronic document and data environment, it is important to recognize that many file and data formats support concepts such as embedded metadata, hidden text, macros, executables (such as Java code), or data element attributes, which are not normally viewable at the time that the file is rendered for viewing. Thus, it is possible for the electronic files to have either embedded and/or hidden information or data, which may or may not be substantive, raising potential rules and legal issues. This concern was voiced in the *Public Citizen v. Carlin* ruling and was cited by the court as an important reason for Federal agencies to effectively manage their electronic documents, data, and archives as opposed to just printing them out on paper. Once again, this issue is an important cross-cutting issue for multiple Federal agencies. It is far from being solved and needs to be addressed by NARA and OMB.

5. **Presentation Issues and Document Fidelity:** *Pageless vs. Page-Oriented* **Displays.** In transitioning from a paper-based emergency management environment to a more electronic environment, presentation issues and document fidelity and integrity are potential issues, which need to be addressed as part of the IT architecture. For example, must a request for a disaster declaration from a Governor look exactly like the original? Is the written signature important or can a digital signature (supported by a secure digital certificate services environment) suffice? Then, what are the concerns that a raster-scanned copy of a written signature can be easily forged or the signed and digitally-imaged document easily altered?

   FEMA is concerned that to maintain page integrity and a *What You See Is What You Get (WYSIWYG)* presentation, it is generally necessary to embed fonts and style elements (such as kerning, line spacing, margins, etc.) into the electronic files or settle for a facsimile. Unfortunately, font and stylistic elements within electronic documents such as commercial word processing files are mostly proprietary (i.e., they are not open), and facsimile documents are not searchable. An ancillary concern is the problem that different printers and different print drivers may also print the document and its embedded graphics differently.

   One way to mitigate this problem is to utilize an intrinsically *pageless* approach to electronic documents, which obviates the need for maintaining constant document presentation and page integrity. This approach is consistent with the direction of the National and Global Information Infrastructure Initiatives (NII/GII) and the use of Standard Generalized Markup Language (SGML) and more recently Extensible Markup Language (XML), which is expected to replace HTML on the Web. However, getting consensus on this approach across the enterprise is difficult, especially with the legal community. The legal community generally wants to preserve the look and feel of a document. Again, this issue is a problem that impacts multiple Federal agencies. It needs to be addressed in a coordinated manner.

6. **Presentation Issues Associated with Multimedia Objects and Complex Objects.** Within FEMA and other Federal agencies, there is increased momentum toward multimedia applications. Within a future electronic document and data environment, there are a number of architectural concerns and issues about the presentation of multimedia

objects (audio-video) and complex objects (such as mathematical and chemical expressions). FEMA can readily envision a scenario where these multimedia and complex objects can become official records of a disaster and, therefore, must be preserved under the *Federal Records Act*. This issue is a problem that impacts multiple Federal agencies and their respective missions.

FEMA's major IT architectural concern is that file types such as MPEG files, MIDI files, AVI files, and VRML files may require special hardware such as a 3-D graphics accelerator boards or sound boards to properly render the file. Furthermore, the actual multimedia presentation may depend on the processing power of the CPU, the actual hardware, or the bandwidth of the transmission network or may be operating system specific. Differences in playback quality between hardware- and software-based approaches to the presentation of multimedia objects need to be addressed for potential significance across the Federal government as a whole. Additionally, this issue has profound implications for long-term archival storage and retrieval as addressed in issue 1 above.

At the current time, there is no simple solution to validation and long-term archival storage and retrieval of multimedia files. This cross-cutting issue needs to be addressed in a coordinated manner across multiple Federal agencies.

7. **Issues Associated with Duplicate Electronic and Paper Documents.** In the IT architectures of most Federal agencies, it is generally possible to print out the document and data files on demand, the obvious exception being embedded multimedia objects.

   This situation raises potential concerns, such as: "Which copy is the *official* copy?" and "What is the best approach to keep the paper-based copy in sync with the electronic copy particularly if the document is dynamically changed throughout the Agency's business processes?" This situation is a cross-cutting issue for multiple Federal agencies, and additional policies and guidelines need to be provided.

8. **Selection of *Intelligent* vs. *Non-Intelligent* File Formats.** Lastly, FEMA appreciates that it is important to recognize that not all electronic file formats for text and graphics are equally as *intelligent* and useful. Some file formats are more *intelligent* in that they can directly support indexing and searching of content within the document. Additionally, some of the file formats can directly support automated workflow processes at the embedded object level within the document. In general, these types of file formats are preferred. However, the real difficulty with this problem is achieving consensus across the enterprise. It is a significant problem for multiple Federal agencies and especially for integration with legacy systems. Legacy systems may not support creation, management, and use of more *intelligent* document and data definitions without significant re-engineering.

   As the *FEMA IT Architecture* evolves and technology improves, FEMA anticipates providing additional guidelines on which file types are preferred and applicable to certain document and data types applicable to the emergency management community. In general, the long-term direction and architectural preference will be toward open systems file types that are *intelligent* and searchable. FEMA understands this to be a consensus-building process.

APPENDIX L.

MAJOR IT NEEDS AND REQUIREMENTS OF

FEMA ORGANIZATIONAL ELEMENTS

SECTION 1.12.2 ADDRESSED FEMA's major business functions of mitigation, preparedness, and response and recovery. These business functions are effectively assigned to the Mitigation Directorate; Preparedness, Training, and Exercises Directorate; and the Response and Recovery Directorate. As noted in Section 1.12.2, these business functions are also supported by FEMA's 10 Regional Offices.

In developing this *FEMA IT Architecture*, the ITS Directorate also interviewed other FEMA organizational elements (including the Regional Offices) to identify current and emerging needs for IT systems to support their assigned business functions. Recognizing the Presidential transition of January 20, 2001, and the new Administration, this organization is subject to change.

This appendix lists the major IT systems needs and requirements that were identified during the structured interview process and provides amplifying information appropriate to Section 1.12.2.

FEMA Organization	IT Needs and Requirements
Federal Insurance Administration	◗ Improved monitoring and compliance program for lenders in coordination with Federal regulatory agencies (e.g., FREDDIE MAC and FANNIE MAE)
	◗ Improved capability to support mass mailings and dissemination of marketing materials
	◗ Restructured relationships with Write Your Own insurance companies supported by IT systems and networks to include improved information dissemination
	◗ Establishment of a contractor-operated Telephone Response Center with appropriate data base access as the central point of contact between the public and the National Flood Insurance Program (NFIP)
	◗ Implementation of a reliable correspondence tracking system
	◗ Improved utilization of Geographic Information System (GIS) products across the FEMA flood insurance community. Increased integration of intelligent electronic formats for maps with claims and underwriting data bases and for tracking policies where losses have occurred (especially repetitive losses)
	◗ Improved ability to provide claims data to Disaster Field Offices (DFOs) and Regions in standard format
	◗ Enhanced marketing initiatives supported by IT systems to increase the number of policies
	◗ Closer coordination with the Mitigation Directorate on plans and policies for use of GIS products

FEMA Organization	IT Needs and Requirements
Federal Insurance Administration (Continued)	▶ Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, data mining, document management systems, electronic commerce and funds transfer, digital signatures, Internet information and dissemination, distributed collaboration and visualization, economic modeling and statistical tools, and on-line analytical processing.
Operations Support Directorate	▶ Upgrade of the Logistics Information Management System (LIMS) to centrally hosted database capable of interfacing with Oracle database systems
	▶ Tighter integration and definition of interfaces of LIMS with the Office of Human Resources Management (OHRM) corporate data base, the Integrated Financial Management Information System (IFMIS), and the National Emergency Management Information System (NEMIS)
	▶ Increased consideration given to IT systems implications for creation, management, and use of official Agency electronic records per the National Archives and Records Administration (NARA) guidelines; support for digital signatures and improved document and data integrity; and resolution of legal and regulatory issues and standards
	▶ Enterprise rollout of print on-demand capability using DocuTech and DocuColor.
Office of Policy and Regional Operations	▶ Improved capability to support environmental management reviews across the enterprise using GIS and other IT systems
	▶ Closer tying of the grants management process with the reporting of outcome-based results consistent with the *Government Performance and Results Act (GPRA)*
	▶ Establishing the need for performance-based results and reporting as part of Performance Partnership Agreements (PPAs) with the States
	▶ Tighter integration of environmental factors (such as endangered species, endangered habitats, and historical and cultural artifacts) with FEMA's GIS products
	▶ Improved communications and document and data interchange with the U.S. Environmental Protection Agency (EPA), U.S Fish and Wildlife Service, and other agencies to provide GIS information of environmental significance
	▶ Consideration of need to provide improved connectivity of the Regions to State and local governments via Extranets and Virtual Private Networks
	▶ Implementation of an enterprise-wide correspondence, issues, and action tracking system.

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FEMA Organization	IT Needs and Requirements
Office of Financial Management	▶ Tighter integration, allocation of functions, and definition of interfaces across IFMIS and NEMIS including improved programmatic documentation. Additionally, tighter integration, allocation of functions, and definition of interfaces across IFMIS and other related financial systems (e.g., Travel Manager and ProTrac) ▶ Implementation of electronic commerce and Electronic Data Interchange (EDI) as a matter of priority for appropriate FEMA business functions (cited as highest priority) ▶ Development of, and implementation of, adequate financial methodologies for specifying, projecting, tracking, and controlling costs for telecommunications and networking potentially including specification and costing of advanced telecommunications services such as Asynchronous Transfer Mode (ATM) (with bandwidth on-demand and Quality of Service) ▶ Improved use of technology in such areas as bridging heterogeneous data bases, economic modeling and statistical tools, digital libraries, data warehousing, data mining, document management systems, electronic commerce and electronic funds transfer, digital signatures, Internet information dissemination, distributed collaboration and visualization, and on-line analytical processing.
Office of Inspector General	▶ Establishment of a digital library of laws, regulations, rules, and State agreements ▶ Improved use of electronic forms and standard work packages ▶ Implementation of an enterprise-wide calendar and scheduling tool ▶ Implementation of an enterprise-wide approach for digital signature and digital signature certificate services for legal evidentiary purposes and to maintain document and data integrity ▶ Improved ability to conduct audits and investigations in the field with auditors and/or investigators having remote access to corporate data via laptops and networks (including Personal Communications System [PCS] services) while in the field ▶ Access to FEMA GIS data and maps to support audits, investigations, and inspections ▶ Standardization of enterprise-wide data dictionary across IT systems ▶ Establishment of accepted enterprise-wide configuration management practices

FEMA Organization	IT Needs and Requirements
Office of Inspector General (Continued)	▶ Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, data mining, document management systems, electronic commerce and funds transfer, digital signatures, workflow, Internet information and dissemination, distributed collaboration and visualization, economic modeling and statistical tools, and on-line analytical processing.
Office of Equal Rights	▶ Currently maintains a complaints data base which is not *user-friendly*; desires a re-engineered capability with more usable and better structured tables
	▶ Need to develop an automated approach and methodology to handle Alternative Dispute Resolution cases
	▶ Potential candidate for electronic document submission and electronic filing of data to the Equal Employment Opportunity Commission (EEOC) in standardized open systems formats with digital signature; will need to achieve consensus on standards and EEOC concurrence (considered somewhat problematic)
	▶ On IT systems development efforts, desires a more formal review of human factors aspects of IT systems design to ensure systems compliance with public laws such as the *Americans with Disabilities Act (ADA)*. Examples of such human factors design considerations include graphics user interfaces, speech recognition devices, and physical workstation configurations
	▶ Need to develop a civil rights data base to support annual reporting; all data is currently on paper in this area
	▶ Desire for improved capability to capture data on electronic forms and scan and convert data provided on paper forms to an intelligent electronic format (such as tagged and indexed text and numerical data fields).
Office of National Security Affairs	▶ Must place special emphasis on secure systems and communications
	▶ In general, IT needs are similar to other offices with major requirements for *NSA-level* security versus just normal *business-sensitive* security
	▶ Desire for access to FEMA enterprise-wide GIS resources and data with appropriate *air gap* for security purposes, which would need to be imported into the system
	▶ Implementation of Electronic Key Management System

FEMA Organization	IT Needs and Requirements
Office of National Security Affairs (Continued)	◗ Potential technologies of interest in a secure environment include bridging heterogeneous data bases (e.g., for intelligence support), data mining (possible counter-terrorism identification), digital libraries, electronic mailroom (for routing and alertment of messages), integrated voice video and data applications with NSA-level security, and distance learning and training (to the extent business partners would also participate) ◗ Significant need for secure group distributed collaboration and visualization ◗ On-line analytical processing (OLAP) tools and techniques (secure) ◗ Development of secure remote access capabilities.
United States Fire Administration	◗ Improved connectivity and networking to customers such as fire departments for access to National Fire Incident Reporting System (NFIRS) data, information dissemination, emergency response and support in the field, training and distance learning, and distributed simulations ◗ Willing to participate in pilot projects to implement new IT architectural components in conjunction with selected customers (e.g., fire departments and industry organizations) ◗ Improved search and retrieval of technical documents across the enterprise ◗ Improved use of GIS systems for fire-fighting and fire suppression as well as mitigation activities ◗ Improved use of technology in such areas as bridging heterogeneous data bases, digital libraries, data warehousing, electronic commerce and funds transfer, digital signatures, Internet information and dissemination, distributed collaboration and visualization, distributed interactive simulation, and virtual reality.
Information Technology Services Directorate	◗ Establishment of a well-defined, enterprise-wide, and standardized IT systems architecture using open systems standards in an appropriate manner ◗ Smooth enterprise-wide rollout of NEMIS and firm identification of NEMIS Version 2 baseline requirements (e.g., enterprise-wide grants management functionality) ◗ Tighter integration, allocation of functions, and definition of interfaces across enterprise-wide IT systems (e.g., NEMIS, IFMIS, LIMS, OHRM data bases, GIS, and FACMAN)

FEMA Organization	IT Needs and Requirements
Information Technology Services Directorate (Continued)	▶ Improved methods for escalating IT systems trouble reports to engineering
	▶ Implementation of an enterprise-wide configuration management system covering hardware, software, data and metadata, documents, networks, etc.
	▶ Establishment of an enterprise-wide and standardized data dictionary
	▶ Development of enterprise-wide, standard IT systems engineering methodology potentially incorporating Software Engineering Institute (SEI) guidelines and criteria
	▶ Improved methods of technology insertion, technology management, and evaluation in IT systems and networks
	▶ More clearly defined policies and procedures for designing, developing, implementing, and integrating IT systems
	▶ Improved GPRA reporting for IT systems
	▶ Implementation of a better enterprise-wide e-mail system
	▶ Establishment of enterprise-wide common IT standards and services such as a document management system, text search services, calendar, and correspondence and action tracking system
	▶ Need to determine and evaluate impact of any emerging IT requirements and technology on FEMA enterprise networks (e.g., connectivity, security, bandwidth).
Regional Offices	▶ All Regions willing to participate in pilot projects to implement new IT architectural components in conjunction with selected customers (States and local governments)
	▶ Desire for better hands-on training and familiarization with NEMIS including involving the States; also better identification of required hardware/software and IT infrastructure needs by the States
	▶ Substantially better access to GIS data bases in an interactive manner
	▶ Improved access to personnel data bases (including tracking personnel resources) in disaster response scenarios
	▶ Improved high-speed connectivity and automated document and data exchange with States and local governments (under the Community Assistance Program) (e.g., Extranets and Virtual Private Networks)

FEMA Organization	IT Needs and Requirements
Regional Offices (Continued)	▶ Proponents for exploiting National Information Infrastructure (NII) capabilities in Regions for disaster response (e.g., increased use of cable modems, Internet access in schools and public buildings) ▶ Proponents for improved collaboration and visualization capabilities and use of digital video and digital photography ▶ Improved methods to support environmental and historical reviews for grant management and operations ▶ Implementation of more standardized approaches for exercise planning, reporting, and analysis in the Regions ▶ Increased utilization of wireless technologies for remote field operations ▶ Establishment of open systems standards and IT architecture for increased interoperability ▶ Ability to scan and convert legacy documents including faxes and to manage within a digital library (with text search, document management system) ▶ In general, desires a decreased reliance on paper and more electronic methods with support for legal and regulatory records.
Office of Congressional and Legislative Affairs	▶ Need for ensured and consistent methods and procedures to identify, capture, flag, track, and monitor all correspondence and interactions with Congress at the Regional and Headquarters levels ▶ Implementation of an enterprise-wide correspondence and action tracking system with ability to search Congressional interest documents ▶ Desires the ability to provide e-mail with attachments to Members; recognizes that this is a bigger issue than just FEMA; standards needed, problematic ▶ Need for reliable archiving of e-mail, documents, office automation products, graphics, records, and data to meet legal and regulatory requirements ▶ Improved access to enterprise-wide solution for desktop faxing (security considerations permitting) ▶ Potential interest in an Extranet or Virtual Private Network to Congress and maybe the Library of Congress to support intelligent collaboration and visualization activities and video tele-conferencing (VTC) with Congress and/or Executive Offices ▶ Desire for implementation of a *push-based* approach to get update information on bills and legislation and then maintain this information in a data base ▶ Desire for an alerting mechanism whenever a letter or correspondence is being sent from Mitigation that might have Congressional interest.

FEMA Organization	IT Needs and Requirements
Office of Human Resources Management	▶ Wider dissemination of data and access across the FEMA enterprise to OHRM corporate data bases and tighter integration with NEMIS and IFMIS (with appropriate privacy and security provisions) ▶ Expressed a potential need for more direct connectivity to the Department of Labor for Workers' Compensation ▶ Tighter integration and connectivity to the Office of Equal Rights and Office of Financial Management ▶ Need to have more direct connections and information exchange with temporary DFOs ▶ Improved capability for VTC to support employee orientation; prefers a PC-based desktop approach ▶ Implementation of an employee call center with a library of answers providing for different tiers of escalation ▶ Better ability to provide human resources information to management including support for ad hoc queries and natural language queries ▶ Implementation of a 24/7 ability for employees to call in and make allowable changes to employee data profiles ▶ Firm establishment of guidelines and directives for electronic records as official agency records in lieu of paper records with support for digital signature and secure digital notaries (e.g., date-time stamping) ▶ Improved capability for automated time and attendance reporting ▶ Implementation of an enterprise-wide correspondence and action tracking system.
Office of General Counsel	▶ Implementation of a better enterprise-wide e-mail system ▶ Improved ability to manage electronic document and data files to meet legal and regulatory requirements; proponent for standardized document and data formats; encourage NARA to clarify and resolve issues on archiving standards for long-term records management and office automation products ▶ Interest in electronic filing of legal briefs to the Department of Justice and the courts as authorized ▶ Proponent for digital signature; it must be simple, workable, and supported ▶ Need to ensure that IT systems can meet long-term data integrity requirements and records management requirements through secure date-time stamping (i.e., digital notary and digital signature) to prove in a court of law that documents and data have not been altered (example cited: debt collection letters and documents)

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FEMA Organization	IT Needs and Requirements
Office of General Counsel (Continued)	◗ Need to develop and implement a methodology for Alternative Disputes Resolution (improved VTC could help); would need to share documents and data and get them signed; might have to record the VTC session ◗ Improved use of technology in such areas as digital libraries, enterprise-wide document management system, legacy data capture and optical character recognition, text search and retrieval, correspondence and action tracking, VTC, electronic commerce, electronic filing, long-term electronic records management, and office automation products.
Office of Public Affairs	◗ Improved methods for allowing disaster operations personnel to update information bases for public information dissemination and media affairs ◗ Improved ability to sift through publications, reports, newspapers, magazines, and documents to clip articles and abstract them for senior managers ◗ Improved coordination with the Emergency Management Institute especially regarding utilization of streaming audio and video ◗ Better ability to scan, convert, and index legacy paper documents and retrieve via text search tools ◗ Increased enterprise-wide standardization of electronic document and data formats (e.g., text, graphics, multimedia). ◗ Proponent for enterprise-wide use of Standard Generalized Markup Language (SGML) and especially Extensible Markup Language (XML) ◗ Increased utilization of Internet LISTSERV technology for information dissemination to lists of subscribers ◗ Better ability to create, manage, and use official agency records ◗ Increased exploitation of Internet and Active Desktop *push* technology ◗ Increased bandwidth to the Internet to support multimedia (e.g., RealAudio and PointCast) to many more simultaneous subscribers ◗ Improved cataloging, indexing, and handling of digital images/photographs ◗ Capability for increased public access to, and use of, FEMA GIS products on the Internet.

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APPENDIX M.

CATALOG OF FEMA ENTERPRISE-WIDE SYSTEMS

THIS APPENDIX AMPLIFIES Section 1.12.4 and provides a more-detailed description of major enterprise-wide applications. It discusses the major business functions the application supports and the standard tools the application uses.

National Emergency Management Information System (NEMIS)
NEMIS provides a systematic application for the Agency to achieve its goal of becoming electronic (e-) FEMA. NEMIS is an integrated system to provide FEMA, the States, and certain other Federal agencies with automation to perform disaster and non-disaster operations. NEMIS requirements support all phases of emergency management, from State mitigation planning to situation assessments, providing disaster assistance, command and control, programmatic planning, emergency support, and mitigation operations. NEMIS provides users at all Region, Headquarters, State, and Disaster Field Office (DFO) locations with standard processes to support emergency management wherever a disaster occurs. It supports information resources that enable FEMA to integrate preparedness, situation assessment, Preliminary Damage Assessment (PDA), and information and planning operations with FEMA programs and disaster assistance. This enables rapid and coordinated transition from monitoring an incident to managing declarations, setting up DFOs, and providing assistance to communities and individuals affected by a disaster.

NEMIS was conceptualized as a result of FEMA's recognition that the current information systems infrastructure is not providing enterprise-wide information and processing support necessary to respond to disasters in an efficient and effective manner. Lack of critical cross-organizational information is affecting FEMA's ability to provide quick and effective assistance. In particular, NEMIS is rectifying the following deficiencies of the current automated environment:

▶ The Automated Disaster Assistance Management System (ADAMS), FEMA's primary automated information system, utilizes outdated technology in a DOS environment. This application is not scalable to support several disasters including a catastrophic disaster simultaneously, and requires a great deal of customized modification to support new disasters and to accommodate disaster-unique circumstances.
▶ Within ADAMS, data is maintained separately for each disaster. As a result, cross-disaster reporting can only be conducted using manual data gathering, analysis, and report generation, requiring a great deal of technical resources. The Disaster Automated Reporting and Information System (DARIS) is used for reporting, but it is a standalone system that requires re-entering data to generate the reports.
▶ Non-disaster operations, PDAs, and many aspects of disaster support do not have adequate automated support which require manual processes or standalone, ad hoc systems and a large amount of human intervention.
▶ Data captured manually or in standalone systems (stovepipe systems) cannot be shared easily among programs, Regions, States, or other agencies which results in a duplication of effort within FEMA and with external agencies.
▶ Within the current *FEMA IT Architecture*, standalone systems for various functions utilize different technologies, environments, system management, and hardware. The array of different systems is confusing to non-technical personnel who must learn different user

interfaces and commands and must determine which system is most appropriate for the task at hand. Supporting different environments also results in higher maintenance costs and lower compatibility between sites and disasters.

◗ Coordination with the States for each disaster can be problematic since FEMA must establish a different interface for each new disaster and individually determine manual transmittal procedures.

◗ Current automated processing is not flexible enough to support disaster-specific circumstances. Disaster-specific rules must be custom developed for each new disaster.

NEMIS is a FEMA-wide system of hardware, software, telecommunications, and applications that provides a new technology base to FEMA and its partners to carry out the emergency management mission. Accordingly, NEMIS is an architectural component of the *FEMA IT Architecture*. NEMIS integrates and automates tools to support operations for:

◗ Human Services (HS)
◗ Infrastructure Support (IS)
◗ Mitigation (MT)
◗ Emergency Coordination (EC)
◗ Emergency Support (ES).

As a major application for e-FEMA, NEMIS has expandability to include other FEMA operations as desired.

NEMIS enables FEMA to use information as a strategic resource to provide effective and timely response, recovery, mitigation, and services. NEMIS provides managers with access to the data and analytical tools necessary for making effective plans and decisions. In addition to providing automated support for a full range of integrated emergency management processes, the NEMIS development project is a comprehensive effort to interface with other systems such as:

Enterprise-Wide Systems:

◗ Integrated Financial Management Information System (IFMIS)
◗ FEMA Enterprise Geographic Information System (GIS)
◗ Logistics data bases (e.g., the Logistics Information Management System [LIMS])
◗ Office of Human Resources Management (OHRM) Corporate Data Base which is being converted to the Personnel Resources Information Systems Mart (PRISM)
◗ Facilities Management System.

Other Systems and Data Bases:

◗ National Flood Insurance Program (NFIP) data base
◗ Preparedness, Training, and Exercises (PT&E) systems
◗ National Emergency Coordination Center (NECC)
◗ Mobile Operating Centers

◗ National Fire Incident Reporting System (NFIRS)
◗ Internal Revenue Service
◗ Small Business Administration (SBA).

NEMIS provides a system that is easier to learn, use, maintain, upgrade, and expand. NEMIS uses a standard architecture with common data formats, standard system interfaces, and a common look and feel. NEMIS is an integrated agency-wide system that will evolve over time to meet multiple program requirements and management information needs. The FEMA Information Technology Services (ITS) Directorate intends to apply these lessons learned in development and integration of other enterprise-wide systems and program-centric systems. With respect to the enterprise-wide *FEMA IT Architecture*, NEMIS integrates new technologies and capabilities with existing FEMA investments, including:

◗ An enterprise data base that provides access to authorized users throughout FEMA and State emergency management agencies
◗ Distributed system architecture that takes full advantage of the FEMA Switched Network (FSN) and future network architecture
◗ A data warehouse to support decision-making and provide an executive reporting system
◗ An on-line reference library to improve communication and dissemination within the agency
◗ GIS capability for conducting analysis and producing geographic products
◗ An imaging storage and retrieval system for electronically storing correspondence, individual verification information, and Disaster Survey Report (DSR) supporting documentation
◗ Workflow management for tracking applications, documents, Congressional inquiries, and financial actions
◗ Electronic signatures to streamline financial controls (under consideration until digital signature becomes more universally accepted, affordable, and manageable)
◗ An interactive Voice Response (IVR) system to enable customer service representatives to answer applicant inquiries efficiently.

The NEMIS enterprise data base is a collection of subject area data bases that are linked together to permit the comprehensive retrieval of information across the entire enterprise. Common data formats and naming conventions allow existing and future applications to share and exchange data. NEMIS enables applications to share and exchange data as they have been unable to do in the past. Information exchange among programs and organizational elements will facilitate coordinated FEMA/State emergency management.

In addition, NEMIS is a valuable tool for increasing the partnership between FEMA and the States. This helps to coordinate the partnership with States by enabling the sharing of data and providing States with the same automated processes used by FEMA. NEMIS provides automated support for joint FEMA/State critical functions such as:

◗ Monitoring incidents
◗ Managing infrastructure projects and grants
◗ Providing individual and family grants
◗ Conducting PDAs.

From an enterprise architecture development perspective, the State/FEMA partnership is crucial to all phases of NEMIS development, from requirements definition to testing and operations. To ensure that NEMIS provides support integral to State operations, State and National Emergency Management Association (NEMA) representatives are involved with the task forces which are defining the processes NEMIS will automate and are involved in designing the system.

In addition to the States, FEMA is in close partnership with several Federal agencies that provide disaster-related services. NEMIS will automate aspects of these relationships, such as the process of issuing and tracking mission assignments, providing reimbursement for transient accommodations, making SBA loan determinations, and others. In addition, FEMA provides and receives information from a number of other Federal agencies. NEMIS is planned to interface with other agency systems to replace current manual or ad hoc transmission of data. More coordinated exchange of information reduces duplication of effort in providing disaster assistance and results in better customer service with a coordinated Federal effort.

FEMA Enterprise-Wide Geographic Information System (GIS)
Within FEMA, GISs provide an good example of the opportunities and challenges of enterprise integration. Within FEMA, GIS is currently heavily used for floodplain mapping and insurance purposes. Data fusion from multiple sources, managed and presented within an interactive GIS, can also support situation assessment and planning for the future evolution of a crisis. A representative example of current Map Analysis Center (MAC) GIS support during a hurricane threat and actual disaster consists of:

◗ Executing a hurricane wind damage model prior to storm landfall and mapping the resultant probabilistic wind damage bands to help determine the required scope of the potential response
◗ Integrating remote sensing data for damage assessment after landfall to assist in response deployments
◗ Geocoding disaster assistance application data and overlaying the data with remote sensing data for a combined and more complete view of the disaster impact.

The MAC is currently developing an interactive mapping Intranet site that will provide desktop dynamic visualization of such maps and data.

In the future with distributed GIS available to States and local government via Virtual Private Networks (VPNs) and Extranets, a GIS map with building locations (drawn from a data base of residences and businesses) could be combined (for example) with sensor data on wind speed and direction to show where evacuation must take place. This capability could also be used for crises involving releases of radioactive materials or toxic gas. Integrating additional GIS-encoded data about the current location of emergency vehicles, shelters, evacuation personnel, and relief supplies could facilitate State/local evacuation planning and response and recovery functions across a wide scope of disasters.

The structured discussions indicated a growing need for GIS products and services across the enterprise. Respondents expressed a need for a fully-integrated, enterprise-wide GIS capability with a supporting telecommunications backbone. FEMA is in the process of establishing an enterprise-wide, integrated GIS capability to support mitigation; preparedness, training, and

exercises; and response and recovery operations. This enterprise capability will assist in geographical data analysis, provide an interface to exchange GIS data within FEMA as well as external organizations, and serve as a maintenance medium for geospatial information. As previously mentioned, this process began with the formation of the FEMA GIS Working Group. The group is currently conducting an enterprise GIS requirements analysis and will also produce the subsequent enterprise GIS strategic plan and implementation plan. This is included in the Target Architecture Capabilities discussed in Appendix P of this volume.

FEMA's GIS environment includes heterogeneous hardware and software tools. The mixed environment includes both UNIX and DOS/Windows-based hardware running MapInfo, ARC/INFO, and Emergency Information System (EIS) software. In addition, many custom applications have been developed that utilize the Special Flood Hazard Area (SFHA) data.

The Environmental Systems Research Institute, Inc. (ESRI) ARC/INFO data format for UNIX workstations has been chosen for the FEMA SFHA Data Library because it offers the greatest flexibility and utility for development, applications, and management of digital geospatial SFHA data. MapInfo Professional, the FEMA desktop standard, provides for conversion from the ARC/INFO data format to the MapInfo format. To establish a more open spatial data platform, the MAC is in the process of migrating from a MapInfo format data base to an Oracle Spatial data base structure. EIS has adopted the ESRI ArcView2 desktop mapping software as its platform for map display and query.

The GIS services currently required of the FEMA SFHA Data Library include activities that are commonly reported by U.S. Bureau of the Census county-equivalent units. Thus, the county equivalent unit is used as the tiling structure for data in the FEMA SFHA Data Library. This allows for a way to filter queries and store the data using a *Librarian* concept. This librarian concept is currently based on the ARC/INFO LIBRARIAN utility.

As noted in Section 1.12.2, FEMA has a major initiative in increasing the quantity and quality of data in its enterprise-wide GIS repository. Major efforts are also underway to exchange GIS information in higher-quality data formats not only within FEMA but also with FEMA's external business partners and customers. With fused, high quality, accurate, and precise IFSAR and LIDAR floodplain data planned to be entered into the GIS environment over the next five to seven years, the volume of data is expected to grow to be very large (estimated to be petabytes). Utilization of this data for mitigation, preparedness, and response and recovery applications will place a premium on distributed high-performance computing and networking.

In addition, the IT MAC provides GIS support services to the Response and Recovery Directorate, including the Emergency Support Team (EST) and DFOs. This includes support for both response planning and actual disaster response operations. The MAC also supports other FEMA directorates on an as-required basis (e.g., support for exercises conducted by the Preparedness, Training, and Exercises Directorate). The MAC consists of mirrored UNIX data servers, PC client workstations, and various print/plot devices. The MAC architecture is being expanded to accommodate both its migration to an Oracle Spatial data base structure and the real time implementation of its interactive mapping Intranet site. It uses the FEMA standard desktop GIS, MapInfo Professional, for GIS analyses and map production. It also executes

models, provided by the Mitigation Directorate, and uses the results in maps that support disaster response planning and operations. ARC/INFO is used as necessary for higher end GIS functions, but all final products are developed in MapInfo.

Personnel Resources Information Systems Mart (PRISM)
Crisis response and recovery operations are widely recognized to be a human resources intense activity, not only requiring large numbers of volunteers, but also individuals with specialized skills such as leadership, planning and operations, command and control, communications, search and rescue, law enforcement, construction, transportation, medical, legal, housing, modeling and simulation, and fire-fighting to name a few. Important factors are also the availability, readiness, and training levels of adequate numbers of skilled personnel to support FEMA's major business functions of mitigation, preparedness, and response and recovery.

FEMA's Office of Human Resources Management (OHRM) manages a set of personnel information systems that can be viewed as a human resources data base. These IT systems include the Automated Deployment Data base (ADD), a payroll system, a standalone commercial off-the-shelf (COTS) automated classification system (COHO), a standalone COTS automated knowledge-base for management of employee conduct and performance (CHINOOK), and two other COTS products called "Quick Time" and "Quick Hire." There is connectivity to several other systems and data bases (e.g., Office of Personnel Management [OPM], Department of Labor, National Finance Center, and Treasury). The corporate resource data base is composed of data relative to processing personnel and payroll actions, reporting time and attendance, recording availability of personnel and tracking their assignments to disaster operations. It also can provide data to other FEMA organizational components through manual file transfers, including historical information for up to one year. PRISM has been proposed as an enterprise-wide integration of human resources data and information and is now included in FEMA's Target Architecture Capabilities.

With appropriate security access controls and privacy considerations, information within PRISM will be integrated with financial management data to form a more complete resource information data base and management reporting system and improved input/output data/documents with archival capability for up to six years. Further development of PRISM will include interface with other enterprise-wide systems, automated timekeeping, workforce management, automated requesting and tracking of personnel action requests, and executive and managerial information systems to include use of electronic signatures.

Logistics Information Management System (LIMS)
LIMS is FEMA's automated agency-wide property management and logistics information management support system. LIMS is in the process of being re-engineered to be compatible in architecture with NEMIS. Upon completion of total re-engineering, LIMS will support agency-wide:

▶ **Property Management** (new item, transfer, loan, local management functions, administrative functions, pre-positioning, stock adjustment, dispose, kit management, delivery *due in*)
▶ **Property Maintenance** (warranty tracking, maintenance history, requirements, work orders, off-site maintenance, schedules)

▶ **Resource Tracking** (item request, source, item location, item description, tracking, location history, packaging, transportation orders)
▶ **Acquisition** (new requests, request approval, tracking, completed requests, back charge, budget, account tracking)
▶ **Readiness** (readiness measurement, kit concepts)
▶ **Inventory Control and Stock Management** (reorder, stock levels)
▶ **Security, Fraud, Waste, and Abuse** (user accounts, access permissions, transaction permissions, security auditing, reporting)
▶ **Interfaces to Other Systems** (barcode, FEDLOG [and in the future, Materiel systems], IFMIS, Facilities Management System, EIS, PRODOC, user badge system, NEMIS [NEMIS release 2])
▶ **Administrative Functions**.

LIMS will support the enterprise-wide standards of sharing of data among other systems, a data naming standard, standard tools such as Oracle, FEMA local and wide area networks, PowerBuilder, Microsoft Office Suite, and standard workstation architecture. The enhanced LIMS general system requirements will include the following:

▶ Interconnect all sites
▶ Maintain a logistics data base for all sites and Regions, including Mobile Emergency Response Support (MERS)
▶ Provide all types of authorized users with functional support
▶ Deliver complete and accurate data
▶ Safeguard and manage all data
▶ Provide programming features which allow authorized users to manage their own property
▶ Formalize and automate the FEMA Standard Property Procedures
▶ Minimize labor required to administer and operate the system
▶ Maintain all hardware and software enterprise standards
▶ Support operations and maintenance
▶ Interconnect with other FEMA source systems
▶ Maintain an ongoing working system to support a dynamic mission environment.

Integrated Financial Management Information System (IFMIS)

Financial management is an important business function associated with both disaster and non-disaster operations. It is a particularly important function with regard to management of FEMA's grants program with increasing requirements to tie or link financial reporting to performance measurements under the *Government Performance and Results Act (GPRA)*.

IFMIS was a system originally acquired from a software vendor. With re-hosting and re-engineering, IFMIS has become FEMA's enterprise-wide, financial management support system. The Office of Financial Management (OFM) has the responsibility for the development of IFMIS and its integration across the enterprise. The IFMIS enterprise-wide integration objectives are discussed below in terms of recent accomplishments.

IFMIS is the central component for achieving OFM's financial objectives to:

▶ **Improve Financial Management Systems:**
  – Automated the interface with the Health and Human Services (HHS) Payments Management System to allow for automatic uploading of obligation data and downloading of draw-down information
  – Completed the automation of the interface between IFMIS and FEMA's printing management system so that data entry would no longer be duplicated
  – Started development and testing of an automated interface between the travel voucher preparation software and IFMIS to obviate the need for re-keying of the voucher.

▶ **Implement GPRA Reporting:**
  – Provided GPRA guidance and training to FEMA organizations
  – Finalized FEMA's *Strategic Plan*, mission statement, and goals and objectives with respect to GPRA implementation
  – Based on the updated *Strategic Plan*, provided input to the Agency's 1999 *Performance Plan*.

▶ **Issue Accounting Standards and Financial Statements**

▶ **Develop Human Resources within OFM:**
  – Obtained senior management approval to submit a formal reorganization proposal to further refine the Chief Financial Officer (CFO) organizational structure and improve financial operations
  – Developed and conducted a disaster response tasking to other Federal agencies training for Agency program and finance managers
  – Increased Agency training funds for specialized training for OFM staff.

▶ **Improve Management of Receivables:**
  – Implemented the remitter's express system to collect user fees from the nuclear power plants
  – Obtained tax identification numbers (TIN) for all debtors and vendors
  – Continued to collect on outstanding debts.

▶ **Ensure Management Accountability and Control:**
  – Continued to prepare financial statements of agency programs
  – Continued to oversee non-disaster-specific administrative expenses
  – Completed reviews of the disbursement function to assess controls over the payment process
  – Completed the final draft report on eligible disaster cost
  – Completed a training course for financial managers on management and internal controls.

▶ **Modernize Payments and Business Methods:**
  – Continued to seek out efficient disbursement mechanisms to better utilize scarce resources
  – Developed alternatives for reimbursing employees for expenditures, normally done through impress funds
  – Implemented an electronic certification system where payments for disaster housing are made via host-to-host systems.

▶ **Improve Administration of Federal Assistance Programs:**
  – Provided more than $2.6 billion of grant funds to State and local governments

- Directed the Logistics Management Institute (LMI) to perform an independent assessment of the Disaster Assistance Grants Program.

▶ **Manage and Administer the Disaster Relief Fund:**
- Completed the reconciliation of the Disaster Relief Fund
- Closed out 16 disasters.

Facilities Management System

This system is currently FEMA's system for providing facilities management support at Mt. Weather. It is intended to evolve into an enterprise-wide system and be integrated with NEMIS through the use of COTS products. (Note: There are a series of integrated systems in use at the National Emergency Training Center [NETC] that serve the same purpose as this system. The NETC systems and the Facilities Management System were the basis of a needs analysis that led to procurement of a COTS facility management package that will be an enterprise system.)

The Facilities Management System has the following functional requirements:

▶ **Work Plan Tracking.** Facilitate the preparation, tracking, and reporting of resource requirements and utilization including budgets and spending plans. Work plan tracking functions include:
- Facilitate project budgeting and planning for five years
- Support managing multiple activities and fund codes
- Allow prioritizing projects on an annual basis
- Support multiple level approvals for planning.

▶ **Requests for Work**. Facilitate identifying, organizing, planning, tracking, and reporting of facility-related maintenance activities. Requests for work functions include:
- Support preventive maintenance based on calendar and cyclic requirements
- Facilitate work order generation as re-scheduled or on demand
- Support central or multiple work order approvals
- Provide automatic notification to customer of work order approval/change
- Allow classification or categorizing of work
- Facilitate cost estimating of work time and materials
- Facilitate scheduling work assignments based on resources available or priority
- Support tracking warranty
- Facilitate failure analysis
- Facilitate capturing actual costs and time
- Facilitate tracking, reporting, and billing of tenant information.

▶ **Inventory Control**. Facilitate the management, tracking, and reporting of equipment, supplies, and services required for successful completion of facility maintenance operations and daily operations. Inventory control functions include:
- Facilitate management, tracking, and reporting of equipment, supplies, and service information (description, location, cost, measure, and type)
- Facilitate managing multiple warehouses at different sites
- Facilitate cross reference equipment and parts
- Monitor stock level

- Support barcoding
- Support billing capability
- Support automated reorder capability
- Support manual reorder capability
- Support tracking equipment usage.

▶ **Acquisitions**. Facilitate the management, tracking, and reporting of purchase and procurements. Acquisition functional requirements include:
- Support tracking purchase requests at multiple project/activity/shop levels
- Provide automatic notification to warehouse/logistics and requestor
- Support multiple approval levels for purchase
- Support historical logging on purchase orders and requisitions information.

▶ **Financial Management**. Facilitate the management, tracking, and reporting of project costs, spending, and budgeting and facilitate the integration with IFMIS and NEMIS.

▶ **Receiving and Distribution**. Functional requirements include:
- Track receiving for both partial and full shipments
- Support stock issue
- Support tracking item returns
- Support automated incrementing/decrementing of inventory levels
- Provide notice of receipt/acceptance of equipment, supplies, and services.

▶ **Action Tracking.** Functional requirements include:
- Support tracking and reporting activities such as correspondence, personnel actions, work assignments, work orders, and purchase transactions
- Provide information such as location, status, responsible party, due date, priority, and subsequent routing.

APPENDIX N.

IDENTIFICATION AND DESCRIPTION OF MAJOR FEMA IT

SERVICES IN THE TECHNICAL REFERENCE MODEL (TRM)

THIS APPENDIX IDENTIFIES and describes the major information technology services (ITS) and architectural components that are incorporated into the Technical Reference Model (TRM). It identifies the relevant information technology (IT) standards or standard tools, describes their status at FEMA, and provides appropriate comments. The IT services or architectural components have been arranged in alphabetical order.

In this appendix, the following terms have the meanings indicated:
▶ *Adopted* means that the standard or standard tool has been formally accepted by the Chief Information Officer (CIO) for the service area or architectural component to which it refers.
▶ *Under evaluation* means that the standard or standard tool has not yet been formally accepted and is being actively evaluated or considered within FEMA.
▶ *Suggested* is a less strong term than *under evaluation*. It means that the IT Architecture Development Team has noted an opportunity and is *suggesting* that the standard or standard tool may have some merit to support the IT service area or architectural component. In the context of this document, *suggested* really means that there is a potential opportunity for technology insertion or standardization that ought to be more formally considered, business case and funding permitting.
▶ *In-service use* means that the standard or tool is currently being used within FEMA IT systems. It is subject to re-evaluation, re-engineering, or additional development prior to being formally adopted.

Identification and Description of Major FEMA IT Services

IT Service or Architectural Component
Action tracking system or services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	To be determined (TBD)	Suggested service area

Comments
Nearly every FEMA organization requested enterprise-wide action tracking services. They should be considered for integration with correspondence tracking, document management, digital library, electronic mailroom, legacy data capture, and text search components. This service area is under active evaluation by the Information Resources Board (IRB) task force addressing combined areas of action tracking, correspondence control, and document management.

IT Service or Architectural Component
Automated tools for desktop applications/system software updates

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Program Management Group (PMG)	Microsoft SMS	In-service use
	Tivoli	In-service use
	BMC Patrol	In-service use

IT Service or Architectural Component
Automated tools for desktop applications/system software updates (Continued)

Comments
The National Emergency Management Information System (NEMIS) PMG is buying Microsoft SMS to distribute and audit software installations. Tivoli provides a suite of tools for software deployment, availability, security, service management, operations, managing business systems, and applications management. BMC Patrol monitors performance of Oracle and PowerBuilder. Please refer to the ITS PMG.

IT Service or Architectural Component
Automated workflow management

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Viewstar (currently)	In-service use, IS and MT modules
	Table-based Oracle approach	In-service use, HS and ES modules

Comments
The NEMIS PMG has used Viewstar for workflow services. However, the implementation has not been as successful as desired. Enterprise-wide automated workflow services are needed and should be integrated with document management and digital library services. Selection of an alternative product to Viewstar is under consideration by the NEMIS project. A table-based Oracle approach is being used in NEMIS HS and ES modules. Please refer to the ITS PMG.

IT Service or Architectural Component
Bridging heterogeneous distributed data bases

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	SQLNet	In-service use

Comments
The NEMIS PMG has used SQLNet and recommends it as an enterprise-wide approach for bridging heterogeneous distributed data bases. A number of organizations expressed interest in an ability to query and join distributed data bases.

IT Service or Architectural Component
Calendar and scheduling services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Schedule+	Under evaluation

Comments
Microsoft Schedule+ integrated with a Microsoft Office Exchange server and Outlook clients also is under consideration as an enterprise-wide standard for calendars and schedules.

IT Service or Architectural Component
CASE tools

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Sybase Powersoft PowerDesigner (formerly S-Designor)	Adopted
	Sybase Powersoft PowerBuilder	Adopted (under re-evaluation)
	Oracle Developer 2000	Under evaluation
	Visual Basic	Under evaluation

Comments
The NEMIS PMG has used S-Designor (now named PowerDesigner) for data modeling and PowerBuilder for rapid applications development. These tools are considered adopted for enterprise-wide development but are under continuous review and evaluation by the ITS PMG. Visual Basic is under consideration for development of desktop applications. Oracle Developer 2000 is under consideration as a potential alternative to PowerDesigner. Please refer to the PMG.

IT Service or Architectural Component
Configuration management (CM) services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate (Configuration Management Branch, support from PMG)	PVCS Tracker and Version Manager	Adopted (mandatory)
	OpenView	Adopted

Comments
The NEMIS PMG is currently using PVCS Tracker and Version Manager to provide CM services and suggests these as possible agency-wide tools. OpenView helps maintain CM control over FEMA networks. Additional CM tools may be needed as the IT architecture is implemented.

IT Service or Architectural Component
Correspondence tracking services/action tracking document management

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OS with ITS Directorate review	Correspondence and Issues Management System (CIMS)	In-service use
	NEMIS approach to correspondence tracking	In-service use
	ACT2	In-service use

IT Service or Architectural Component

Correspondence tracking services/action tracking document management (Continued)

Comments

Nearly every organization identified a need for an enterprise-wide correspondence tracking system and/or requested improvements to existing in-house systems. CIMS is mostly being used for Congressional and White House correspondence tracking. NEMIS has developed an approach for disaster-related correspondence action tracking. ACT2 primarily provides correspondence action tracking among various Directorates. A well-integrated enterprise-wide solution is needed to support FEMA business functions. Some business process re-engineering may also be required. The requirements need to address potential integration with action tracking, document management, digital library services, electronic mailroom, legacy data capture, archival systems for legal electronic records management, multimedia, workflow, and text search components. Potential impact on the networks also needs to be addressed. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management.

IT Service or Architectural Component

Data base management system and services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Oracle	In-service use
	Oracle 8	Under evaluation in NEMIS

Comments

Oracle is adopted as FEMA's enterprise-wide relational data base management system standard. Future enterprise adoption of Oracle 8, with incorporation of new object-relational features, is under consideration. Oracle 8 is under evaluation in NEMIS.

IT Service or Architectural Component

Data dictionary standardization

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Configuration Management Branch	TBD	Suggested service area

Comments

Interviews conducted during the development of this IT architecture indicated that data dictionaries for various enterprise- and program-centric IT systems are not harmonized. The Configuration Management Branch is the lead to develop the standards.

IT Service or Architectural Component

Data mining services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD	Suggested service area

Comments

Interviews with FEMA organizations indicated a strong desire to be able to perform data mining to identify trends and discover new relationships in corporate/distributed data.

IT Service or Architectural Component

Data warehousing services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	TBD	Under evaluation

Comments

The NEMIS PMG is the lead for development of data warehousing services. The NEMIS project is currently using and evaluating software for data warehousing services. Please refer to the ITS PMG.

IT Service or Architectural Component

Digital library services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	TBD	Suggested service area

Comments

At the current time, NEMIS digital library services are mostly text-based. Structured discussion with FEMA organizational elements indicated an emerging requirement to extend digital library services to other complex objects including mixed-mode compound documents and data sets (hyperlinked text, graphics, multimedia, spreadsheets, GIS, etc.). This effort also needs to consider integration of action tracking, correspondence tracking, document management, digital library, electronic mailroom, legacy data capture, workflow, multimedia, GIS, electronic records management, and text search components.

IT Service or Architectural Component

Digital signature services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Fortezza	Suggested
	FIPS 186	Suggested
	Rivest-Shamir-Adelman (RSA)	Suggested
	Pretty Good Privacy (PGP)	Suggested
	Access Certificates for Electronic Services (ACES)	Adopted

Comments

The ITS Directorate is the organizational lead for development of enterprise-wide digital signature services. A requirement for enterprise-wide digital signature services to meet electronic commerce requirements and legal and regulatory requirements was expressed by a number of FEMA organizations. FEMA is implementing PKI access technology during April 2001. Full digital signature capability will be operational in the near future.

IT Service or Architectural Component
Distance learning technology

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Emergency Education Network (EENET)	Adopted
	Other Internet, Intranet, or Extranet approaches	Suggested

Comments

Organizational elements with strong training missions, such as the Preparedness, Training, and Exercises (PT&E) Directorate, the Response and Recovery (R&R) Directorate, the Mitigation Directorate, and the National Fire Academy, suggested development of additional enterprise-wide distance learning tools and techniques. EENET is a satellite-based system that is currently being successfully used. Collaboration with other Federal agencies and universities to use the Internet for interactive distance learning needs to be explored. Distance learning technology and services can provide significant cost-benefit with outreach to large numbers of students. Network multicast issues and bandwidth concerns for large multimedia objects would also need to be addressed.

IT Service or Architectural Component
Distributed exercise planning, reconstruction, and analysis services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PT&E United States Fire Administration (USFA)	TBD	Suggested service area

Comments

PT&E, R&R, Mitigation, and the National Fire Academy are proponents of this type of collaborative service.

IT Service or Architectural Component
Distributed planning tools

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD	Suggested service area

Comments

A number of FEMA organizational elements expressed a desire for identification of enterprise-wide services and tools to support distributed planning operations. See Section 1.12.6 for additional details on the desired distributed planning service.

IT Service or Architectural Component
Document Management System (DMS)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	TBD	Suggested service area

IT Service or Architectural Component
Document Management System (DMS) (Continued)

Comments

Nearly every FEMA organization expressed a need for a well-integrated, enterprise-wide document management system. The NEMIS PMG is the lead development and integration activity. Selection of a standard or standard DMS tool also needs to consider integration of action tracking, correspondence tracking, electronic records management, digital library, electronic mailroom, legacy data capture, workflow, multimedia, and text search. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management.

IT Service or Architectural Component
Economic forecasting and modeling tools

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
TBD	TBD	Suggested service area

Comments

The OFM, R&R, Mitigation, and the National Fire Academy expressed interest in the identification of, and development of, enterprise-wide standardized tools for economic forecasting and modeling. Section 1.12.6 provides additional details on the desired economic forecasting and modeling tools that are desired.

IT Service or Architectural Component
800-number services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Program Services Division	TBD	Suggested service area

Comments

The Program Services Division operation at Mt. Weather is currently providing 800-number services and is suggested as the lead for enterprise development purposes. There is a recognized need for an enterprise approach to integrate and consolidate 800-number services to get maximum usage and cost savings out of the numerous 800-number lines into FEMA.

IT Service or Architectural Component
Electronic Commerce (EC) and Electronic Data Interchange (EDI) services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from the Office of Financial Management (OFM) and the Operations Support Directorate (OSD)	FIPS 161	Suggested
	ANSI X12 EDI	Suggested
	UN EDIFACT	Suggested for international use
	Secure credit card approach on the web using Secure Sockets Layer (SSL)	Suggested
	XML- and/or Java-based web approach	Suggested

IT Service or Architectural Component

Electronic Commerce (EC) and Electronic Data Interchange (EDI) services (Continued)

Comments

The ITS Directorate, with support from OFM and OSD, is the organizational lead for the development of enterprise-wide EC and EDI services. FIPS 161 is the Federal government standard for EDI and is suggested as a standard. FIPS 161 sanctions the use of ANSI X12 EDI transaction sets and UN EDIFACT messages. A potential requirement exists to develop (1) an enterprise-wide approach to secure credit card transactions on the web using the SSL and (2) a potential XML-and/or Java-based approach for electronic commerce transactions as an alternative to X12 on the Internet. In the interest of open systems, the FEMA enterprise-wide approach to EC needs to be broader than just acquisition and provisioning and cover elements of electronic document submission, transportation, invoicing, bills of lading, catalogs, construction, materials expediting, medical, etc. Use of open systems EDI standards needs to be considered to support FEMA logistics operations under OSD.

IT Service or Architectural Component

Electronic filing and/or tele-registration services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	NEMIS approach to tele-registration	In-service use

Comments

NEMIS has developed a technical approach to tele-registration that is recommended as a basis for a potential enterprise-wide solution. This service area also needs to consider an enterprise-wide approach for electronic grants application and management. This effort can benefit from integration of electronic filing with document management, digital library services, text search, electronic mailroom, and workflow. An opportunity also exists to leverage results of the Inter-agency Electronic Grants Working Group (www.Financenet.gov/iaegc). See also *Grants Management System services* below.

IT Service or Architectural Component

Electronic forms services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OSD with support from ITS Directorate	Jetform Formflow	Under evaluation

Comments

Jetform is under consideration and evaluation by OSD. Jetform is used by many other Federal agencies, thereby promoting interoperability. However, FormFlow files are saved in proprietary format. Data can be saved as dBase files and also as proprietary file format and not accepted by the National Archives and Records Administration (NARA). OSD would need to save and archive files as delimited ASCII to meet NARA requirements. Additional standards profiling of JetForm FormFlow is needed to promote it to archival status.

IT Service or Architectural Component
Electronic Funds Transfer (EFT)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from OFM	Automated Clearing House (ACH) transactions	Suggested service area and suggested standard

Comments

ACH transactions are the accepted method of electronic funds transfers with the banking community and are suggested.

IT Service or Architectural Component
Electronic mailroom services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OS with PMG/ITS support	TBD	Suggested service area

Comments

A number of FEMA organizations identified automated 24/7 electronic mailroom services (such as automated message routing, receipting, date-time stamping, validation services, print on-demand, and delivery services) as an enterprise-wide requirement. OSD is the lead for defining processes and functions for the mailroom. The NEMIS PMG will provide IT systems support. This service area is under active evaluation by the IRB task force addressing combined areas of action tracking, correspondence control, and document management. A well integrated solution is desired which integrates electronic mailroom services with document management, routing and workflow, digital library services, date-time stamping and receipting services, scanning and conversion, indexing services, digital library services, and correspondence and action tracking. See Section 1.12.6 for a high-level description of key electronic mailroom architectural components.

IT Service or Architectural Component
Electronic publishing services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OSD	QuarkXpress	In-service use
	Pagemaker	In-service use
	Framemaker	In-service use
	Postscript Level 2	In-service use
	Open systems standards (SGML/XML and associated style files, CGM, JPEG, IGES)	Suggested (some limited in-service use)
	Portable Document Format (PDF) (Acrobat)	In-service use

IT Service or Architectural Component
Electronic publishing services (Continued)

Comments

Within OSD, the electronic publishing concept has evolved to *Electronic Design and Pre-Press (EDPP)* services, creating files to be imaged on high-resolution devices. Standard tools (e.g., QuarkXpress, Pagemaker, and Framemaker) are for page layout and produce Postscript Level 2. Concern is that file formats for these products are proprietary. There is general concern about NARA acceptance of the file formats for the electronic copy produced by these standard tools. Saving documents in open systems file formats is the preferred architectural solution and is supported by NARA. PDF is acceptable for web dissemination but not high resolution for high-end image setters. PDF is also acceptable for delivery of composed final-form documents for playback on desktop systems.

IT Service or Architectural Component
E-mail services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Lotus cc:Mail	Adopted (but under review)
	Microsoft Exchange with Outlook clients	Adopted

Comments

Microsoft Exchange with Outlook clients is under evaluation as a standard tool to replace cc:Mail. In general, there is a desire for enterprise-wide e-mail services to comply to widely implemented Internet standards: MIME, S/MIME, SMTP, POP-3, IMAP, and LDAP.

IT Service or Architectural Component
Engineering drawing services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from OSD	AutoCAD (with DXF file format)	In-service use
	Initial Graphics Exchange Standard (IGES)	Suggested

Comments

AutoCAD currently is in-service as an engineering drawing standard tool at FEMA. AutoCAD uses the Autodesk Drawing Exchange Format (DXF) as the file format. FEMA currently has more than 10,000 drawings as AutoCAD files at Mt. Weather. DXF is a widely implemented industry standard that is not currently acceptable to NARA for archival purposes. IGES is suggested as a future FEMA enterprise-wide open systems engineering drawing standard but needs additional profiling and customization. IGES is under consideration by NARA as an open systems archival approach. See the discussion on IGES in Appendix O.

IT Service or Architectural Component
Geographic Information System (GIS) services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from Mitigation Directorate	MapInfo Professional (for Desktop GIS)	Adopted (see comments)
	ARCINFO	Adopted
	Q3 flood data products	Adopted
	DLG formats	Adopted
	TIFF	Adopted
	FIPS 173 (SDTS)	Adopted

Comments
The *Q3 Flood Data Specifications (Draft)* available on the FEMA web site provides definitive TRM guidelines for GIS products and standard tools. See also Appendix M (GIS).

IT Service or Architectural Component
Grants Management System services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Inter-Agency Electronic Grants Working Group (IAEGC) standards: ◗ Common multi-agency data dictionary ◗ ANSI X12 EDI ◗ Interactive web ◗ Java applets ◗ SGML/XML (under consideration)	Service area is under evaluation by ITS PMG; IAEGC standards are suggested for consideration

Comments
Electronic grants management and reporting is an important business area for FEMA that can benefit from a standardized, enterprise-wide solution. The NEMIS PMG is the organizational lead. An enterprise-wide solution for grants management is a NEMIS Phase 2 requirement. This service area can benefit from integration of electronic filing services, document management system services, electronic commerce, electronic funds transfer, digital library services, text search, electronic mailroom, and workflow services. Opportunity also exists to leverage the results of IAEGC (www.Financenet.gov/iaegc), which is developing and demonstrating standards for multi-agency grants management. The IAEGC standards-based approach is suggested for consideration.

IT Service or Architectural Component
Graphic arts and drawing toolkit(s)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from OSD (Printing and Publishing Branch)	Visio	In-service use
	PowerPoint	In-service use
	Adobe Illustrator	In-service use
	Adobe Photoshop	In-service use
	Macromedia Freehand	In-service use
	CorelDraw	In-service use

Comments

The graphic arts and drawing tools in this section are currently in use in their native file formats. A concern is that the proprietary formats may not be acceptable to NARA for archival purposes without detailed profiling and additional file definition. Computer Graphics Metafile (CGM) is the preferred open systems file format and is under consideration at NARA.

Operations Support Directorate Infogram #98-06 states that Adobe Illustrator, Macromedia Freehand, or CorelDraw should be used for illustrations and preparing files for digital printing. Visio is also acceptable for illustrations to be published. PowerPoint is acceptable for presentation graphics only.

IT Service or Architectural Component
Graphics file formats

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from OSD (Printing and Publishing Branch)	Native file formats for graphics art tools (above)	In-service use
	Compressed Tagged Image File Format (TIFF)	In-service use
	Graphics Interchange Format (GIF)	In-service use
	Microsoft Bitmap (BMP)	In-service use
	Windows Metafile (WMF)	In-service use
	Portable Network Graphics (PNG) format	In-service use
	Encapsulated Postscript (EPS)	In-service use
	Open systems file formats (CGM, CCITT Group 4, JPEG, M-JPEG)	Suggested

IT Service or Architectural Component
Graphics file formats (Continued)

Comments

Native file formats for enterprise-wide graphic arts tools (identified above) are currently in use, though FEMA organizations are cautioned that they will require additional profiling, validation, versioning, and file definition for long-term legal archival storage purposes. TIFF, GIF, BMP, WMF, PNG, and EPS are widely implemented industry standards and are currently allowable FEMA enterprise-wide graphics file formats. However, they will require additional profiling, definition, validation, versioning, and file definition for promotion to full long-term legal archive status. Compressed TIFF is the preferred method for interchanging raster-scanned or bitmapped graphics. TIFF will require additional profiling and validation activity to promote it to full archival capability. In particular, allowable TIFF tags must be defined and validated for IT systems that use TIFF files. In addition, allowable file compression algorithms (e.g., CCITT Group 4 .T6 compression, JPEG compression) must be further defined for TIFF files across the enterprise. Use of open systems file formats is suggested, though it is recognized and acknowledged that they require additional profiling, definition, and testing.

IT Service or Architectural Component
Help desk services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Operations Division at the Mt. Weather Emergency Action Center (MWEAC) for IT help desk services	Remedy	Adopted
PMG for help desk services for external customers	TBD	Suggested service area

Comments

As with the 800-number services, a number of FEMA organizations expressed a need for standardization of an enterprise-wide approach to providing help desk services. Help desk services fall into two basic categories: (1) help desk services for IT systems provided to FEMA employees and (2) help desk services for external customers such as disaster victims seeking help or information (e.g., Human Services support). In general, there is a need or desire for enterprise-wide standardization for both of these help desk functions. The ITS Operations Division is the organizational lead with the help desk approach, using Remedy at Mt. Weather (MWEAC), which is determined to be the preferred enterprise-wide solution for providing help desk services. The NEMIS PMG is suggested as the lead for development of enterprise-wide help desk services with external customers. Increased integration with common 800-number services is desired. Additional tools may be required for enterprise-wide adoption of help desk services.

IT Service or Architectural Component

High-bandwidth management services with adaptive Quality of Service (QoS) capability

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Engineering Division	Asynchronous Transfer Mode (ATM)	In-service use

Comments

The ITS Engineering Division has implemented high-bandwidth management services using adaptive Quality of Service (QoS) capability provided by ATM. Section 3.4.3.4 of this *FEMA IT Architecture* further describes ATM. ATM is a transfer protocol that provides scalable bandwidth; integrated voice, video, and data; and native adaptive QoS services.

IT Service or Architectural Component

High-performance computing and communications (HPCC) services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD	Suggested service area

Comments

The ITS Directorate is the organizational lead for development of HPCC services, subject to business case analysis. A number of FEMA organizations suggested potential applications that might require high-performance computing and communications resources (e.g., virtual reality, distance learning, distributed interactive simulation, interactive GIS, and digital library applications). If HPCC services are required to meet the emerging requirements, they should be provided in a standardized enterprise-wide fashion. As an important IT architectural consideration, the FEMA ITS Directorate will explore avenues for collaboration with FEMA's business partners, other Federal agencies, the CIO Counsel, and universities. See also *Next Generation Internet and Internet2* below.

IT Service or Architectural Component

Imaging system services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OS with ITS Directorate review	Digital imaging services: ◗ ZyImage ◗ Visustar ◗ Powerscan, Filenet, OTG	In-service use (under re-evaluation)

Comments

There is a generally recognized need for an enterprise-wide approach for providing digital imaging services for scanned documents. ZyImage is currently a part of CIMS but provides few or no recordkeeping capability and does not conform to emerging NARA optical imaging and records management standards. Images are saved as TIFF files with the potential to be altered via pixel editing with minimal controls for maintaining scanned document data integrity. An enterprise-wide solution needs to consider integration with optical character recognition (OCR) techniques, text search and indexing, document management, digital libraries, electronic records management, and archival storage components.

IT Service or Architectural Component
Information dissemination services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG in coordination with the Office of Emergency Information and Media Affairs (EIMA)	Oracle Web Server	In-service use
	PointCast	In-service use

Comments

The NEMIS PMG, with close coordination from EIMA, is the suggested organizational lead for development of enterprise-wide information dissemination services. NEMIS is using Oracle Web Server for information dissemination services and recommends it as an enterprise-wide solution. Please refer to the PMG. PointCast is currently being used by EIMA for streaming audio and video on the web. PointCast will require additional profiling, development, and definition to promote it to archival status and to provide a basis of support that will be acceptable to NARA.

IT Service or Architectural Component
Integrated voice, video, and data applications, with video tele-conferencing (VTC)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Engineering Division	Asynchronous Transfer Mode (ATM)	In-service use

Comments

Most of the FEMA organizational elements that were interviewed during the development of the initial *FEMA IT Architecture* identified a requirement for FEMA to develop an enterprise-wide integrated approach to voice, video, and data applications (with VTC). The ITS Directorate Engineering Division is the organizational lead for the development of standardized network applications that support this architectural component. ATM provides native protocol support for integrated voice, video, and data applications and has been fully implemented throughout the organization.

IT Service or Architectural Component
Intelligent Collaboration and Visualization (IC&V), groupware services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD; Group Systems from Ventana Corporation	Suggested as a service area; under evaluation

Comments

IC&V groupware services relate to *integrated voice, video, and data applications* above with the added dimension of integration of digital library services, distance learning, and interactive GIS. The requirement is to support intelligent collaboration and visualization on complex objects across the enterprise. This architectural component also relates to distributed planning and distributed economic modeling. This architectural component also provides enabling technology to support distributed exercise planning and distributed modeling and simulations services. See Section 1.12.6 for additional details of this suggested service area. Nearly every FEMA organizational element identified IC&V services as an important future service area. The Regional Offices expressed a desire to collaborate and evaluate this technology in prototypes and demonstrations. The Group Systems approach from Ventana is under evaluation by PT&E.

IT Service or Architectural Component
Internet technology services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Internet technologies: ◗ Java ◗ SSL ◗ MIME w/Base64 Encoding ◗ S/MIME ◗ HTTP ◗ POP-3 ◗ IMAP ◗ SMTP ◗ LDAP ◗ TCP/IP ◗ HTML ◗ Dynamic HTML ◗ XML with style sheets ◗ CGI scripts	All suggested

Comments

In developing the initial *FEMA IT Architecture*, a number of FEMA organizational elements identified a requirement to broaden the perception of potential use of the Internet beyond just providing information dissemination services. In particular, they sought utilization of the Internet and Internet technologies as a tool to support business functions in such areas as distributed planning, conferencing and chat, desktop collaboration, validation of electronically-filed documents and data sets, visualization, messaging, FTP, shared office automation applications, originator authentication, and archival storage and retrieval. The ITS Directorate is the organizational lead for development of enterprise-wide approaches and solutions for advanced Internet services of this type. Each of the suggested standards will require additional profiling and development.

IT Service or Architectural Component
Kiosks (information)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
TBD	TBD	Suggested service area

Comments

Portable, distributed information kiosks, which might be set up in an emergency to support large-scale response and recovery operations, have been suggested as a potential technology and approach to capture data and to provide information dissemination in a disaster area. It is envisioned that the kiosks might exploit existing services in a region such as fiber optic communications, phone lines, cellular services, indigenous cell and frame relay networks, and cable.

This *FEMA IT Architecture* establishes that if information kiosks are developed as an architectural component, they should be developed consistently as an enterprise-wide solution and be consistent with NEMIS. The organizational lead is yet to be determined.

IT Service or Architectural Component
Legacy data capture (scanning, conversion, OCR)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Open systems file formats	Suggested service area

Comments

The NEMIS PMG is the organizational lead for development of an enterprise-wide approach for legacy data capture. Legacy data capture services broadly include optical scanning, conversion and translation services, OCR for text, and intelligent recognition of objects and vectors in figures and illustrations. See Section 1.12.6 for details on this suggested service area. This architectural component needs to be closely integrated with electronic filing services, document management system services, electronic commerce, electronic funds transfer, digital library services, text search, electronic mailroom, and workflow services. Particular emphasis needs to be placed on conversion and translation to open systems file formats. Standard tools also need to be identified.

IT Service or Architectural Component
Long-term electronic records management and archiving services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate with support from OSD (Program Services Division) and the Office of General Counsel (OGC)	Open systems file formats	Suggested service area; suggested use of open systems standards

Comments

The ITS Directorate, in close coordination with OGC and the Program Services Division, is the organizational lead for the development of services to support long-term electronic records management and archival storage in a legal environment. NEMIS currently provides an environment that supports long-term records management and archiving services and should be considered as the basis for development of enterprise-wide architectural services in this area. Additional analysis of emerging NARA requirements and guidelines will be necessary, as will additional profiling and definition of standards.

IT Service or Architectural Component
Mobile/nomadic computing services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate (Engineering Division in coordination with PMG)	Personal Communications System (PCS)	Suggested service area; PCS technology is under evaluation

IT Service or Architectural Component

Mobile/nomadic computing services (Continued)

Comments

The NEMIS PMG is currently developing mobile and nomadic computing services. This is being coordinated with the Engineering Division, which is currently evaluating PCS technology as part of a separate Network Technology Architecture task. As a result of the structured discussions, the most important early requirement appears to be development of a good distributed e-mail service and/or messaging services. See also *e-mail services* and *PCS services*. Identification of mobile/nomadic services includes future specification and integration of laptops, modems and protocols, wireless services, applications, interfaces, thin clients, and possibly Global Positioning System (GPS).

IT Service or Architectural Component

Modeling and Simulation (M&S), Distributed Interactive Simulation (DIS)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Department of Defense (DOD) DIS protocols	Suggested service area; suggested standards base

Comments

The DOD M&S Office has developed protocols for DIS. DIS can potentially provide FEMA with a capability to model and simulate disasters across distributed networks for training purposes. Mitigation, PT&E, R&R, and the National Fire Academy are interested in this technology. With additional definition and business case analysis, the ITS Directorate is the lead for systems engineering and development for this type of technology. See *distributed exercise planning, reconstruction, and analysis services* above. Also, see Section 1.12.6 for additional details.

IT Service or Architectural Component

Multimedia integration services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	MPEG	Suggested
	M-JPEG	Suggested
	AVI	In-service use
	WAV	In-service use
	General MIDI	Suggested
	PointCast	In-service use
	Multimedia hardware:	Suggested
	❥ Sound board	
	❥ CD-ROM drive	
	❥ Digital Versatile Disk (DVD) drive	
	❥ Digital Cameras (still and video)	
	❥ Microphones	
	❥ Video capture boards	
	❥ Mass storage and optical jukebox	
	❥ Multimedia *pump*	

IT Service or Architectural Component
Multimedia integration services (Continued)

Comments

The ITS Directorate is the organizational lead for systems engineering and integration of multimedia services. A number of FEMA organizations expressed interest in multimedia services to provide improved training and information dissemination. MPEG and Motion-JPEG are suggested open systems standards. Microsoft Audio-Visual Interleave (AVI) format and WAV format (for recorded sound) are widely implemented de facto standards and are currently being used. Musical Instrument Device Interface (MIDI) is an industry standard for synthetic sound. General MIDI is suggested as the APP. PointCast is currently being used by EIMA for streaming audio and video via the web. All of the multimedia formats place potential demands on the network. All of the formats require additional profiling and definition for long-term archival storage to meet NARA requirements. Multimedia services also need to be integrated with digital library services. The quality of multimedia playback frequently depends on specialized hardware, raising potential legal and regulatory concerns.

IT Service or Architectural Component
Next Generation Internet (NGI) and Internet2 services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Emerging NGI and Internet2 standards	Suggested service area; suggested standards

Comments

Excellent opportunities exist for FEMA to collaborate with other Federal agencies that are already participating in the NGI project and with more than 100 universities that are part of the Inernet2 consortium. NGI and Internet2 are important developmental efforts addressing: scalable high-bandwidth, QoS, Internet security, digital library science, multimedia, storage resource brokers, distributed high-performance computing and metacomputing, and storage and retrieval of very large archives (e.g., petabytes). See also Section 1.12.6. Any potential FEMA involvement or collaboration with NGI and Internet2 participants needs to be coordinated across the enterprise with the ITS Directorate as the organizational lead.

IT Service or Architectural Component
Office automation tools

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Microsoft Office 97 Professional Edition	Adopted
	File formats from Microsoft Office 97	Adopted
	SGML-based and XML-based documents containing open systems graphics and multimedia objects	Suggested

IT Service or Architectural Component
Office automation tools (Continued)

Comments
Components of the current FEMA office automation toolkit include

▶ Word processor (Word)
▶ Spreadsheet (Excel)
▶ Presentation graphics (PowerPoint)
▶ Desktop relational data base management (Access)
▶ E-mail client (Exchange Server and Outlook)
▶ Web browser and plug-ins (Internet Explorer)
▶ Web page authoring (Word augmented by FrontPage)
▶ Calendar tool (scheduling) (Schedule+)
▶ Contact manager (Schedule+ and Outlook)
▶ Task manager (simple) (Outlook)
▶ Project management (Microsof t Project)
▶ Journaling tool (Outlook)
▶ Windows environment (NT, Win 95/98)
▶ Multimedia playback (Media Player).

File formats are proprietary and require additional profiling to meet archival storage requirements.

Future needed capability includes authoring of XML (as an open systems replacement for HTML on the web). XML is expected to be in the next release of Microsoft Office. SGML and XML tools are widely available. Document type definitions and style sheets need to be developed and standardized.

IT Service or Architectural Component
On-Line Analytical Processing (OLAP) and On-Line Transaction Processing (OLTP) Tools

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD	Suggested service area

Comments
OLAP and OLTP tools are a comparatively new class of products that provide capabilities as suggested by their names. They facilitate automated on-line processing of data bases including aggregating and presenting results for management review. OFM, in particular, expressed interest in this class of products. These products should be evaluated for potential standardization across the enterprise. See Section 1.12.6 for additional details on OLAP and OLTP.

IT Service or Architectural Component
Operating System Environment (Desktop)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	Microsoft Windows NT	Adopted
	Windows 95	Adopted

IT Service or Architectural Component
Operating System Environment (Desktop) (Continued)

Comments
Microsoft Windows is the accepted desktop operating system environment. Selection of Windows NT or Windows 95 for any particular workstation is made on a case-by-case basis.

IT Service or Architectural Component
Personal Communications System (PCS) services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Engineering Division	TBD	Under evaluation

Comments
Digital PCS services provide an opportunity for integrated e-mail, messaging, mobile computing, remote data base access, and digital cellular telephone services. Structured discussions with the Directorates indicated that PCS is becoming increasingly attractive to FEMA field personnel engaged in response and recovery operations and other field services (e.g., surveys and inspections). PCS needs to be considered as an enterprise-wide opportunity. The Engineering Division is currently evaluating PCS as part of a separate study on FEMA's network architecture.

IT Service or Architectural Component
Print on-demand and publish on-demand services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
OSD	Xerox DocuTech	In-service use
	Xerox DocuColor	In-service use

Comments
OSD is the organizational lead for development of enterprise-wide, high-volume, print on-demand and publish on-demand services. Xerox DocuTech and DocuColor are currently in-service and have been suggested by OSD as prospective adopted standard tools.

IT Service or Architectural Component
Systems engineering and development toolkit (including CASE)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
Engineering Division in coordination with PMG	Software Engineering Institute (SEI) methodology	Suggested methodology

Comments
The ITS Engineering Division, in close coordination with the NEMIS PMG, is the organizational lead for development of enterprise-wide standard tools and techniques for systems engineering. Identification of additional tools and techniques will be made in future revisions to this IT architecture. SEI methodology is suggested for development of IT systems and would need to be applied on a case-by-case basis.

IT Service or Architectural Component
Teleconferencing (voice only)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
National Network Operations Center (NNOC)	TBD	Suggested

Comments
A number of FEMA organizations expressed a need for improvements in voice-only teleconferencing services especially in the areas of voice quality and streamlined approaches to set up teleconferences. NNOC at Mt. Weather is assigned the organizational lead for development of improved capabilities.

IT Service or Architectural Component
Text search services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
PMG	Oracle ConText	In-service use

Comments
Most of the FEMA organizations that were interviewed expressed a need for an enterprise-wide text search and indexing capability. This architectural component needs to be integrated with office automation, legacy data capture, document management, data base management services, digital library services, correspondence and action tracking, and others to achieve enterprise-wide capabilities. The NEMIS PMG is the organizational lead for development and has used Oracle ConText for text search and indexing. Other text search engines may need to be evaluated and explored.

IT Service or Architectural Component
Video teleconferencing services (VTC) (video and voice only)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	VTC system in ITS Directorate managed by Engineering Division	In-service use
	Microsoft NetMeeting integrated within office automation toolkit	Suggested

Comments
Most of the FEMA organizations that were interviewed identified a requirement for high-quality video teleconferencing services to support distributed planning and liaison functions with their business partners. Architectural issues to be addressed include bandwidth utilization and electronic capture of business-significant proceedings (e.g., minutes) to support legal and regulatory requirements. Desktop video conferencing using Microsoft NetMeeting is suggested for potential evaluation.

IT Service or Architectural Component
Virtual reality representation mechanisms (VRML and 3-D stereoscopic viewing)

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	International Standards Organization (ISO) Virtual Reality Modeling Language (VRML)	Suggested service area; ISO VRML suggested as an open systems standard

Comments

The Mitigation Directorate, PT&E, R&R, and the National Fire Academy are proponents for the use of virtual reality representation mechanisms in simulations for distance learning and training purposes. Explicit operational requirements and business case for virtual reality (VR) need to be developed. A prototyping approach is suggested in close collaboration with other Federal agencies (e.g., DARPA, NOAA). 3-D stereoscopic viewing is possible using CAVE technology that permits a simulated walkthrough of the operational scenario. The *FEMA IT Architecture* establishes that any virtual reality representation and stereoscopic viewing services (including hardware and software) shall be developed as an enterprise-wide architectural component. Due consideration must be given to the potential impact of VR on the network. The use of ISO-compliant VRML is suggested as an open systems approach. The ITS Directorate is the organizational lead.

IT Service or Architectural Component
Voice mail services

FEMA Organizational Lead	Relevant Standards or Standard Tools	Status
ITS Directorate	TBD	Suggested

Comments

Interviews with a number of FEMA organizational units indicated a need to standardize voice mail services across the enterprise. Several voice mail systems are currently in use. The ITS Directorate is the organizational lead and will promulgate the approved enterprise-wide standard in future revisions to this document.

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APPENDIX O.

PROFILES OF MAJOR IT STANDARDS

THIS APPENDIX PROVIDES amplifying information on Section 2.3 and identifies a number of selected standards that offer significant potential for achieving openness across FEMA's IT systems in the future.

Standard Generalized Markup Language (SGML) and Extensible Markup Language (XML)

SGML is an internationally-accepted open systems standard (ISO 8879) published in 1986. XML is a recently proposed dialect or implementation of SGML that is much simpler to implement and is planned to supplant Hypertext Markup Language (HTML) on the Web. The fundamental requirement for XML is that documents be *well-structured*. An SGML Document Type Definition (DTD) formally defines the required structure and content elements of a document. A DTD is considered optional for XML compliance. SGML/XML has generated a considerable amount of interest among various Federal agencies as an open systems approach to the interchange of structured text documents. In addition, SGML (and XML) is the only recognized approach for long-term archival storage and retrieval of text-based documents by the National Archives and Records Administration (NARA).

For FEMA, SGML/XML represents the only internationally-recognized standard for markup of the structure and content of text documents. SGML is data base-oriented and is intrinsically pageless. SGML supports hyperlinking to graphics and multimedia objects. SGML is also the basis for HTML, which is used on the Web on the Internet. SGML provides a platform-independent method for describing both the content and structure of compound documents. In particular, SGML provides facilities for defining the following:

- ◗ Structure of the document
- ◗ Characters transmitted in a document
- ◗ External information incorporated in the document such as external graphics and multimedia files
- ◗ Special features for marking up text
- ◗ How text is to be processed by the receiving system (e.g., support for workflow).

The technology base for SGML is over 10 years old. The grammatical nature of SGML makes it a stable standard. What is not so standard are the myriad implementations SGML (e.g., tables, common text, and mathematics formats) and concurrence on external entities (e.g., image formats). Not withstanding these limitations, SGML has proved to be an extremely viable option for platform independent document encoding.

For FEMA, SGML and XML represent a particularly valuable future architectural approach to represent documents and to interchange them with FEMA's business partners in a well-disciplined, open, and structured manner in the future. In contrast, most interchanges of information today are via word processor file formats, which provide only a loose structure for document and data interchange. With the anticipated replacement of HTML by XML on the Web, the next generation of office automation products and word processors is projected to be XML-compliant. This will present important new opportunities for FEMA. In addition, XML is

rapidly gaining momentum as a preferred approach for electronic commerce via the Internet. With this approach, on-line data validation techniques using Java are becoming popular.

For FEMA, the most important step would be the development of a series of SGML DTDs for the various document types, which are typically interchanged amongst FEMA's business partners, as well as seeking concurrence of FEMA's business partners on SGML/XML as the preferred open systems interchange format for text-based documents in the future. SGML/XML has the potential to be the preferred approach to the interchange of structured electronic documents.

Geographic Information System (GIS) Standards and Standard Tools
The *Q3 Flood Data Specifications (Draft)* document available from the FEMA Web site provides details of the GIS Technical Reference Model and associated standards profiles for FEMA's GIS products. Please refer to that document for additional details. Per that reference, the Digital Line Graph Level 3 (DLG3) has been adopted by FEMA as the standard data model for the distribution and storage of digital Flood Insurance Rate Map (DFIRM) products. DLG3 is FEMA's data distribution format until specifications for data distribution that meet the Spatial Data Transfer Standard (SDTS) Federal Information Processing Standard [FIPS] 173) can be implemented.

The United States Geological Survey (USGS) is migrating to the DLG-E (Enhanced) data model from the existing DLG3 model. DLG-E is designed for the capture, storage, and processing of USGS' spatial data. DLG-E data will be distributed by USGS in SDTS format. DLG-E will provide an internal data structure with a more flexible method of storing feature characteristics, metadata, and topological (spatial relationships) information for two-dimensional data. DLG-E will permit features and attributes to be handled separately, with classification criteria for over 200 feature types. An additional improvement will be the inclusion of feature names (e.g., stream or road names) and the treatment of spatial elements as objects. This object-oriented data model will allow for multiple spatial relationships among features to be identified and queried by their natural classification groups, such as the Great Lakes or the Florida Keys.

The USGS National Mapping Division (NMD) continues its work pertinent to the DLG-E model and its transfer to SDTS. Many software vendors have implemented, or are in the process of implementing, SDTS translators.

As an IT architectural consideration, FEMA is investigating the use of the DLG-E data model for data storage and processing. FEMA plans to adopt the SDTS standards for distribution of its geospatial data in compliance with the FIPS when development of appropriate specifications and mechanisms has been finalized.

FEMA Q3 flood data products are provided in public domain transfer format (DLG and Tagged Image File Format [TIFF]) as well as proprietary formats (ARC/INFO and MapInfo). Although the Federal government supports several geospatial data models, the USGS DLG standard offers one of the more efficient and widely recognized data formats for the distribution of vector data. DLG-3 supports basic topology (spatial relationships between data elements) in a vector data model but is limited in the area of feature annotation, non-numeric data elements, and named features. FEMA is in the process of developing and implementing specifications for data sets in

SDTS, and when this effort is complete, it is expected that SDTS will replace DLG as FEMA's distributed public domain vector format.

ARC/INFO and MapInfo are used by FEMA as internal working files; however, due to the popularity and utility of these two formats, they are distributed as well. Q3 raster FIRMs are distributed in TIFF format compressed using CCITT Group 4.

Computer Graphics Metafile (CGM)
Originally defined by the International Standards Organization (ISO) in 1987, the CGM standard was designed as a basic, general purpose, two-dimensional, graphical interchange format. A CGM metafile is not a picture, only a description of a picture. Over the years, the CGM standard has been amended a number of times in order to increase its graphical representation power, and today is the preferred, internationally-accepted, open systems standard for the representation of graphics such as technical illustrations and vector drawings. A recent amendment to the CGM standard allows application structuring and the inclusion of hot links in CGM-compliant files. A color addendum has also been added.

Well over 100 commercial implementations of CGM exist in software products to date. The CGM standard is stable and supported by a broad base of software packages on almost all hardware platforms; however, interoperability is somewhat hampered by inconsistent implementations. As a result, Application Portability Profiles (APPs) need to be developed to standardize these features between trading partners. These APPs have been a major issue in the CGM community, and the newly established CGM Open Group is attempting to set standards for the APPs to achieve interoperability. In 1995, CGM became a registered MIME type. For FEMA, CGM could evolve to become the preferred standard for exchanging simple to moderately complex drawings among business partners. NARA has expressed strong interest in CGM as an archival standard. The efforts of the CGM Open Group should be closely tracked and monitored. CGM has the potential to become the preferred open systems approach for the interchange of technical drawings and illustrations across the FEMA enterprise.

Consultative Committee for International Telephony and Telegraphy (CCITT) Group 4 Raster Image Standard
(Note: CCITT has been renamed the International Telegraphic Union (ITU))

The CCITT Group 4 raster image standard is a widely implemented facsimile standard for black and white images (i.e., images not containing gray-scale or color). The standard contains the .T6 recommendation for file compression using a run-length encoring (RLE) algorithm. For the typical typed documents and line art illustrations, CCITT Group 4 encoding offers compression ratios of nominally 20 to 30 to 1. Group 4 viewers are widely available. For FEMA, Group 4 is the preferred, internationally-accepted method of interchange of black and white raster-scanned images and illustrations. Group 4 is also the preferred mechanism for interchange of TIFF files in FEMA's GIS products.

Initial Graphics Exchange Specification (IGES)

Developed in the United States in the early 1980s, IGES has quickly gained a reputation for effectiveness in transferring geometric-based data (such as engineering drawings). Today, IGES is used throughout the world in a number of industrial applications. IGES standardizes the representation of specific types of complex graphical objects for data interchange. IGES is intended for platform-independent exchange of complex engineering product data as generated by modern day computer-aided design and manufacturing (CAD/CAM) software.

The IGES standard product data encompasses technical drawings, geometric and non-geometric data (e.g., tolerances), materials, and surfaces. IGES software consists of two processing modules: a pre-processor which transforms the native CAD system format into the neutral IGES format, and a post-processor which performs the translation of IGES format to the target system format. The IGES exchange is highly dependent upon the quality of the IGES translators at the sending and receiving systems. Many systems now allow users to *flavor* their output IGES to take advantage of a specific target system's expectations and capabilities.

The IGES standard has been revised over the years in order to improve its graphical representation power and keep pace with technological advances in the CAD/CAM arena. IGES is widely accepted by CAD/CAM software manufactures as a neutral exchange mechanism. Virtually all major CAD/CAM implementations can generate and interpret IGES files, though there is frequently some inconsistency in the implementations. IGES presents the internationally-accepted alternative to the interchange of engineering drawings via proprietary formats such as AutoCAD. Within the *FEMA IT Architecture*, IGES has the potential to become the preferred open systems method of exchanging engineering drawings, although AutoCAD format is also considered acceptable.

Joint Photographic Experts Group (JPEG)

JPEG is an internationally-accepted standardized compression method for full-color and gray-scale images. JPEG was designed to compress *real-world* scenes such as pictures. JPEG is implemented as part of the JPEG File Interchange Format (JFIF), which is produced by many digital cameras. An alternative industry file format is TIFF (an industry standard format). In actuality, TIFF files may have images compressed using JPEG or CCITT Group 4 or several other compression schema. In general, cartoons and other non-realistic images are not handled well by JPEG. JPEG is a *lossy* method of compression with the result that the output image (after decompressing) is not necessarily identical to the input image (before decompression). Because of this limitation, one would not use JPEG on images requiring precise reconstruction (i.e., CAD drawings, satellite images, maps, etc.). However, on typical images of real-world scenes such as photographs, excellent compression levels can be obtained with no visible change, and amazingly high compression levels are possible if low-quality images are tolerable.

JPEG has long been a standard for photographic types of images, and support for it across industry is extensive. The recent surge in multimedia has also driven manufacturers to develop specialized coprocessors to support JPEG compression and playback. Microsoft incorporated support for JPEG under its Windows 95 operating system. JPEG provides FEMA with a stable, efficient, internationally-accepted, and color-capable standard for photographic quality images.

Motion JPEG offers FEMA a method for multimedia storage of submitted videotapes and recordings. JPEG has the potential to become the preferred open systems approach to interchange photographic images. TIFF is considered an acceptable alternative file format.

Motion Picture Experts Group (MPEG)
Motion Picture Experts Group (MPEG) is a group that meets under ISO to generate standards for multimedia data interchange (i.e., mixed-mode audio and video). In particular, the MPEG standard defines a compressed bit stream. However, the compression algorithms are up to the individual manufacturers, and that is where proprietary advantage is obtained within the scope of a publicly available international standard. An industry-standard alternative to MPEG is the Audio-Video Interleave (AVI) file format, which is integrated into many PC-based multimedia packages.

Unlike JPEG, which primarily condenses information within each frame, the standard developed by the MPEG compresses information between frames, such as a background that does not change from frame to frame. Products to support MPEG have been on the market for several years. Public domain viewers for MPEG are now available, though not as widely used in the market place as AVI-based tools. The MPEG standards offer FEMA a wide range of capabilities for handling standard and high-resolution video, audio, and multimedia data in an open, internationally-accepted file format in the future. MPEG can also be used for storing both video and audio submissions, storing multimedia records of a disaster scene, and videoconferencing. MPEG has the potential to become the preferred open systems approach to interchange audio-video files. AVI file format is considered an acceptable alternative file format.

Virtual Reality Modeling Language (VRML)
Virtual Reality Modeling Language (VRML) is a developing standard for describing an open-platform, independent file format for three-dimensional (3-D) graphics on the Internet. Similar to the core Web text standard (HTML), VRML encodes computer-generated graphics into a compact format for transportation over the network. With VRML, a user can view the contents of a file (in this case an interactive 3-D graphics file) and navigate to other VRML worlds or HTML pages.

VRML is scalable, enabling users to navigate through virtual worlds. In effect, VRML is designed to connect virtual worlds across the global Internet. The VRML standard has recently been embraced by ISO, thus affording FEMA an opportunity to adopt and implement an internationally-accepted approach to representation and interchange of 3-D data. For the purposes of this architecture, VRML is an excellent candidate to represent real-world scenes such as disaster areas, fire scenes, training environments, etc. The ISO-accepted version of the VRML standard is suggested as a potential open systems approach to representation and rendering of 3-D product model data.

Adobe Portable Document Format (PDF)
The industry PDF standard was developed to make the interchange of formatted documents between differing computing environments as reliable as possible. The standard was once under consideration as a FIPS standard, though it is understood that this effort has basically stalled due

to a number of Federal agencies' concerns about PDF having its origins as a proprietary file format. PDF is still very popular as a potential electronic file interchange format in the courts, because PDF does an excellent (though not perfect) job of preserving the *look and feel* of the document being interchanged regardless of the computer, operating system, or application software used to create the original document.

The PDF format describes the final form of any document containing text, graphics, or images. Because PDF files are device- and resolution-independent, they can be rendered on almost all major display and output devices. PDF files can be created from any application that supports the PostScript language. Special application programs can translate the PostScript output into the PDF format and vice versa. Encoded in 7-bit ASCII, the PDF file can be readily compressed to make maximum utility of transmission bandwidth and storage capacity. The Adobe Acrobat Reader is a public domain viewer for PDF files and may be freely distributed. FEMA needs to evaluate potential applications of PDF throughout the enterprise as a mechanism for storing, interchanging, and composing various final form documents. The PDF format is under evaluation as a standard for the interchange of final form documents where the *look and feel* must be preserved. Additional guidelines for configuring and using Acrobat products will need to be promulgated.

Electronic Data Interchange (EDI) and EDI for Administration, Commerce, and Transport (EDIFACT)

Electronic data standards include:

◗ ANSI X12 family of standards for EDI
◗ EDIFACT family of standards (EDI for Administration, Commerce, and Transport)
◗ FIPS Pub 161-1–*Electronic Data Interchange*
◗ SGML/XML implementation on the Web.

EDI or Electronic Commerce (EC), as it is sometimes called, is the application-to-application electronic exchange of business data in a standardized, non-proprietary format. The essence of EDI is that it replaces paper documents with an electronic equivalent of the transmission of data contained in those documents.

Closely related to EDI is Electronic Funds Transfer (EFT), which on the simplest level is the electronic transfer of funds between organizations via their respective banks. The last part of the EFT definition is significant because only the banking system can move funds. All checks and electronic payments must be settled by banks. The most prominent method of EFT is the Automated Clearing House (ACH). Operated by the Federal Reserve and participating banks, the rules and standards for ACH are set by the National Automated Clearing House Association (NACHA), an association in which about 85% of the country's banks participate. The ACH is by far the most popular EFT system, handling more than 1 billion transactions each year.

Within the United States, emerging electronic commerce requirements for integration of traditional EDI with EFT have given rise to new terminology, entitled Financial EDI, or (F)EDI. Financial EDI is the electronic exchange of payment and payment-related remittance information

such as payment amount, invoice numbers, discounts, and deductions between trading partners. *Information* is the key part of this definition, because it is the primary distinction between Financial EDI and EFT. Financial EDI entails moving both *information* and *instructions* to the banking system to move funds.

In short, EDI transmissions are machine-readable and transaction-oriented. They are normally intended to be integrated into applications to automatically update an inventory, query a catalog, place an order, track a shipment, expedite a process or inquire about the status of an order, trigger a tickler, invoice a customer, or direct payment to a vendor via electronic funds transfer techniques. Insofar as many of these functions must be accomplished in the emergency management environment, ANSI X12 and the international EDIFACT standard have the potential to become FEMA enterprise-wide IT standards. Also, FEMA needs to remain cognizant of emerging trends toward implementation of electronic commerce practices using XML on the Web.

Within the Federal government, FIPS Pub 161 currently establishes policy and procedures for government agencies to implement EDI capabilities. EDI implementation software is widely available. This includes EDI data stream encoders and decoders, data base translation software, automated data base interfaces, graphics user interfaces, encryption and security services, X12/EDIFACT syntax translators, and telecommunications facilities. Software has been developed for all major hardware and software environments including mainframes, PCs (under DOS, Windows, and OS-2), Macintosh, and engineering workstations under UNIX. XML-based software is also rapidly becoming available.

Digital Signature

Digital signatures for electronic documents are designed to replace the roles of handwritten signatures and special seals in paper documents. Digital signatures are strings of bits attached to an electronic document. Generated by the signer, this bit-string is based on both the document's data and the signer's secret password. Digital signatures can be created by using public-key cryptography, in which the signer generates a unique bit pattern by using a private key that only he/she knows. The receiver verifies the authenticity of the signature with a public key, which everyone knows. The implementation of the *Government Paperwork Elimination Act (GPEA)* requires that agencies consider the use of electronic signatures, and develop plans to implement electronic signatures, if practicable, by October 2003.

Three major proponents have emerged in the area of data encryption and digital signatures for secure communications. These include the following:

1. The National Institute of Standards and Technology (NIST) has proposed a Digital Standard Algorithm (DSA) for the **Digital Signature Standard (DSS)**. Adopted in May 1994 and effective December 1, 1994 (FIPS Pub 186), the DSS uses a private key/public key concept. It will be reviewed every five years in order to assess its continuing adequacy. The algorithm is available free to all agencies. The DSS applies to all Federal departments and agencies for use in protecting unclassified information that is not subject to the Warner Amendment. Since the DSS was announced, a Secure Hash Standard has been approved as FIPS 180. The hash function is used in the signature generation process to obtain a con-

densed version, called a message digest, of the data that is to be signed. The message digest is input to the DSA in generating the digital signature. Signature verification makes use of the same hash function. FIPS 186 and 180 are suggested for consideration.

2. **RSA** Data Security's (Redwood City, CA) Public Key Crypto System has become an industry *de facto* standard. RSA technology gives every user two keys — one public and one private. Data encrypted by one key can only be decrypted by the other key. RSA is very popular and is suggested for consideration as a potential FEMA enterprise digital signature standard.

3. In addition, **Pretty Good Privacy (PGP)**, a *public domain* algorithm similar to RSA, is widely used on the Internet. PGP can be used to implement a public/private digital signature using *public domain* or shareware programs widely available on the Internet. More documents are digitally signed on the Internet with PGP than any other competing approach. Thus, FEMA should consider PGP as a potential alternative. As with RSA, the PGP approach is suggested for consideration as a potential FEMA enterprise digital signature standard.

FEMA is cognizant of ongoing Federal efforts to develop a Public Key Infrastructure (PKI) and will continue to track and monitor that effort as an important initiative to implement secure electronic commerce practices in government.

APPENDIX P.

FEMA'S TARGET ARCHITECTURE CAPABILITIES

IN UPDATING THE *FEMA IT Architecture, Version 2.0*, identifying the new initiatives that make up the Agency's Target Architecture Capabilities that will help to lead to e-FEMA was a critical task. The capabilities listed below do not include the major IT systems that the Agency has had under prior development. The capabilities discussed below are new identified initiatives that may lead to formal projects sometime in the future.

FEMA's enterprise-wide IT architecture must follow stringent implementation guidance. The Office of Management and Budget's (OMB) Capital Planning and Investment Control Process (CPIC) requires that Federal agencies directly integrate their IT architecture implementation with CPIC. The General Accounting Office also has guidance on implementing structured IT evaluations and management procedures. The *Clinger-Cohen Act a*ssigns specific responsibility to the Chief Information Officer (CIO) for ensuring IT projects are systemically vetted and well managed. The revised OMB Circular A-130, dated November 28, 2000, incorporates all of the these requirements into one directive.

Depending upon the outcome of the above CPIC process and FEMA's priorities, some of the capabilities identified below may advance to the formal project and funding stage. Other capabilities may remain undeveloped but integral to the target architecture, for an undetermined period of time. CPIC will continue to be an important process in determining the return on investment for any potential new project.

Correspondence and Action Tracking System

Current findings show major problems with the processing and tracking of correspondence largely due to the existence of multiple tracking systems within FEMA, each having limited functions and capabilities. The constant expansion and maintenance of these systems create a financial burden for the Agency. This situation, as well as other operational problems, increases the incidence of duplications, different responses to the same constituent, and ineffective communication among the offices.

The Agency needs a comprehensive electronic tracking system to help improve the accountability and efficiency of correspondence and other actions agency-wide. It is in FEMA's best interest to invest in a more comprehensive tracking system that can meet the Agency's current needs and accommodate future enhancements. Separate from improving the tracking of correspondence and action items, many offices have expressed the need for their own data bases to manage internal correspondence and business actions. Other concerns mentioned in the Correspondence and Action Tracking Working Group study are the need for a better way to handle records management and the full transformation of paper records to electronic accessibility. The urgency to streamline and standardize the correspondence process and meet the business needs of the Agency calls for the prompt implementation of a new system agency-wide including all the offices at Headquarters and the 10 Regions. The tracking system must provide FEMA with the following business needs:

◗ Tracking and management of correspondence and actions
◗ Improvement of document management
◗ Meet mandatory requirements for electronic records management.

The Director has determined that a new Correspondence and Action Tracking System is one of the Agency's top priorities.

Automated Grants and Acquisition Management
FEMA has a number of disaster and non-disaster grant programs that have similar functional and managerial requirements. A comprehensive and well-integrated enterprise-wide IT solution for overall FEMA grants management is recognized to be a high priority in the Agency. The Automated Grants Management System would become part of the National Emergency Management Information System (NEMIS), and could incorporate some or all of the following:

◗ Authoring standards for developing and packaging the grant application which may contain scientific and technical material covering all hazards and disciplines
◗ Signature by the originating authority
◗ Submission to FEMA (ideally via electronic means)
◗ Receipting and date-time stamping of the grant application
◗ Review and collaboration of the grant application
◗ Tracking, monitoring, and reporting in consonance with the *Government Performance and Results Act (GPRA)*
◗ Engineering and scientific analysis of the results
◗ Digital library storage and retrieval of documents
◗ Application of security architecture measures to maintain document and data integrity, audit trails, and legal and regulatory records
◗ Broad information dissemination to get the results out to partners at the State and local levels
◗ Training associated with the results
◗ Accelerated financial operations and payments and streamlines assistance for disasters
◗ Processing enhancements due to *Stafford Act* changes
◗ Grant management process for Non-DRF Mitigation programs
◗ Project closeouts.

Personnel Resources Information Systems Mart (PRISM)
The goal of this project is to collect and coordinate human resources information from a variety of heterogeneous sources and to provide easy access to all HR-related information via a Web-based datamart. Currently access to Payroll/Personnel data and information requires multiple queries and access to multiple systems. PRISM intends to utilize a "datamart" concept to integrate pertinent information from existing payroll and personnel support systems and make that information available to FEMA management for planning, budget, and decision purposes via Management and Executive Information Systems (MIS and EIS) modules.

PRISM will store current and historical data on:

◗ Employees
◗ SF-52 transactions
◗ Time and attendance reporting

⬥ Accounting codes
⬥ Workforce management.

The PRISM datamart will be designed utilizing a relational data base approach with an interface to the National Finance Center (NFC) for employee, time and attendance, and financial payroll data and an interface to the Integrated Financial Management Information System (IFMIS) for allowed payroll change codes.

By taking full advantage of existing systems, the datamart concept leverages existing assets and avoids the construction of yet another "new information system." It will provide full access to all personnel and payroll related information via state-of-the-market relational data base technology, which supports both standard and ad hoc queries and "what if" scenarios. FEMA management, specifically, the Offices of Human Resources Management and Financial Management, with support from the Logistics Management Institute, have determined this to be the best and most cost-effective approach to improve the accuracy and timeliness of personnel and payroll data, while at the same time making enhanced human resources and financial information available to management.

Enterprise GIS Integration

This project is to develop agency-wide GIS requirements and to promote and implement an enterprise GIS solution for FEMA in accord with the *FEMA IT Architecture* and the Agency's mission.

In order to accomplish its chartered goal for a FEMA Enterprise GIS solution, the GIS working group is undertaking a process that will develop and document a requirements analysis, strategic plan, and implementation plan for a FEMA Enterprise GIS.

The following projects include initial known projects that are underway as well as placeholders for other expected projects. All of these projects will be included in the requirements analysis, strategic plan, and implementation plan process being conducted by the GIS Working Group. During this process and as enterprise requirements become clear, merging of and revisions and additions to these projects are expected. The projects include:

⬥ Mapping and Analysis Center (MAC) interactive mapping Web site
⬥ Federal Geographic Data Committee (FGDC) standards support
⬥ Mitigation Atlas/Clearinghouse
⬥ GIS Web support
⬥ Support for OpenGIS Consortia standards development
⬥ Identification and estimation of losses in hazard zones by hazard
⬥ Community Information System
⬥ GPS applications
⬥ Enterprise GIS Data Model
⬥ Enterprise GIS Architecture

◗ Interagency data access

◗ Standardization of the GIS capability in the Regional Operations Centers.

Critical Information Assurance/Protection

FEMA is required to implement Presidential Decision Directive (PDD) 63 for critical infrastructure protection. PDD 63 calls for a national effort to ensure the security of the increasingly vulnerable interconnected public and private infrastructure of the United States. All Federal agencies are required to undertake work necessary for strengthening the nation's defenses against unconventional threats to the United States, including terrorist attacks, attacks on our critical infrastructure, and cyber attacks. Work must be undertaken in the areas of critical infrastructure asset identification, risk management, critical infrastructure continuity and contingency planning, physical infrastructure protection, information systems security and information assurance, emergency preparedness, awareness training, and exercises and simlulations.

The Office of National Security Affairs and the Information Technology Services Directorate have recently identified several cyber protection requirements that need to be addressed in FY 2001 in order to enhance FEMA's Critical Infrastructure Protection. Vulnerability assessments are currently being conducted on the IT systems within the Agency. These efforts could identify new requirements for the Agency. In addition, the Operations Support Directorate has developed a FEMA-wide Security Systems Integration project that will also support the physical infrastructure protection of the Agency. This effort is planned to develop a state-of-the-art integrated security system.

Virtual Private Networks (VPNs)

FEMA's requirement to coordinate the activities of other Federal, State, and local governments during declared disasters could be greatly enhanced with VPNs. The potential for FEMA to connect to the digital network of both State and other Federal agencies through a VPN within the Region where the emergency is occurring provides the opportunity to provide dramatic improvements in disaster relief support for U.S. citizens.

Digitization of governmental activities offers new opportunities for efficiency of operations not achievable before. At the network level, VPNs providing high bandwidth capacity can be made with short notice. VPNs are scalable in terms of number of users such that real-time coordination within and across government agencies can be tailored to any situation with the implementation of technology and services that are commercially available today.

FEMA, recognizing the benefits of digitizing its network systems, has launched into an aggressive migration of its communications backbone to a solution based on Asynchronous Transfer Mode (ATM). Other Federal agencies have complementary networks. Conceptually, a digital ATM network allows FEMA to integrate its voice, video, and data traffic onto a single system that can be quickly reconfigured to meet the demands of a rapidly developing emergency situation.

The FEMA ATM network can be reconfigured as required by the Agency. The allocation of bandwidth can be increased during times of national crises for both sustainable and peak cell rates

for individual virtual circuits. This is a major advance for FEMA in terms of rapidly responding to a highly dynamic real-life national catastrophe. The capability of a VPN to increase specific virtual circuits allows for any part of the Agency to participate in the disaster relief operation, regardless of its geographic location.

Next Generation Emergency Operations Center – Web-Based Response and Recovery Information System

The Agency's disaster response and recovery efforts span a very broad set of locations (NIEOC, FOC, ROCs, MOCs, DFOs, and pre-disaster staging areas). The response efforts also include several varied and dynamic groups and teams (EST, ERT, ERT-A, ERT-N, CDRG, ROST, etc.).

To optimize the speed and efficiency of relief to disaster victims, there is an important requirement to develop the Next Generation Emergency Operations Center. Such a Center would leverage advancements in networking and communications, collaboration and visualization, and information dissemination. The Center would utilize the power of the Internet/World Wide Web to provide a virtual Information Source to support all Response and Recovery teams and groups in the gathering, posting, display, and reporting of critical information and data.

This project would partially accomplish its objectives through the procurement, configuration, and deployment of a commercially-available, totally Web-based enterprise software solution. The goal to be realized by this project is to provide a "virtual" environment for coordinating FEMA response and recovery activities (an environment accessible to any authorized Agency personnel from any location) without the need for locally-installed software, only a commercial Web browser.

Consistent with the Agency's mission of reducing loss of life and property and protecting our nation's critical infrastructure from all types of hazards, the Agency must utilize the best available technology to help disaster-affected victims. The first Web-based software system designed to support FEMA's uniquely-structured Incident Command System is now available on the leading technology platforms and architecture and is now available from the world's leading provider of emergency management information solutions.

The project would include EIDA re-design for a new location.

Intelligent Collaboration and Visualization Tools

This project includes a class of tools that support distributed operations and business functions requiring persons to interact with each other on documents and data sets. In general, these tools need to be integrated across the enterprise to gain seamless access to integrated systems and services. These tools facilitate collaboration and visualization of objects across the enterprise in an intelligent fashion. Through careful systems development and integration, these tools are able to access and use other systems and services such as the relational data base system, workflow processes, and text source tools. These tools typically support voice, video, and data applications; distributed planning; video tele-conferencing; and distributed interactive simulation. These tools are referred to in the *FEMA IT Architecture* within the "Groupware" architecture component.

These tools support operations and business functions such as (1) response and recovery where FEMA enterprise decision-makers are mutually sharing a digital map and comparing notes on objects that are geo-referenced on the map; (2) human services where an application has been filed and must be reviewed by a number of individuals who are distributed; (3) mitigation activity in sharing results of studies and analyses with distributed partners, the States, and Regions; and (4) training and exercise events.

Wireless Technologies

The *FEMA IT Architecture* calls for improved mobile and nomadic computing and communications (wireless) support for FEMA operations including:

◗ High-bandwidth deployable wireless communications in the field
◗ Increased us of existing networks
◗ Support for Personal Communications System (PCS) communications, messaging, and notification for the public and deployed FEMA Emergency Response Team (ERT) personnel
◗ Integration of Global Positioning System (GPS) with digital maps for inspections
◗ Increased utilization of wireless laptops and Personal Digital Assistants
◗ Improved support for digital photography and data transfer.

The project will provide a testbed for future integration of advanced mobile and nomadic computing and communications technology to meet emerging operational requirements. It will provide for:

◗ Technology transfer and insertion
◗ Improved mobile and nomadic connectivity with FEMA's business partners and state/local governments
◗ Improved response and recovery capability to the public.

Electronic Publishing

The primary objective is to develop one single central repository for all FEMA publications and forms. This storage device should serve as the single source for providing documents for printing, duplicating, print-on-demand, fax-on-demand, archiving, writing to other electronic media (disk etc.), Internet, depository libraries, Library of Congress, etc.

By establishing a single repository of all FEMA publications and forms, all of the above "users" can download publications and forms from one central source.

The objective would be to centralize electronic storage of all publications and forms. This would include maps and other documents, thus eliminating the duplication in effort and cost for developing multiple systems that perform the same function.

Another objective of electronic publishing pertains to FEMA's Headquarters In-house Print Shop. Over 99% of FEMA'S printing requirements are fulfilled by private contracts done through

the U.S. Government Printing Office. FEMA has a limited print-on-demand in-house printing facility set up at Headquarters to handle rush-priority-sensitive work.

The FEMA Print Shop has been upgraded over the last two years to a digital facility. The goal is to make this capability available to all FEMA Headquarters staff and the Regional Offices on an emergency basis.

Distance Learning – FEMA Virtual University

The FEMA Virtual University initiative is designed to provide training opportunities for employees at their locations (Headquarters, Regional Offices, Disaster Field Offices) through a distributed, computer-based, on-line system. The system will be designed to provide:

◗ Mandatory training, such as Equal Employment Opportunity (EEO), procurement, ethics, customer service, and other training, to all FEMA employees
◗ Effective training for employee positions, including training for disaster assignments
◗ Commercial off-the-shelf (COTS) training on a variety of subjects needed by employees
◗ Orientation and "just-in-time" training for new employees or employees serving in temporary assignments
◗ Complete records of employee training accounts including courses completed, additional training needed, and costs.

While some training may still require a traditional classroom setting, many (if not most) of the courses can be deployed using this system. Employees will be able to complete training courses at their locations, and at their own pace, saving travel costs and causing little disruption to workloads. The system also will facilitate using courses offered by other organizations. The system will include capabilities for text-based courses, such as Independent Study Courses, as well as video-based courses and instructor-led or mediated activities.

Other components in out-years will be an emergency management on-line library of key publications and research documents, a videotape library, and Learning Centers in each of the Regions where students can gain a variety of multi-media training systems.

Exercise Planning, Execution, and Analysis

Planning, conducting, and evaluating exercises is manpower intensive. An opportunity exists to automate the processes for exercise support to achieve efficiencies across the enterprise. The scope of this project is to develop an automated exercise planning, execution, and evaluation capability.

The *FEMA IT Architecture* indicated that a potential candidate for future enterprise-wide functionality to be incorporated in NEMIS could be an Exercise and Training Module. Such a module would include Response and Recovery functionality and would simulate emergencies in a virtual environment. The module would support distributed exercise planning, scenario development, operations, placement and movement of resources on maps, and post-exercise evaluations.

The automated exercise process could potentially be linked to a digital library and archive for information dissemination purposes.

Integrated Safety Management System

The system will comprise six safety modules that will enhance data efficiency, produce trends and analysis reports, incorporate risk management methodologies, track accidents and hazard incidents, compile training requirements, track inspection abatement schedules, and serve as an archive data base. The six modules are:

1. **Training Requirements Program.** The module will maintain a data base of all safety training required and provided to FEMA personnel. The system will contain a data base of safety training presentations/programs available to OSH personnel to present at DFOs, DRCs, and fixed facility sites. The training programs will include video capability, computer based training (CBT), and electronic media.

2. **MSDS.** A data base containing commonly used Material Safety Data Sheets (MSDSs).

3. **Vaccination Tracking Program.** This module will track all vaccinations given to FEMA personnel.

4. **Inspection Abatement Program.** This program provides the safety professional with the capability of tracking and scheduling inspections, entering violations/deficiencies identified during an inspection, assigning RAC, and monitoring abatement status.

5. **Safety Archive Program.** This module will provide the safety professional with the capability to query a data base to retrieve archived records of inspections, evacuation plans, etc., of previously used DFOs and DRCs.

6. **Safety Intra-Communication Program.** The program will provide the capability of safety professionals (DAE Cadre) to communicate within the FEMA safety arena whether activated for a deployment or at home/work. The program will enhance communications, improve efficiency and productivity of the cadre, and provide real time access which is essential during a major disaster deployment.

This system will assist in meeting Federal (OSHA, 29 CFR 1910 and 1960), State, and local regulations that require the employer to provide a safe and healthful workplace environment for employees.

Advanced Call Center/Integrated Voice Response

FEMA's mission is to reduce the loss of life and property and to protect our institutions from all hazards. This requires a robust communications capability that can operate and support the mission during day-to-day activity, as well as in emergency situations where disaster victims are in need of reporting and accessing information in an efficient manner. The implementation of advanced call center technology supports this requirement by providing access to important information on an around the clock basis. It also frees up customer service representatives to deal with exceptional issues while allowing routine registration calls and inquiries to be handled in an

automated manner. The dial-out capability provided through this initiative will automate disaster deployments by allowing FEMA staff to concentrate on other more complex issues and resulting in a quicker deployments. The management and provision of efficient communications services following a disaster are critical elements of FEMA's mission.

Use of advanced call center technology provides several significant advantages over non-automated systems and reliance on live attendants. Advantages such as accurate and efficient call routing by the use of interactive call response (IVR) technology and more efficient call resolution via automated attendants and data base interaction via computer telephony integration (CTI) are among the most desirable features.

Reduced Staff Time. One of the most critical advantages provided by an interactive voice response (IVR) system is that it allows callers to perform a self-service interaction with the system. This interaction is by speech recognition as well as keypad input. The IVR system compares the caller's input to internal data base information and determines the proper call routing. The system provides the capability of providing the caller with an automated verbal status report based on the caller's data base file. This alone should provide substantial savings in staff time to all centers. These savings will be especially beneficial to the disaster response centers.

Reduced Staff Cost. An IVR system provides the capability of providing the caller with an automated verbal status report based on the caller's data base file. This typical inquiry currently requires a live agent to handle. Automating this will result in substantial savings in staff time which equates to recruiting, training, and payroll savings to all centers.

Improved Customer Service. Advanced call center technology improves customer service numerous ways. Among the most notable improvements are more accurate routing of calls, faster call resolution, fewer transfers, rapid access to status inquiries, fewer busy signals, fewer calls placed on hold, and reduced instances of having to repeat information in order to receive desired information. In addition, methods of access are increased by unified messaging which includes fax, Internet access, e-mail, and chat capability.

Increased Agent Efficiency. Linking the computer and the telephone through a technology known as CTI provides enhanced features, such as "screen pops." Screen pops display the caller's personal information on the agent's screen at the same time the call is routed to the agent. This saves agent time and increases efficiency as it allows the agent to know the name and other relevant information about the caller as soon as the call is transferred. It also reduces call time by reducing the number of questions the agent has to ask of the caller. Additionally, the caller receives better customer service by not being asked the same question numerous times.

The principal strategy for procuring this technology and related services is to utilize the very low competitive rates available through the General Services Administration (GSA) Schedules.

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