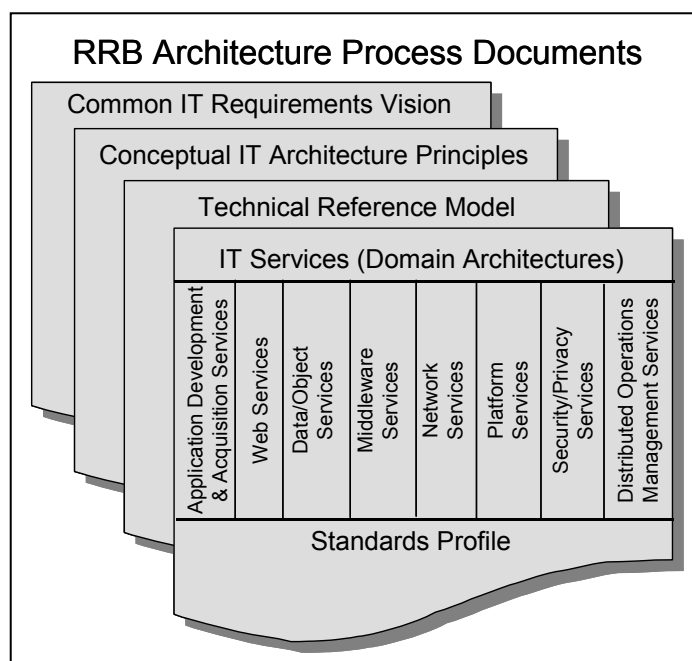




U. S. Railroad Retirement Board TECHNICAL REFERENCE MODEL

1. Introduction

The Technical Reference Model (TRM) is an integral component of an Information Technology Enterprise Architecture and is required, by the Office of Management and Budget (OMB), as part of a Federal ITA (OMB M-97-16). The purpose of the TRM is to provide a conceptual framework or context to define a common technical vocabulary so that the Railroad Retirement Board (RRB) can better coordinate acquisition, development, and support of RRB's information systems.



The TRM provides a taxonomy for identifying a discrete set of conceptual layers, entities, interfaces and diagrams that provides for the specification of standards. The TRM is rooted in the concept of an open systems environment and through its application supports portable, scalable, and interoperable applications through standard services, interfaces, data formats, and protocols. The technical reference model establishes a framework for the identification of information services and standards. The OMB Memorandum of June 1997, concerning IT architectures calls for a technical reference model and a profile of standards.

"The Technical Reference Model identifies and describes the information services used throughout the agency.... The standards profile defines a set of IT standards that supports the services articulated in the Technical Reference Model; they are the cornerstone of interoperability... Together with the Technical Reference Model, the Standards Profile enables the development and acquisition of standardized systems to cost effectively meet the business needs of the agency."

The Railroad Retirement Board has adopted the technical reference model presented below. The model features eight Enterprise Architecture service (domain) areas in which to categorize standards. The eight service areas are:

- Application Development and Acquisition Services
- Data/Object Management Services
- Middleware Services
- Network Services
- Platform Services
- Web Services
- Security/Privacy Services
- Distributed Operations Management Services

TRM Components

Any technical reference model has two main components:

- a *Taxonomy*, which defines terminology, and provides a coherent description of the components and conceptual structure of an information system,
- an associated *Technical Reference Model graphic*, which provides a visual representation of the taxonomy, as an aid to understanding.

The objective of the Technical Reference Model is to provide a core taxonomy and an appropriate visual representation of that taxonomy.

Standards Profile

Based upon the Technical Reference Model core taxonomy a Standards Profile is developed. The Standards Profile is a database of facts and guidance about information systems standards. The standards to which it refers come from many sources: from formal standards bodies such as ISO or IEEE; from authoritative consortia, like the World Wide Web Consortium and the Object Management Group; and, from internal sources such as the RRB's Standards Review Committee.

The Standards Profile has three main uses:

- **Architecture development:** It provides a valuable source of information about standards that are used to populate the architecture.
- **Acquisition / Procurement:** In planning a procurement (whether or not based on an architecture) it can help ensure that the procurement gives a clear statement of technical requirements, with an assurance of conformance.
- **General information:** Finally, it can simply be a source of information about relevant IT standards, for use by anyone at any time.

The RRB standards profile is contained in the detailed architectural documents describing each domain service area.

2. Technical Reference Model

The RRB *Technical Reference Model* (TRM) allows designers, developers, and users to agree on definitions, have a common understanding of the services to be provided, and identify and resolve issues affecting interoperability, portability, and scalability. The TRM defines the service areas for which architecture standards have been derived. The service areas correspond to the domains in the technical architecture. The domains represent related groups of technologies for which the Bureau of Information Services (BIS) provides support and services to the user community to support the goals and functions of the agency. The technical standards identified for each area are documented in the Standards Profile. Figure 1 displays RRB's eight service areas. Also shown are the specialized services offered within each service area.

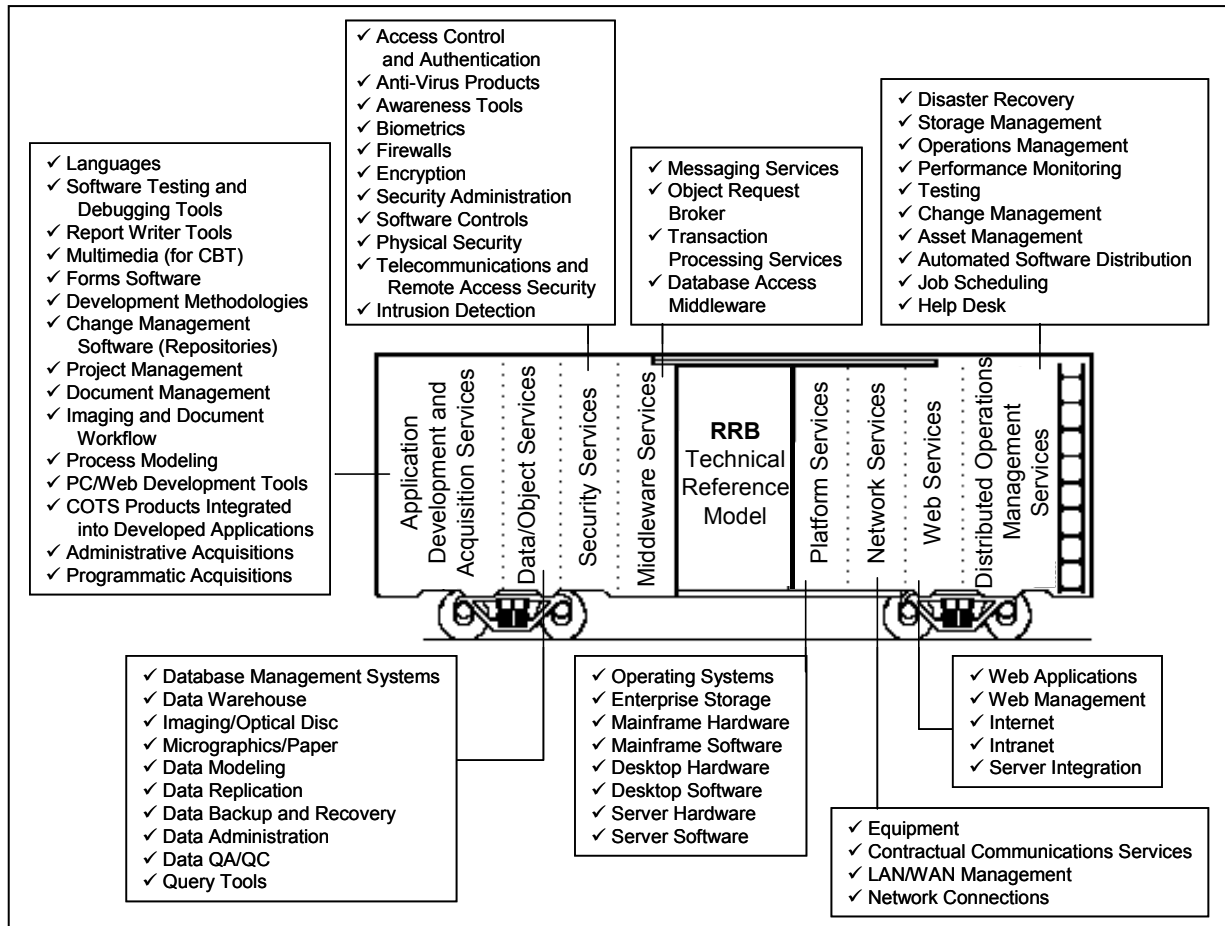


Figure 1. RRB Technical Reference Model

The *Technical Reference Model* describes the following services:

1. **Application Development and Acquisition Services** provide consistency, structure and accountability in the acquisition, design, development and interaction of applications. It enables a high level of system integration, reuse of components, rapid deployment of applications and high responsiveness to changing business requirements. Service is provided in the following areas:

- *Software Development Testing and Debugging Services*. Provide aid in programming, debugging and testing of software and applications
- *Multimedia Services*. Provide aid with computer systems that integrate audio, video and data.
- *Forms Software Services*. Provide aid in the development of forms and reports.
- *Development Methodology Services*. Provide aid in software development methodology such as methods, notations and tools.
- *Project Management Services*. Provide aid in tracking and managing projects throughout the SDLC
- *Report Writers Services*. Provide services that assist in producing reports with minimal programming
- *Change Management Software Services*. Provide services that are used to identify, organize and manage changes to software built by programmers
- *Document Publishing Services*. Provide services for electronically storing and publishing documents
- *Imaging and Document Workflow Services*. Provide services that enable digital images and computer output to be stored, organized and routed into the workflow
- *PC/Web Development*. Provide aid in the development of PC and Web based applications
- *Commercial Off the Shelf (COTS) Product Services*. Provide aid in integrating COTS products into developed applications

2. **Data/Object Services** enable the mechanics for managing, securing, designing, defining and maintaining the integrity of the data and objects without regard to platform. It addresses the need for high-quality, consistent data and objects in support of the business functions of the RRB. Services are provided in the following areas:

- *Query Tool Services*. Provide aid for queries and reporting of data.

- *Data Base Management Systems Services.* Provide aid in managing data for multiple users ensuring data integrity and security.
 - *Data Warehouse Services.* Provide aid in supporting database decision-making.
 - *Imaging/Optical Disk Services.* Provide aid to store, search, retrieve, manipulate, display and print digital representations, i.e. 'images', of objects by computers.
 - *Micrographics/Paper Services.* Provide aid in storing and accessing using storage media that is historical and inaccessible electronically.
 - *Data Modeling.* Provide aid to assist in creating models to analyze information needs and transform them into database solutions
 - *Data Replication Services.* Provide aid in efficiently copying DBMS data and managing the distribution of the copies.
 - *Data Backup and Recovery Services.* Provide aid for business resumption needs.
 - *Data Administration Services.* Provide aid for the definition and support of an enterprise-wide data architecture.
 - *Data Quality Assurance/Quality Control Services.* Provide aid to enhance data reliability and consistency.
3. **Distributed Operations Management Services** provide the structure and procedures to manage and support RRB automated business systems. IT provided for the monitoring, control, tracking and auditing of all technologies to ensure better performance and consistent delivery of service. Services are provided in the following areas:
- *Storage Management Services.* Provide for the management of the various storage devices, software, and tools that are used to control data storage.
 - *Disaster Recovery Services.* Provide for the technologies and processes to recreate all critical business systems in a production environment at an offsite location in the event that our infrastructure is unusable.
 - *Operations Management Services.* Provide for the management of the operations that are involved in running the production environment. This includes managing the technologies, tools, and processes to identify, control, and correct abnormal events. This also includes managing the tools to document procedures, program and device interactions, problem resolution, job scheduling information, etc. for installations and deployments.
 - *Performance Monitoring Services.* Provide for performance monitoring that includes measuring, tracking, and analyzing system performance for use in forecasting purchases, upgrades, maintenance to ensure the efficient use of components in the RRB IT environment.

- *Testing Services.* Provide for the testing and methods to ensure that all software and hardware products satisfy requirements, perform without error and are compatible with existing software and hardware before they are placed in the production environment.
 - *Change Management Services.* Provide for the management of changes to software and hardware by identifying, organizing and managing all changes.
 - *Asset Management Services.* Provide for the tools and processes to account for all software, hardware, and all other equipment used at the RRB.
 - *Automated Software Distribution Services.* Provide for processes, tools, and technologies to ensure consistent deployment of software to all end-users.
 - *Job Scheduling Services.* Provide for the scheduling of production jobs by planning, controlling and executing processes in a sequential order defined by business needs.
 - *Help Desk Services.* Provide for the capability to quickly track and resolve IT problems, and identify trends which enable proactive identification and mitigation of problems.
4. **Middleware Services** provide support for communications between the functional tiers of an application, between two or more different applications, and between application and shared services.
- *Messaging Services.* Provide services to use message passing and queuing to provide peer-to-peer asynchronous communication between programs.
 - *Object Request Broker (ORB).* Facilitate or broker, communication between client processes and server objects. Server objects are server processes and data that has been encapsulated in an object.
 - *Transaction Processing Services.* Provide for processing files as they are received by the computer. Master files are updated as soon as transactions are entered at terminals or received over communications lines. It also implies that confirmations are returned to the sender.
 - *Database Access Middleware.* Provide services for software that is part of the operating system or network control programs that perform storing/retrieving or transmitting/receiving of data. It also includes responsibility for detecting bad transfers of data caused by hardware or network malfunctions and providing for corrections, if possible.

5. **Network Services** provide a consistent, scalable and reliable approach to the reliable transmission of data across various platforms for the use of employees, business partners, and customers. Services are provided in the following areas.
- *Equipment Services.* Provide services to direct network traffic and connect the various components of the platforms and other networks.
 - *Contractual Communication Services.* Provide for communications services provided by private organizations allowing the RRB to extend its network beyond the headquarters facility.
 - *LAN/WAN Management.* Provide network management control facility/utility that allows the access and egress of data and voice communications.
 - *Network Connections.* Provide services for the wireless, fiber, and copper communications connection.
6. **Platform Services** provide for the physical technical infrastructure, services, and guidelines to meet the business requirements of the user community. Services are provided in the following areas.
- *Operating Systems.* Provide for the installation and maintenance of software dedicated to a specific hardware platform. It manages resources, devices, and other services
 - *Enterprise Storage.* Provide for storage devices that serve multiple platforms
 - *Mainframe Hardware Services.* Provide for the physical components and peripheral devices designed to process large-scale transactions in a multi-processing environment in both batch and on-line modes handling many enterprise-wide users.
 - *Mainframe Software Services.* Provide for the acquisition, installation or maintenance of software designed to run on mainframe hardware.
 - *Desktop Hardware Services.* Provide for the physical components, internal and peripheral devices that comprise a desktop or mobile system.
 - *Desktop Software Services.* Provide for the applications required by all users and developers to run a desktop. This does not include any applications specific to an application or unit within the organization.
 - *Server Hardware Service.* Provide for the physical components and peripheral devices designed to process transactions in a multi-processing environment in both batch and on-line modes handling many enterprise-wide users.
 - *Server Software.* Provide for the acquisition, installation, or maintenance for software that runs on server technology.

7. **Security/Privacy Services** are necessary to protect the availability, confidentiality, and integrity of all information resources created, received, provided and maintained by the RRB. Services are provide in the following areas:
- *Access Control and Authentication Services.* Provide for control of who accesses the mainframe and server systems.
 - *Anti-Virus Services.* Provide for the prevention, detection of and response to electronic viruses designed to infiltrate PC based computers and programs.
 - *Intrusion Detection Services.* Provide for the prevention of unwanted access and/or attacks by non-RRB authorized users.
 - *Telecommunication and Remote Access Security Services.* Provide for the protection of the communications link from headquarters to remote locations and from remote locations and headquarters.
8. **Web Services** provides for the development, integration, maintenance, submission, and disclosure of information through Internet, intranet and extranet where practical. Services are provided in the following areas.
- *Web Application Services.* Provide for workflow solutions, web E-Government applications, and integration to Intranet and Extranet solutions.
 - *Internet Services.* Provide for Internet as a technology implementation option, information publishing, and personalized information access.
 - *Intranet Services.* Provide for the deployment via internal web servers of information, services, and applications for the use of RRB personnel.
 - *Web Management Services.* Provide for the overall administration of Internet, Intranet, and Extranet sites. Managing presentation guidelines for the agency's web pages, operating rules and guidelines, and adherence to applicable laws and regulations.
 - *Web Application Development.* Provide for team formation and processes, multi-tier development strategy, and overall development methodology.
 - *Server Integration Services.* Provide for distributed processing and the use of middleware products to provide access to necessary data.