
Part II — Information Architecture

Chapter 1 — Information Architecture Introduction

Introduction

Part I provided an overview of the Medicaid IT Architecture (MITA) Business Architecture (BA). This section provides an overview of the MITA Information Architecture (IA) Framework. The MITA IA identifies the major types of information needed to support the business functions. It identifies and defines the information models, metadata repositories, and their relationships to the business functions and to both the business and technical services (described in Part III Chapters 4 and 6, respectively).

The MITA IA will provide a good understanding of the information and data assets of a Medicaid enterprise, so that it can be managed more efficiently. It will also enable the identification of processes needed to manage that data.

The MITA IA has been developed to enable the characterization of Medicaid enterprise information at different levels of abstraction.

This chapter answers the following questions:

- What is the MITA Information Architecture?
- How will the MITA Information Architecture be developed?
- What are the components of the MITA Information Architecture?
- How do States use the MITA Information Architecture?
- How do States participate in developing the MITA Information Architecture?

Purpose

The MITA IA describes a logical architecture for the Medicaid enterprise. The primary objectives of an IA are as follows:

- Align information requirements with Medicaid enterprise vision and direction
- Improve system effectiveness
- Facilitate growth and innovation
- Lower overall life-cycle costs
- Enable interoperability and data sharing

The MITA IA provides a description of the information strategy, architecture, and data to a sufficient level that States can use it to define the data needs that will enable the future business processes of their Medicaid enterprise.

Scope

This section provides an overview of the key features and benefits of the MITA IA in order to provide background for the remaining sections.

The MITA IA is technology-, organization-, and location-neutral. MITA does not address these aspects of the implementation, because they are the responsibility of each State. It is extremely important that each State have the flexibility to address the technology, organization, and location aspects for its specific implementation

The MITA IA includes mechanisms to extend MITA so as to accommodate individual State needs when a common approach is insufficient.

It is imperative that the BA and IA be considered together. The two architectures are connected and aligned through a set of information system requirements that are derived from the BA and fulfilled by the IA. They are meant to be different views of the integrated enterprise architecture, not truly separate architectures.

Just as the BA's business model has subgroupings of business processes called *business areas*, the IA's models have subgroupings of information/data called *subject areas*. The generic term that MITA uses to describe a business area or subject area is *domain*. These subgroupings allow a portion of the model to be viewed as a whole or the entire model to be viewed at an overview level, thereby eliminating some complexity involved in understanding a large model. Within the BA and IA, all domains must be aligned (e.g., the Provider Management business area needs to be aligned with the Provider subject area in the information model). Each domain must support the others, and domains must be properly aligned at each major system deployment to minimize redundancy and overlap. Given the transformation potential of IT, it is important to view the domains as interdependent. MITA embraces this principle.

Thus, the system architects are responsible for first understanding the BA and then creating and maintaining the IA in alignment with the BA. Solution architects, who are guided by the information and technical architectural methodologies, work with the business and system architects to maintain this alignment throughout the projects. This cooperation continues through full deployment and ongoing operations.

Finally, the architectural design for both the business and the information must continually be reviewed and refined as the enterprise changes.

What Is the MITA Information Architecture?

The MITA IA is a consolidation of principles, models, and guidelines that form a template for the States to use to develop their own enterprise IA. Examples of principles include interoperability, data sharing, data quality, data integrity, data standards, and data semantics.

These principles will be discussed in more detail in the Part II Chapter 2, Data Management Strategy, and in the methodology sections of the Conceptual and Logical Data Model chapters (Part II Chapters 3 and 4, respectively). Several data models are used to shape the MITA Framework because of the complexity of the Medicaid enterprise. Data models used to illustrate MITA include the Subject Area Model, Conceptual Data Model (CDM), Conceptual-Flow Diagram, and Logical Data Model (LDM). Within the enterprise IA, MITA provides guidelines to promote the alignment of a State's information and data with Medicaid business needs and the information and data needs of other States.

Future Medicaid enterprises will require a rigorous, methodical approach to IA development because of interoperability requirements and the use of electronic health records. MITA supports this trend by providing an architecture or guideline that offers a common reference point for each State to leverage when building its own enterprise architecture, which will be useful for defining and implementing its IT projects. The MITA IA provides the overall guidance to support States individually while maintaining the standards needed for interoperability.

How Will the MITA Information Architecture Be Developed?

The MITA IA is driven by the BA's Business Process Model (BPM). Because of the importance of successful data sharing, the MITA IA focuses on identifying the data elements needed by the MITA end-to-end business processes so that standards can be identified to enable successful sharing across enterprises. The following data models are included in the MITA IA:

- Conceptual Data Model
- Logical Data Model

The As-Is and To-Be CDMs are constructed using the identified subject areas. Next, as the data needed by end-to-end business processes and their business capabilities is defined in detail, the MITA As-Is and To-Be CDMs are detailed into LDMs using the breakdown of subject areas into classes and their attributes. Relationships are modeled using entity relationships and class diagrams. The LDM development is an ongoing process and will continue to be refined as end-to-end business processes are developed.

Completing the MITA IA requires the definition of data services and data management patterns. Data services are derived from the MITA LDM by partitioning the LDM into future-state logical databases and utilities to perform operations on the databases such as reading, writing, updating, and deleting. Data management patterns identify the patterns in the Medicaid enterprise for the exchange and sharing of Medicaid information. Identifying the patterns allows the development of optimal data governance procedures, data architecture, and data-sharing architecture for the Medicaid enterprise.

The methodology employed to define the MITA IA has been tailored from several industry-accepted models: the Zachman Framework, the Federal Enterprise Architecture (FEA) Reference Models, the *National Association of State Chief Information Officers (NASCIO) Architecture*

Handbook, and other proprietary methodologies. State CDMs and LDMs were used along with the HL7 Reference Information Model (RIM) to develop the As-Is MITA CDM and LDM. These models were then expanded to cover the To-Be data models. This expansion was purely business-driven based on new business processes and capabilities. The final result of this effort is a series of data models and supporting processes optimized for MITA.

What Are the Components of the MITA Information Architecture?

Together with the BA, the IA maps enterprise data to business processes. MITA's IA comprises four components:

- Data Management Strategy (DMS)
- Conceptual Data Model
- Logical Data Model
- Data Standards Table (DST)

These are living models that will evolve throughout the MITA life cycle. The level of detail in each will be tailored to meet the specific needs of the intended audience. **Figure 1-1** provides an overview of the components of the MITA IA. Each of these components will be described in detail in Chapters 2 through 5.

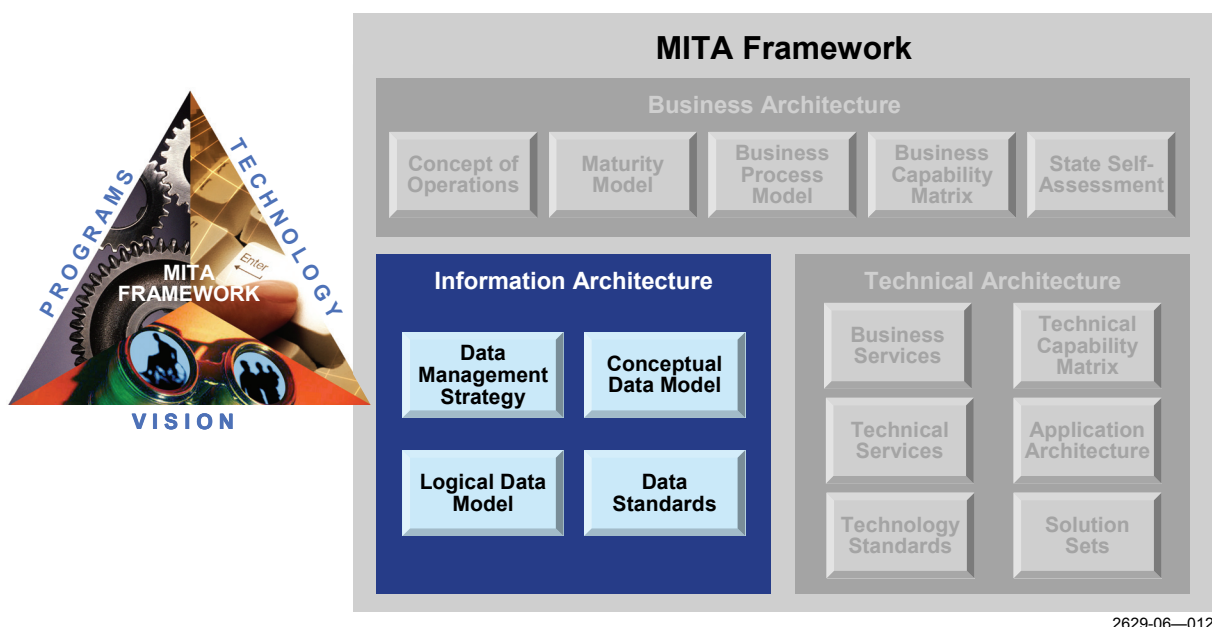


Figure 1-1. Information Architecture in the Context of the MITA Framework

The MITA IA describes the current and future (i.e., near-term and long-term) information and data needs of a State Medicaid enterprise. Through a series of models, the IA specifies the key

elements of information systems used by Medicaid enterprises to execute their business processes. These elements include the principles, the goals, the access strategies, the information itself, the applications that use the information to enable the business processes, and the ways that applications and information together support the enterprise's business functions.

The following is a brief overview of the four components that compose the MITA IA.

Data Management Strategy

The DMS provides a structure that facilitates the development of information/data that can be effectively shared across a State's Medicaid enterprise boundaries to improve mission performance. It also provides an impetus for State Medicaid agencies to better understand their data and how it fits in the total realm of Medicaid information. The DMS addresses fundamental areas necessary to enable information sharing opportunities and to position State Medicaid agencies to operate in an environment of global information. (Part II Chapter 2 discusses the MITA DMS in greater detail.)

Conceptual Data Model

The CDM shows the MITA subject areas that are common to the States and the relationships of these common subject areas. A CDM represents the overall logical structure of the data, which is independent of any software or data storage structure, and provides a formal representation of the data needed to run the Medicaid enterprise or business process. It may contain data objects not yet implemented (e.g., To-Be objects and relationships). The CDM contains the principal entities and relationships required by the Medicaid enterprise. It is used primarily as a communication tool between the business user and IT architect to obtain agreement on the scope and relationships of the data and to facilitate the identification of subject areas. (Part II Chapter 3 discusses the MITA CDM in greater detail.)

Logical Data Model

The LDM shows data subject areas broken down into the data classes and attributes needed for every drilled-down business process, as well as the relationships between these subject areas. The LDM identifies all of the data elements that are in motion in the system or shared within the Medicaid enterprise. The MITA LDM does not include State-specific data objects and relationships. Rather, States will complete the LDM to include State-unique entities and relationships and detailed attributes. States will also be responsible for deriving a physical model from their LDM. (Part II Chapter 4 discusses the MITA LDM in greater detail.)

The MITA CDM, together with the MITA LDM, make up the Medicaid Enterprise Data Model Layer.

Data Standards Table

The DST identifies the applicable standard for each MITA data element. The MITA DST is a collection of standards applicable to the administration and operation of Medicaid enterprise data. Each standard is defined by the following attributes:

- Title
- Category
- Objective
- Source (i.e., standards body)
- Type
- Versions and status
- Applicability
- References
- Relationships to other standards
- Key terms

The standards are identified in associated standards templates and will relate to the key design aspects and concepts that are defined in the MITA Framework. (Part II Chapter 5 discusses MITA's data standards in greater detail.)

How Do States Use the MITA Information Architecture?

The MITA IA provides a conceptual and logical view of all of the data commonly used throughout a Medicaid enterprise. It describes the integrated information requirements of the State Medicaid enterprises using general data objects and relationships. It is the primary tool for strategic planning, communicating information requirements throughout the organization, implementing integrated systems, and providing an integrated information strategy.

The Medicaid enterprise data model layer is the pivotal layer of the IA, as it connects reusable business concepts to application-level views of enterprise data through generalized content. It is being built incrementally through the conceptual and logical design of individual processes and services.

States will build Logical Application Data Models to provide application-specific details using the MITA data models (including state-specific adaptations and extensions). Application data models are built at the logical and physical abstraction levels and reuse data objects defined at the enterprise level. This ensures that application models will have common keys, attributes, and definitions throughout the enterprise data architecture. A single entity in the MITA data model can be represented in multiple application-specific models with attribute variations based on business need (i.e., rules) or as subtypes of more generic enterprise entities. Data consistency and reuse are supported through the single entity in the MITA data model.

MITA IA provides States with guidance on selecting a data strategy that will meet national standards for data sharing and interoperability. The IA will also enable States to use common strategies (e.g., data hubs) when designing Medicaid information solutions.

How Do States Participate in Developing the MITA Information Architecture?

States participate in MITA by adopting and promoting the key features of the IA throughout their entire organization. By integrating the features of the MITA IA with State processes and products for IT design, development, acquisition, and funding, States will conform to a clearly defined pathway for the future of the Medicaid program.

To ensure that MITA meets the ongoing and changing needs of the State Medicaid participants, States can help shape the future (see **Figure 1-2**) by joining in efforts to refine the MITA IA and models. States can take a proactive role by collaborating on joint projects to develop and implement shareable, reusable IT components and data access processes. States can also work in Office of the National Coordinator for Health Information Technology (ONCHIT) projects and within standards development organizations (SDOs) and the National Medicaid Electronic Data Interchange (EDI) Health Insurance Portability and Accountability Act (HIPAA) Workgroup (NMEH).



Figure 1-2. Shape the Future

The Centers for Medicare & Medicaid Services (CMS) recognizes that different States have differing needs and are likely to begin adopting components of the MITA IA from different starting points. The MITA IA can accommodate an implementation path best suited to each State's individual situation. For instance, when implementing the MITA IA, States will choose the IA components that align with the business processes chosen for MITA upgrade and are reflected in their Advance Planning Documents (APDs).

How Will This Affect the States?

The MITA IA will change the way States design, build, change, and modify their Medicaid systems and the manner in which States perform IT investment planning. In the future, States will need to ensure that their business goals and objectives meet the MITA goals and objectives in the areas of business process, information management, and technology. State participation in

the ongoing refinement of the MITA IA will continue the process of shaping the Medicaid systems of the future.

Conclusion

The MITA IA helps to ensure that technology decisions align with Medicaid business needs and achieve business goals. With participation by States, partners, and other stakeholders, the MITA Framework will be refined and become more specific over time. State Medicaid enterprises will evolve to optimize adaptability, flexibility, interoperability, and data sharing. This evolution will enable major improvements in policy and decision making, as well as day-to-day operations.