
Part III — Technical Architecture

Chapter 4 — Business Services

Introduction

This chapter provides a discussion of the Medicaid IT Architecture (MITA) Business Service. The MITA Business Service provides the guidance and specifics to an IT staff (e.g., States or vendors) on how to implement a MITA business process.

A service-oriented architecture (SOA) using MITA Business and Technical Services solves the existing Medicaid Management Information System (MMIS) legacy problems of creating a custom framework and vendor lock-in. It enables a State Medicaid organization to use multiple vendors to supply and support the MITA Framework. Business Services developed under the MITA Framework will have a much larger support base and, as such, will probably be worked out and debugged to a greater degree than single-use applications. By using the MITA Framework, it will be practical to purchase prebuilt business services in the open market or, in the case of State-developed systems, share Business Service implementations. Prebuilt business services can be used As-Is or enhanced using standard object-oriented techniques to vastly leverage development. Organizations can also purchase a wide variety of tools to help use and build applications in the MITA Framework, including design and implementation tools, data analysis tools, languages, libraries, and utilities. The use of standard Business Services will also leverage training. Development organizations will be better able to find employees and consultants who already understand how the business system operates.

The principal potential disadvantage to the MITA Framework may be flexibility. The Framework may not do exactly what is required in very special conditions. However, the SOA paradigm will help in these situations as well because the MITA Framework and individual Business Services (in fact, all services in the architecture) can all be extended or adapted. In short, the MITA Framework and associated Business Services will foster a marketplace in Medicaid Business Services that will benefit all States and vendors.

This chapter answers the following questions:

- What is a MITA Business Service?
- What are the parts of a MITA Business Service?
- How is a MITA Business Service developed?
- What is the MITA Business Service flow?
- How do States use MITA Business Services?
- How do States participate in developing MITA Business Services?

Purpose

The MITA Framework has two categories of services: Business Services and Technical Services. Business Services provide business functionality to the enterprise and are derived from the Medicaid Business Process Model (BPM), as described in Part I Chapter 4, and the MITA Business Capability Matrix (BCM), as described in Part I Chapter 5. Technical Services provide underlying technical functionality (e.g., forms management, security, etc.) and are discussed in Part III Chapter 6.

A MITA Business Service defines a standard interface and functionality for a business process that will align the common factors of a State's implementation with the MITA enterprise definition. A MITA Business Service allows two things:

- **Plug-and-Play.** With plug-and-play, an individual service can be replaced with a new implementation without affecting the rest of the enterprise. For example, an enterprise can replace a service that is currently a wrapped COBOL application with a commercial off-the-shelf (COTS) product or J2EE C++ program without changing any of the external interfaces.
- **Interoperability.** With interoperability, a system can change an external user of a service (e.g., delete, add, or modify external services or clients) without changing the service itself. For example, a new service could be an application or a client added to the enterprise that takes as input the output from an existing service.

Scope

Independence is an important characteristic of a Business Service. An independent service can be easily replaced by a different service, provided the new service meets the needs of the user. Services are also location independent, because, in today's IT environment, a service does not have to be collocated with the users of that service.

Details of exactly how the service is performed must be documented so that other computers can read and interpret them. The documentation includes the functions that are included in the service (e.g., what is the expected output, what error checking will occur to ensure accuracy of the output, etc.) and describes how to obtain the service and how other computers request the service. Because computers cannot "complain" if the service is not satisfactory, documentation must include precise information about possible unsatisfactory conditions (i.e., errors) and how each should be handled.

Definition methods for a MITA service:

- Interfaces are defined in Web Service Definition Language (WSDL).
- Messages are defined in XML Schema.
- Business logic, which is currently freeform text, will become business rules in the future.
- Service management (i.e., orchestration) is defined in Web Services-Business Process Execution Language (WS-BPEL).

A MITA Business Service is implementation-neutral. It does not specify platform, binding protocols, programming models, operating systems, underlying infrastructure technologies, or other implementation details used to execute the Business Service.

Various implementations of a single MITA Business Service look identical on the outside:

- Same input (both interface and messages)
- Same output (both interface and messages)
- Same behavior

However, inside (i.e., “under the hood”) they can be very different. As shown in **Figure 4-1**, a Business Service can be all custom code, a COTS product, wrapped legacy code, a combination of the above, or a composite of other services. This opaqueness is what enables plug-and-play of the Business Services.

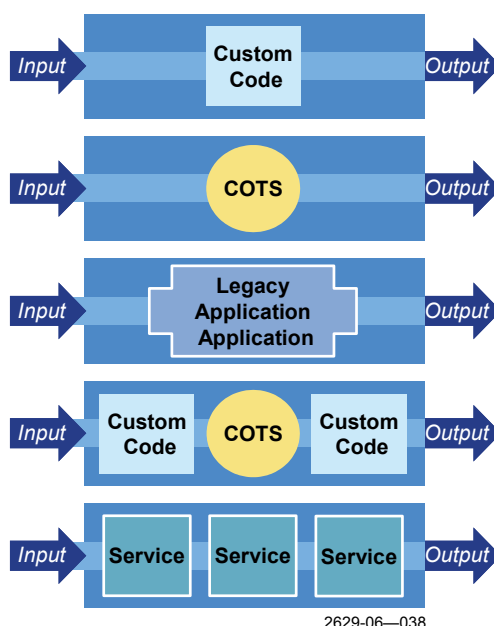


Figure 4-1. Example Service Conceptual Implementation Methods

MITA Framework 2.0 includes coarse-grain Business Services. These coarse-grain services provide the functionality of individual Medicaid business processes. As described in Part I Chapter 4, these processes provide access to functionality (e.g., Enroll Member) or shared data (e.g., access to member registry). These MITA Business Services define what services are needed by a Medicaid enterprise to implement the required business processes. The goal of MITA Framework 2.0 is to specify services that allow interoperable Medicaid business processes. MITA Framework 2.0 does not address the sub-Business Services (i.e., fine-grain

Business Services) used to build a MITA Business Service, and it does not attempt to maximize the reuse of software components. These will be covered in future versions of the MITA Framework.

Individual services and messages are woven together using an orchestration process, which is defined in Part III Chapter 7, Application Architecture.

What Is a MITA Business Service?

A Business Service is a piece of software that implements a business process at a specific capability level. It has a defined interface for its invocation, performs a defined function that corresponds to the capability, and returns defined results.

Unlike business processes and capabilities, which may have multiple levels of capability, a Business Service has only one state.

A Business Service is the basic element in an SOA. One goal of an SOA is to provide services that have a concrete meaning on the business level. A service is a software element that provides a complete business process or function. Once the MITA business processes have been identified, the next step is to develop the MITA Business Service. As part of the development of the business process, an entry in the BCM is developed for each process. (For a more detailed discussion of the MITA business processes and BCM, see the relevant chapters [Part I Chapter 4, Business Process Model, and Part I Chapter 5, Business Capability Matrix, respectively].) A single Business Service will be developed for each non-Level 1 (and optionally Level 2) business-processes capability. This relationship is illustrated in **Figure 4-2**, which shows that one MITA Business Service is defined per business process per capability.

MITA defines a logical representation that all States and vendors may use as part of their Medicaid architecture. The Business Services are coarse-grained decompositions of Medicaid business processes. In addition to being coarse grained, the service specifications are designed to be opaque (i.e., black box). All implementation details are private to a service. The message-oriented interfaces and operations that a Business Service exposes provide ample insulation from the implementation choices made by a particular service developer. This characteristic is critical to service autonomy, and it allows flexibility of implementation details. It also allows the substitution of one service implementation for another. As long as both services respond to the same set of messages and operations with comparable results, the requestor is unaware that a different implementation of a Business Service has been used.

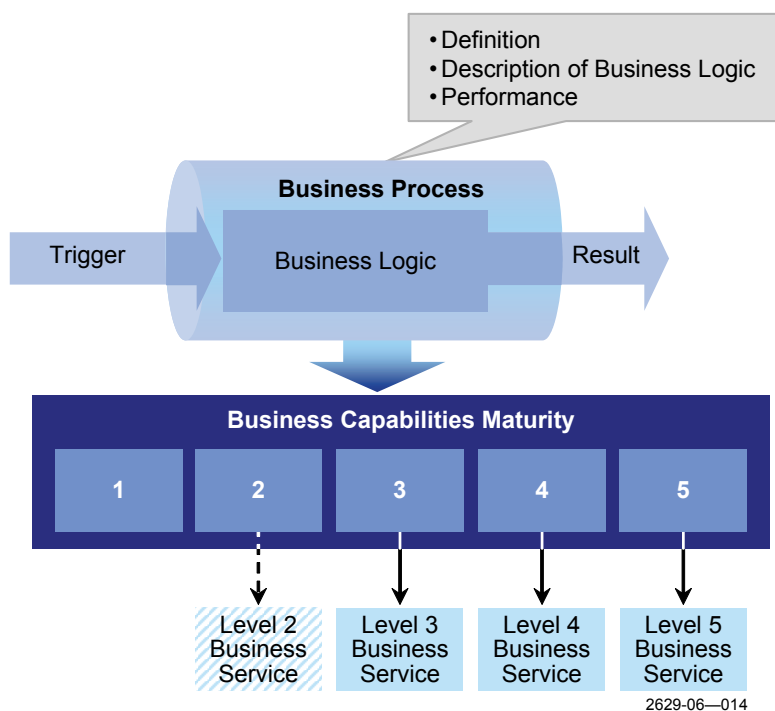


Figure 4-2. Generic Business Process, Associated Metadata, and Business Service

In order to accommodate these implementation details (e.g., performance, platform, infrastructure, and software model), each MITA Business Service may have one or more State logical description of the service, and for each of these one or more implementations may be instantiated. Specific implementation details are specified for each unique implementation by a State- or vendor-developed logical service definition. This relationship is shown in **Figure 4-3**. (This unique logical specification is discussed in the next section of this chapter.)

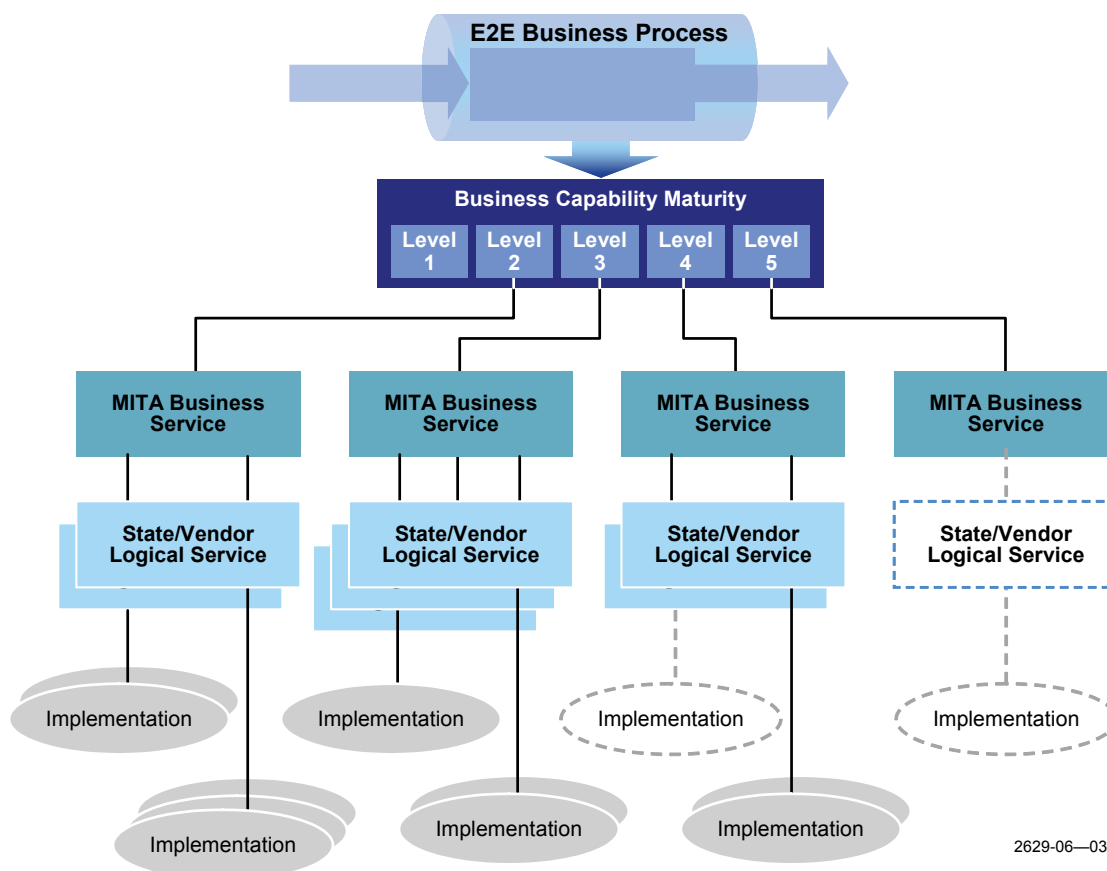


Figure 4-3. Relationship Between MITA Business Process and Implementation

What Are the Parts of a MITA Business Service?

This section defines the individual parts of a MITA Business Service. In the MITA Framework, a Business Service must have the following associated data:

- **Service Name.** The name of the service that is invoked by
- **Business Service Definition Package (BSDP)** is a MITA-defined set of metadata describing the service.
- **Service Contract** describes the expected behavior of the interface (e.g., Is the interface a real-time or online interface?), as well as the security and privacy constraints on the service (e.g., Is strong encryption required?). The following are examples of interface behavior patterns:
 - *One way only* receives or outputs data (e.g., report generator)
 - *Two way* receives and sends data. Two-way traffic has two other attributes:
 - (1) *initiator* defines who initiates the interface, either the service (e.g., request for

information) or the outside client (e.g., inquiry), and (2) *processing characteristic* defines the relationship between the input and the output:

- Point-of-sale (POS) transaction — a real-time transaction (e.g., a pharmacy POS) that features a very constrained response time and high reliability
- Online transaction — an inquiry on a member or provider that features a more relaxed response time while still allowing for conversation-type human interaction
- Batch — typical batch processing constraints
- Asynchronous — no constraints on processing times but response and coordinating data are required

- **Purpose.** This is developed from the business process definition and associated BCM entry.
- **Business Logic.** This describes what goes on “under the hood” of the Business Service. It documents the underlying logic, functionality, and capability provided by the service. Initially, the business logic will be freeform text or template driven, but it will eventually become business rules.
- **Constraints.** Any constraints of the service are listed. A formal interface definition is developed using the business process Triggers, Results, and MITA data model. It also documents the interfaces and operations used by the service. The interface is defined by using the WSDL. Initially, MITA will provide an informal textual description (i.e., template) of the services interface. As groups populate the MITA services, WSDL interface descriptions will be developed.

WSDL is a document written in XML and is an XML document. The document describes a Web service. It specifies the location of the service and the operations (or methods) the service exposes.

- **Use Case.** This will initially only document the main success path and critical failure conditions of the service. Initially, it will be in free-form text, but it will be in Unified Modeling Language (UML) once the population of the Business Services begins.
- **Solution Set.** This area will map the Solution Sets developed to implement this service.
- **Structure Diagram.** This will graphically depict the business logic performed by the service and interconnect the Solution Sets.
- **Performance Measures.** Performance measures are defined so that all stakeholders can measure the same things in the same way.
- **Test Scenarios and Test Cases.** Test scenarios and test cases that could be used to validate compliance to the service contract are documented.

- **Map to MITA data models.** This mapping provides a trace of data used by the service (e.g., data in motion and shared business data only) to the MITA Conceptual Data Model (CDM) and Logical Data Model (LDM). This is an enhancement of the mapping done for the Business Service. Data in motion is defined by XML schema.

How Is a MITA Business Service Developed?

The process for developing a MITA Business Service is described in this section.

The first step in developing a Business Service is to decide what MITA business process the service is enabling and at what maturity level. Once this is done, the MITA repository¹ must be accessed to determine if the service already exists. If the service already exists, the implementer must then look at the associated metadata to determine whether the service will need to be adapted or extended. (Extension/adaptation of services is discussed in a later in this chapter.) If the Business Service does not have to be extended, the implementer should then examine the associated Solution Sets to determine whether an implementation meets the specific technology requirements. (Solution Sets are described in Part III Chapter 9.) If a Solution Set exists, the implementer should use the existing definition. If a Solution Set does not exist, the implementer should define a new Solution Set and submit it back to the MITA repository.

If the Business Service does not exist in the MITA repository, then the service and BSDP must be created. Most of the information is derived from either the business process definition or the associated entry in the BCM. **Figure 4-4** illustrates the relationship between the Business Service and the business process.

¹ The MITA repository does not currently exist but will be developed in the future.

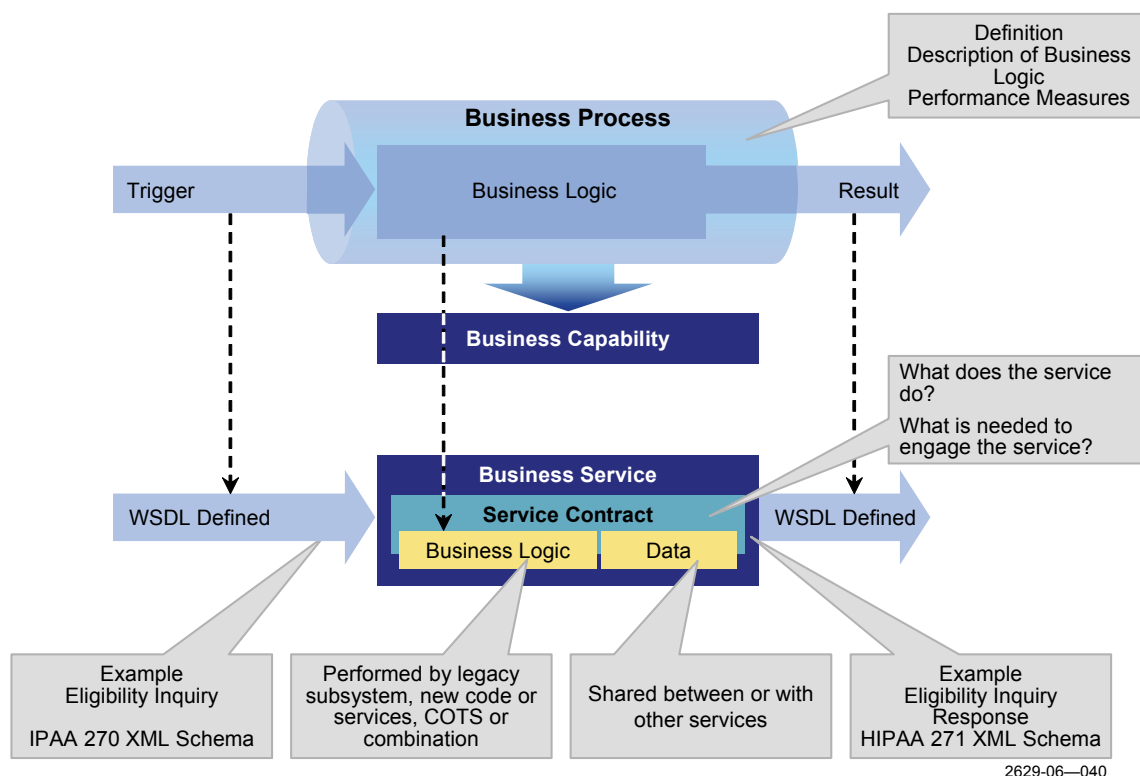


Figure 4-4. Relationship of Business Processes to Business Services

The following steps reveal the process for creating a BSDP:

1. **Service Name Development.** The service name should be the same as the business process name (e.g., verb, noun) to avoid confusion. This is the name that will be used to register the Business Service in the MITA service registry.
2. **Configuration Data.** This data includes the following:
 - a. *Owner* defines who owns the particular instance of the service being described. MITA will be listed as the owner for the MITA logical service definition, and States and vendors will be the owners for State logical and physical service definitions.
 - b. *Version*
 - c. *Date*
3. **Service Contract Development.** This process involves the following elements:
 - a. The *purpose* is developed. It is a short one- to two-sentence description of what the service does, and it is derived from the business process definition and BCM.
 - b. The *functionality* and *capability* provided by the service are documented.
 - c. Any *constraints* on the service are listed.

- d. *Common service requirement* and candidate areas for Business Service adaptability and extensibility are identified.
 - (1) Adaptability enables the customization of common services to meet the needs of a specific State. An example would be verifying provider credentials to one licensing bureau for medical doctors and a different licensing bureau for natural doctors.
 - (2) Extensibility enables States to add new functionality to common services in order to meet their specific needs, while still meeting MITA goals and objectives. An example would be adding the ability to verify that a provider is qualified to perform a specific service.
- e. The *formal interface definition* is developed using the business process Triggers, the Results, and the MITA data model. It also documents the interfaces and operations used by the service. Initially, MITA will provide an informal textual description (i.e., template) of the services interface. As MITA matures, WSDL interface descriptions will be developed. WSDL involves the following elements:

WSDL describes a Web service in two fundamental stages: one abstract and one concrete. Within each stage, the description uses a number of constructs to promote reusability of the description and separate independent design concerns.

At an abstract level, WSDL describes a Web service in terms of the messages it sends and receives. Messages are described independent of a specific wire format using a type system, typically XML schema.

At a concrete level, a *binding* specifies transport and wire format details for one or more interfaces. An *endpoint* associates a network address with a binding. And finally, a *service* groups together endpoints that implement a common interface.

- (1) *Interfaces*. A WSDL interface describes the interfaces (i.e., connection points) exposed by a MITA Business Service. It can be compared to a function library (or a module or a class) in a traditional programming language.
- (2) *Operations*. Each operation can be compared to a function in a traditional programming language. An *operation* associates a message exchange pattern with one or more messages. A *message exchange pattern* identifies the sequence and cardinality of messages sent and/or received as well as those who the messages are logically sent to and/or received from. An *interface* groups together operations without any commitment to transport or wire format.
- (3) *Messages*. Messages define the data that is communicated with the service. These messages are input Triggers or output Results from the service. The messages are described using XML schema. The message is a combination of a MITA header and a standard payload. The payload message should be based on a standard format (e.g., HL7 or X12) if possible.

- (4) *Parts*. This is not part of the standard MITA BSDP but is filled in for the implementer-specific Solution Set.
 - (5) *Services*. This is not part of the standard MITA BSDP but is filled in for the implementer-specific Solution Set.
 - (6) *Endpoints*. This is not part of the standard MITA BSDP but is filled in for the implementer-specific Solution Set.
 - (7) *Bindings*. This is not part of the MITA Business Service. It maps the actual protocol used to the messages.
 - (8) *Types*. This defines the data contained within a message.
 - (9) *Documentation*. Current documentation is freeform text document service.
4. **Use Case**. Initially, use case will only document the main success path and critical failure conditions of the service. Scenarios are documented using UML.
 5. **Solution Set**. This area will map the Solution Sets developed to implement this service.
 6. **Business Logic**. The business logic performed by the service and the behavior of the “black box” service are described. Initially, freeform text from the business process definition will be used, but it will eventually be specified by business rules as they are incorporated into the enterprise.
 7. **Performance Measures**. A definition of performance measures will be developed, so all stakeholders can measure the same things in the same way. This definition will be derived from the performance measures defined in the Business Service definition.
 8. **Test Scenarios and Test Cases**. Test scenarios, test cases, and test data to be used to validate compliance to the service contract will be derived from the test scenarios and test cases in the Business Service definition.
 9. **Map to MITA Data Models**. This mapping provides a trace of data used by the service (e.g., data in motion and common business process data only) to the MITA CDM and LDM. This is an enhancement of the mapping done for the business process. Data in motion is defined by XML Schema as part of the formal interface definition in the service contract.

Business Service Solution Sets

Since MITA Business Services are implementation-neutral, the MITA Framework requires a method for documenting these implementation details. This is required so that individual States and vendors do not have to keep recreating the solution for the service. Solution Sets are the logical implementation of a MITA service (see Part III Chapter 9). The Solution Sets are pattern-specific and can be platform- and technology-dependent:

- A Solution Set is an implementation of a MITA Business Service.
- Solution Set mapping is shown in **Figure 4-5**.



Figure 4-5. Relationship of Solution Sets to Business Processes

- A MITA repository will be available to store Solution Set information.
- States can use MITA Solution Sets to determine whether there is already an implementation of a MITA service that is applicable to their specific implementation.

A MITA Business Service Solution Set consists of an implementation-specific BSDP and an associated implementation. The implementation-specific BSDP is derived from the MITA Business Service BSDP and adds the implementation-specific details to the MITA BSDP attributes (e.g., protocols and binding information and endpoint). This relationship is shown in **Figure 4-6**. The implementation-specific BSDP provides the specifications for the Business Service being implemented by the State. In some cases, the WSDL in the implementation-specific BSDP may be used by a code generator to actually generate some of the required code. The implementer of the Business Service (State and/or vendor) is responsible for producing the implementation-specific BSDP for this solution if one does not already exist in the MITA repository. When completed, the Solution Sets are submitted back to the MITA repository.

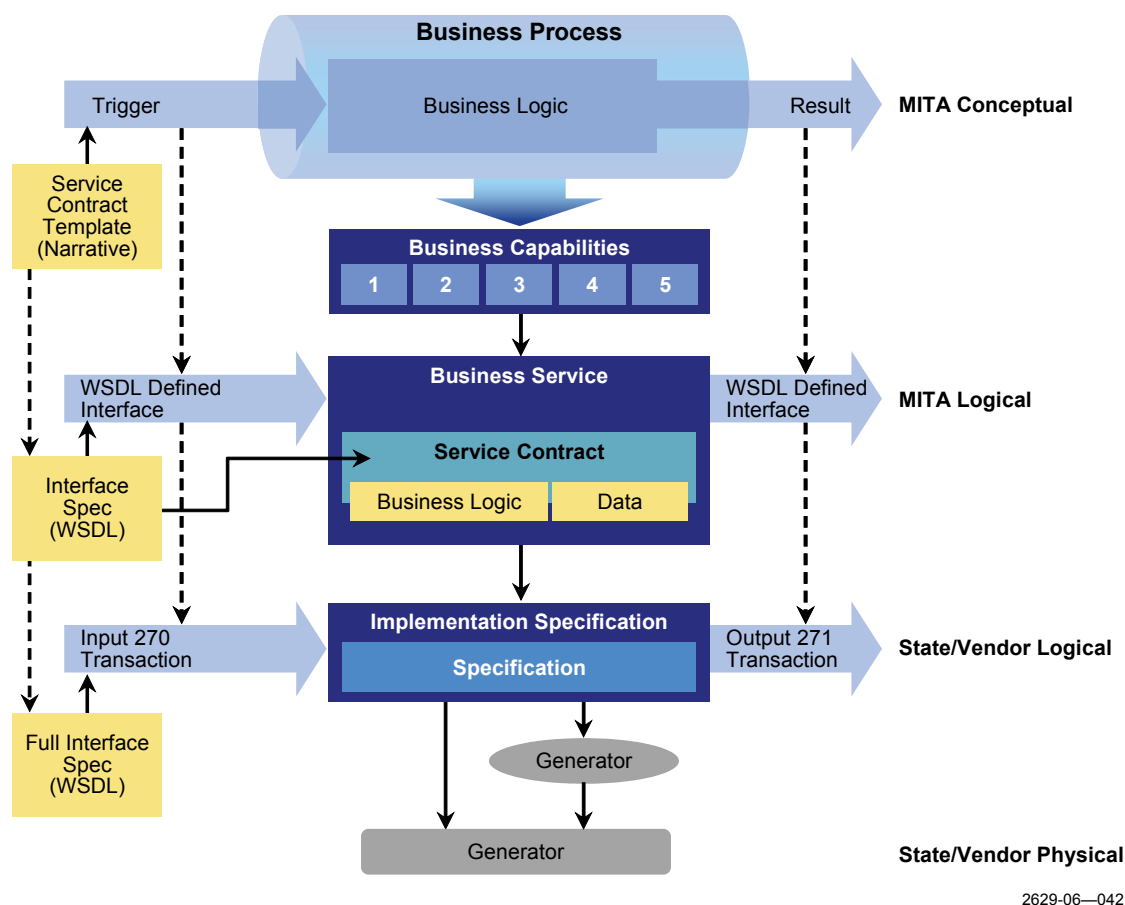


Figure 4-6. Business Process to Implementation

What Is the MITA Business Service Flow?

The objective of Business Services objective is to provide an independent version of a business process that can be woven together with other services to form composite business processes. This independence is provided by services guided by the following architectural concepts:

- Services loosely coupled
- No predefined predecessor or successor services to an individual service
- Services configured through the use of a service contract and an orchestration language
- Changes to the flow of services made through changes to this orchestration, *not* to the service itself
- Mandatory interface compatibility among the services

As stated earlier, access to an individual service is defined by the service contract using WSDL. The process to define a flow linking several services together is called orchestration, which is done using BPEL.

BPEL is used to describe the behavior of a Business or Technical Service based on interactions between the service and other services. The interaction with each service occurs through the service interfaces, and the structure of the relationship at the interface level is encapsulated in the service interface link. The BPEL defines how multiple service interactions are coordinated to achieve a business goal, as well as the State and the logic necessary for this coordination. Finally, BPEL also introduces systematic mechanisms for dealing with exceptions and processing faults.

Orchestration defines successor and predecessor services to a service. Since this orchestration is based on definite implementation specifics, MITA will not develop the BPEL orchestration for a service. The States will be responsible for developing BPEL orchestration and submitting them to the MITA repository as part of a Business Services Solution Set. Once in the repository, the BPEL orchestration will be available for reuse by other States.

How Do States Use MITA Business Services?

The MITA Business Services should be used as a reference document that identifies the business interfaces that must be exposed to other processes, the standard interface definition, and a description of the underlying business logic. It should also be used as a requirements document specifying the details for Business Services. The document in this role can be used as a source for a State's Advance Planning Documents (APDs) and RFPs.

How States Can Personalize MITA Business Services?

The use of MITA Business Services will provide the following benefits:

- **Reuse.** A service can be shared by multiple organizations and systems. Each time a service is used by an additional system, value is gained from the original investment in that service. An example would be security access and controls, which is a service needed by every application. By writing this service once and reusing it for all applications, development time and complexity are reduced.
- **Cost.** A service that is written once and maintained in one place reduces overall development and maintenance costs. An example would be security access and controls because costs increase when each application writes its own security access and control modules.
- **Consistency.** When a service is shared across multiple applications, results will always be the same. Using the security access and control example, a user could use one password to access multiple systems. Another example would be performance measurement services. By always measuring performance in the same way, it is

possible to perform valid comparisons between organizations or within a single organization over a period of time.

- **Flexibility.** Widespread use of services makes it possible for systems to be more responsive to change. Changes can be implemented by improving the functionality of a single service, using a different service to accomplish a task, or incorporating new services.

In addition, MITA Business Services support State alignment with the MITA Enterprise Architectures. MITA Business Services are defined in terms of common solutions that enable State-specific implementations, making it possible to develop services that are adaptable and extensible. The MITA Business Service approach combined with the accommodation for State-specific implementations means that the MITA Business Services will help meet State business needs.

How Do States Participate in Developing MITA Business Services?

States participate in developing the MITA Business Services by:

- Participating in working groups defining the common Business Services requirements
- Participating in working groups defining the standard interface for each Business Service
- Defining implementation-specific portions of a Business Service's WSDL
- Defining orchestration specifics in BPEL
- Participating in defining standards for the MITA infrastructure
- Submitting details into the repository as MITA Solution Sets

As mentioned earlier, States may need to adapt or extend a MITA Business Service to meet their individual requirements. The MITA Framework provides several ways for States to personalize a MITA Business Service. These personalization methods are listed below:

- **Change message structure.** This is done by changing the schema used in the Business Service's WSDL. For example, a schema change could be used if the standard schema shows certain entities as being optional and a State wants those entities to be mandatory in its implementation.
- **Change data being used.** This involves changing a dataset name (e.g., instead of mapping to "State-A-MVA," map to "State-B-MVA") or substituting a different dataset with the same name.
- **Replace capability.** This involves replacing the service with a State's unique service, but preserving input and output.
- **Reorchestrate Business Services.** This involves adding new services to the flow. Reorchestration can be used to recombine existing services or to add new services.

- **Change business rules.** This involves replacing the set of business rules used by a service with a new set of business rules.

Conclusion

The MITA Business Services help to ensure that implementations are interoperable and plug-and-play capable. With participation by States, partners, and other stakeholders, MITA Business Services 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, decision making, and day-to-day operations.