
Part III – TECHNICAL ARCHITECTURE

Chapter 3 – BUSINESS SERVICES



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Introduction

This chapter provides a discussion of the Technical Architecture (TA) Business Services, which provide the guidance and specifics to Information Technology (IT) staff on how to design a Medicaid IT Architecture (MITA) business service.

The topics covered in this chapter include:

- ❖ Business Service Overview
- ❖ Business Service Details
- ❖ Business Service Parts
- ❖ Business Service Development
- ❖ Business Service Solution Sets
- ❖ Business Service Flow
- ❖ Using TA Business Services

Purpose

The TA includes two (2) categories of services: business services and technical services. Business services provide business functionality derived from the MITA Business Process Model (BPM), as described in Part I, Chapter 4, Business Process Model, and the MITA Business Capability Matrix (BCM), as described in Part I, Chapter 5, Business Capability Matrix. Technical services, discussed in Part III, Chapter 4, Technical Services, provides underlying technical functionality (e.g., forms management, security, etc.).

A business service defines a standard interface and functionality for a business process that aligns the common factors of the State Medicaid Agency (SMA) design with the Medicaid Enterprise requirements. A MITA Business Service allows two (2) things:

1. **Modularity** – A new deployment replaces an individual service with a new business service without affecting the rest of the enterprise. For example, an enterprise replaces a service that is currently a wrapped Common Business Oriented Language (COBOL) application with a Commercial Off-the-Shelf (COTS) product or Oracle Java Platform, Enterprise Edition (J2EE) C++ program without changing any of the external interfaces.
2. **Interoperability** – A system changes 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 is an application or a client added to the enterprise that takes the output from an existing service as an input.

Scope

A different service can easily replace an independent service, provided the new service meets the needs of the user and the service has the same standard interface defined. Services are also location independent because in today's IT environment, a service does not have to collocate with the users of that service.

The SMA staff documents the details of how the service performs so that other computers can read and interpret them. The documentation will include the functions in the service (e.g., expected output, error checking, accuracy, etc.) and will describe how to obtain the service and how other computers may request the service.

Business Service Overview

Definition methods for a MITA service:

- ❖ *Services use Interfaces definition languages, such as, Web Service Definition Language (WSDL).*
- ❖ *Services use messages defined in World Wide Web Consortium (W3C) Extensible Markup Language (XML) Schema.*
- ❖ *Business logic, which is currently free-form text, becomes business rules.*
- ❖ *Service management/orchestration uses Web Services-Business Process Execution Language (Web Services Business Process Execution Language [WS-BPEL] or Business Process Execution Language [BPEL]) or executable Object Management Group (OMG) Business Process Model and Notation (BPMN).*

The TA defines business services for the MITA Framework as Service-Oriented Architecture (SOA) based services established to perform a specific Medicaid business need. A business service is implementation-neutral and does not specify platform, binding protocols, programming models, operating systems, underlying infrastructure technologies, or other execution details to deploy the function.

Figure 3-1 shows that the Business Architecture (BA) derives business services by aligning a MITA Business Process (e.g., Determine Provider Eligibility, Enroll Provider) with a maturity level. This process is similar to Technical Functions aligning with a maturity level to form an associated technical service. The expectation is that the TA will establish each business service that aligns with the defined MITA Framework Service Standards and approved solution set where available.



TA-3-1

Figure 3-1. Conceptual Relationship – Business Process to Business Service

Various deployments of a single business service look identical on the outside:

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

As shown in **Figure 3-2**, a business service can be custom code, a COTS product, wrapped legacy code, a combination of the above, or a composite of other services. This opaqueness is what enables modularity of the business services.

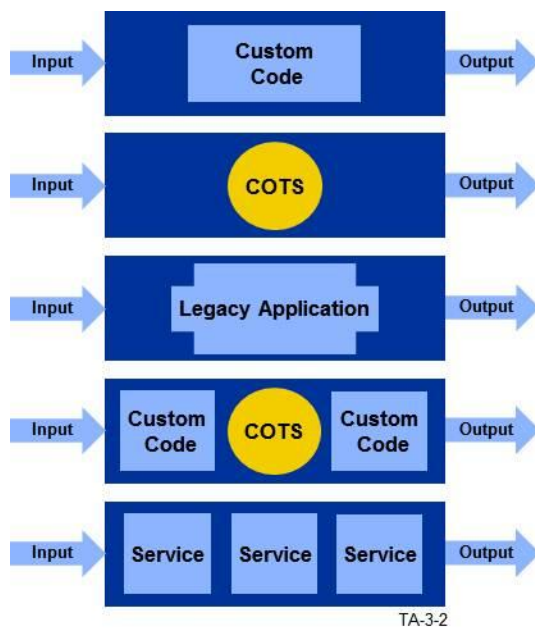


Figure 3-2. Service Conceptual Design Methods

The MITA Framework includes coarse-grain business services rather than fine-grain definitions. Coarse-grain services provide the functionality of individual MITA Business Process. As described in Part I, Appendix C, Business Process Model Details, these processes provide access to functionality (e.g., Enroll Provider) or shared data (e.g., access to provider registry). These MITA Business Services define what services are necessary for a State Medicaid Enterprise to deploy the required business processes. The goal of the MITA Framework is to specify services that allow interoperable Medicaid business processes. The MITA Framework does not address the sub-business services (i.e., fine-grain business services) used to build a MITA Business Service. The MITA Framework defines Technical Service Areas (TSA) and Technical Service Classifications (TSC) where the TA determines the maturity level by the reuse and/or modularity of a component.

Individual services and messages interrelate using an orchestration process defined in Part III, Chapter 5, Application Architecture.

Business Service Details

A business service is a software component that executes a business process at a specific capability level. It includes a defined interface for its invocation, performs a defined function that corresponds to the capability, and returns defined results.

Unlike business processes that may have multiple capabilities, a business service has only one (1) state based on the combination of the business process and the maturity level.

A business service is the basic component in XaaS Cloud Computing and SOA. One goal of an SOA is to provide services that have a concrete meaning on the business level. A service is a software component that provides a complete business process or function. Business services can reside on local or remote infrastructure platforms and can be in an orchestrated business process along with technical services that reside on varying platforms. Remote platforms could be outside the Medicaid Enterprise within the state environment or Cloud Computing based. The following diagram, **Figure 3-3** depicts several scenarios where business services and technical services are either locally active, active in a mixed environment (combination of local and Cloud), or active totally in a Cloud Computing environment.

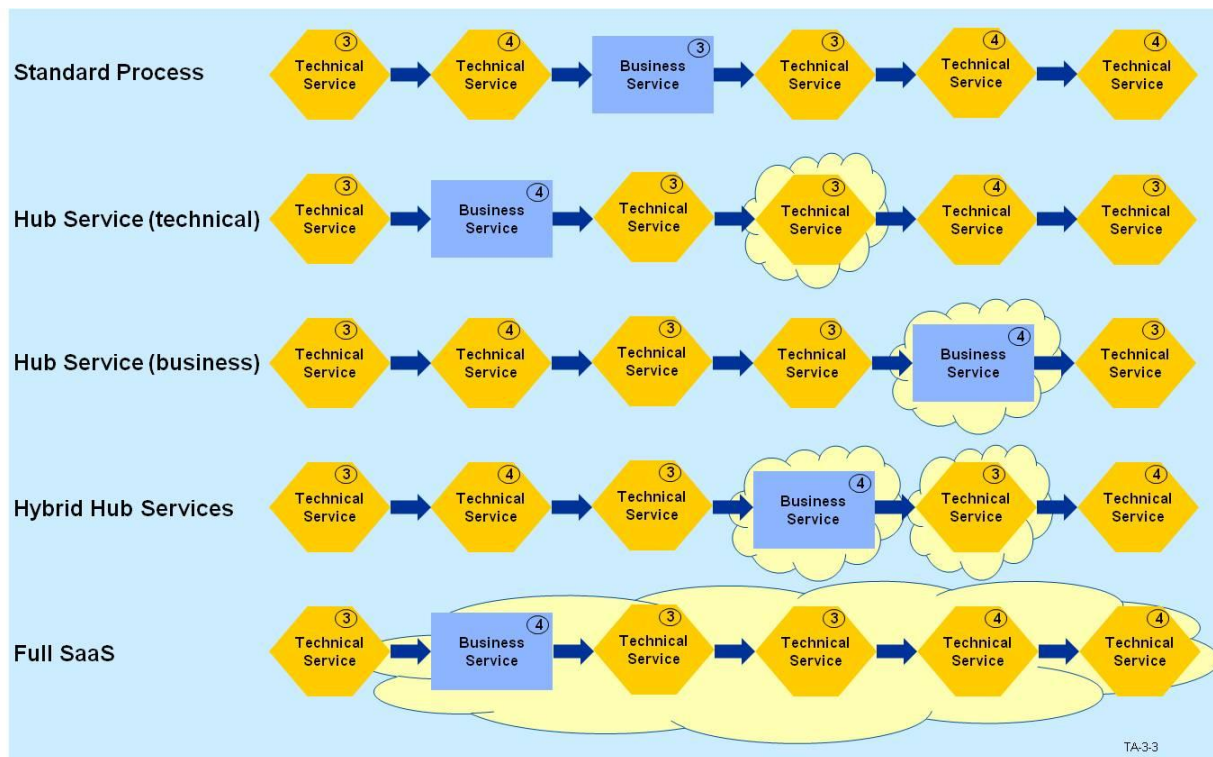


Figure 3-3. Business Services Both Local and in Cloud Computing Environments

The MITA Framework Part I identifies the MITA Framework Business Processes and BCM. 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.

Once the BA identifies the business processes, the next step is to develop the TA Business Service. As part of the development of the business process the BA develops each business process capability for each level of maturity in the BCM. The TA develops a single business service for maturity level 3 through 5 business capabilities. Based on the business capabilities, it may not be necessary to have a business service for maturity level 1 and 2.

Figure 3-4 depicts the relationship that there is one (1) MITA Business Service per business process, per maturity level.

The MITA Framework defines a logical representation that the SMA and/or vendor will use as part of their design for a State Medicaid Enterprise. The business services are coarse-grained decompositions of Medicaid Business Processes. In addition to being coarse grained, the TA designs the service specifications to be opaque (i.e., not transparent). All execution details are private to a service. The message oriented interfaces and operations that a business service exposes provide ample insulation from the design choices made by a particular service developer. This characteristic is essential to service autonomy, and it allows flexibility of execution details. It also allows the substitution of one (1) service deployment for another. As long as both services respond to the same set of messages and operations with comparable results, the requestor is unaware of which deployment a business service uses.

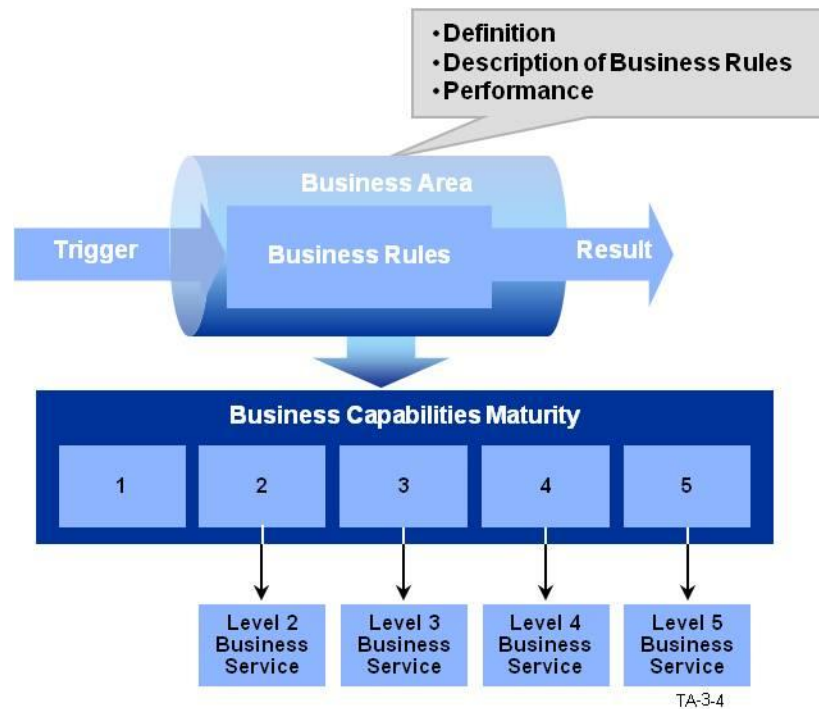
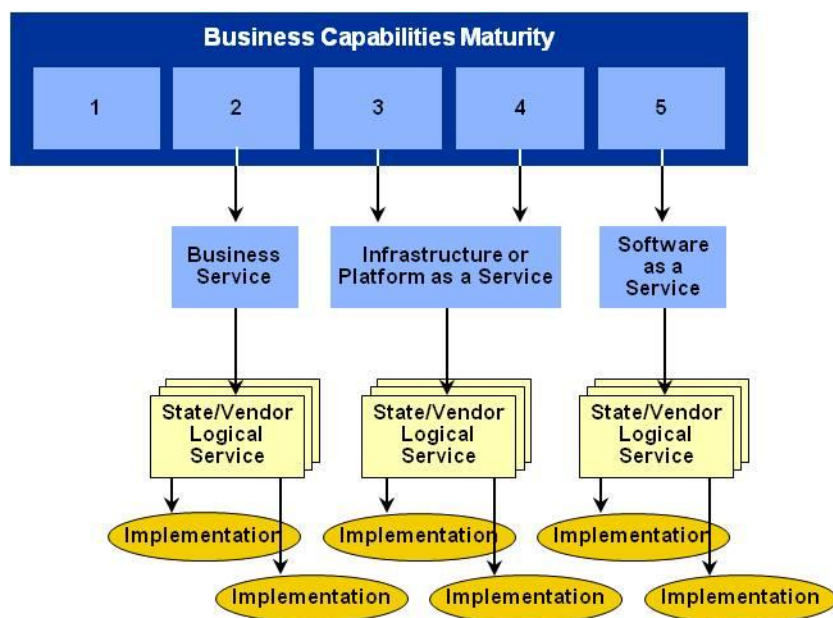


Figure 3-4. Generic Business Process, Associated Metadata, and Business Service

In order to accommodate these execution details (e.g., performance, platform, infrastructure, and software model), each MITA Business Service may have one (1) or more logical description of the service, and for each of these, may instantiate one (1) or more deployments. The SMA defines specific execution details for each unique deployment by the SMA or vendor-developed logical service definition. **Figure 3-5** shows this relationship. (The TA discusses this unique logical specification in the next section of this chapter.)



TA-3-5

Figure 3-5. Business Processes and Cloud Computing Maturity Levels

Business Service Parts

The service registry tracks the numerous services that the SMA shares within the State Medicaid Enterprise. This section defines the individual parts of a MITA Business Service. Each business service should have the following associated data:

- ❖ **Service Name** – The title of the service.
- ❖ **Business Service Definition Package (BSDP)** – Defined set of metadata describing the service.
- ❖ **Service Contract** – Describes the expected behavior of the interface as well as the security and privacy constraints on the service. The following are examples of interface behavior patterns:
 - One-way only receives or outputs data (e.g., report generator).

- Involved parties negotiate a specific Service Level Agreement (SLA).
- Two-way receives and sends data. Two-way traffic has two (2) other attributes:
 - Initiator defines who initiates the interface, either the service (e.g., request for information) or the outside client (e.g., inquiry).
 - 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 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** – Developed from the business process definition and associated BCM entry.
- ❖ **Business Logic** – Describes what is occurring within the business service. It documents the underlying logic, functionality, and capability provided by the service. Initially, the business logic is free-form text or template driven (e.g., MITA Business Process Template), that an application developer will define and code in order to incorporate into a business process orchestration step and possibly integrate to a rules engine.
- ❖ **Constraints** – List of any constraints of the service. The MITA business process triggers, results, and the MITA Logical Data Model (LDM) provide a formal interface definition. It also documents the interfaces and operations used by the service. Initially, the MITA Framework provides an informal textual description (i.e., template) of the services interface. As groups populate MITA Services, they can then define and develop interfaces using WSDL interface descriptions.

WSDL files are XML documents. The document describes a web service. It specifies the location of the service and the operations (or methods) the service exposes.

- ❖ **Use Case** – Documents the main success path and critical failure conditions of the service. Initially, the TA writes a use case in free-form text, and then models it with OMG Unified Modeling Language (UML) prior to the development of the business services.
- ❖ **Solution Set** – Maps the specific detail developed to execute a service.
- ❖ **Structure Diagram** – Graphically depicts the business logic performed by the service and inter-connects to the solution sets.
- ❖ **Performance Standards** – Define the anticipated performance metrics of the service so all stakeholders measure the same criteria in the same manner.

- ❖ **Test Scenarios and Test Cases** – Documentation to validate compliance to the service contract.
- ❖ **Map to MITA Data Models** – 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 LDM. This is an enhancement of the mapping done for the business service. Both American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12 positional transactions and W3C XML Schema are examples of defined data in motion.

Business Service Development

The first step in developing a business service is to decide what MITA business process the service is enabling and at what MITA Maturity Level. The SMA conducts an evaluation of the service registry to determine if the service already exists.

- ❖ If the service does exist with associated metadata information, the system designer needs to determine whether to adapt or extend the service. The TA reviews extension/adaptation of services later in this chapter.
 - If the SMA does not extend the business service, the system designer examines the associated solution sets to determine whether a deployment meets the specific technology requirements.
- ❖ If a solution set exists, the system designer uses the existing definition.
- ❖ If a solution set does not exist, the system designer defines a new solution set.
- ❖ If the business service does not exist in a service registry, then the SMA will create the service and the BSDP. The SMA may derive most of the information from either the business process definition or the associated entry in the BCM. **Figure 3-6** illustrates the relationship between the business service and the business process.

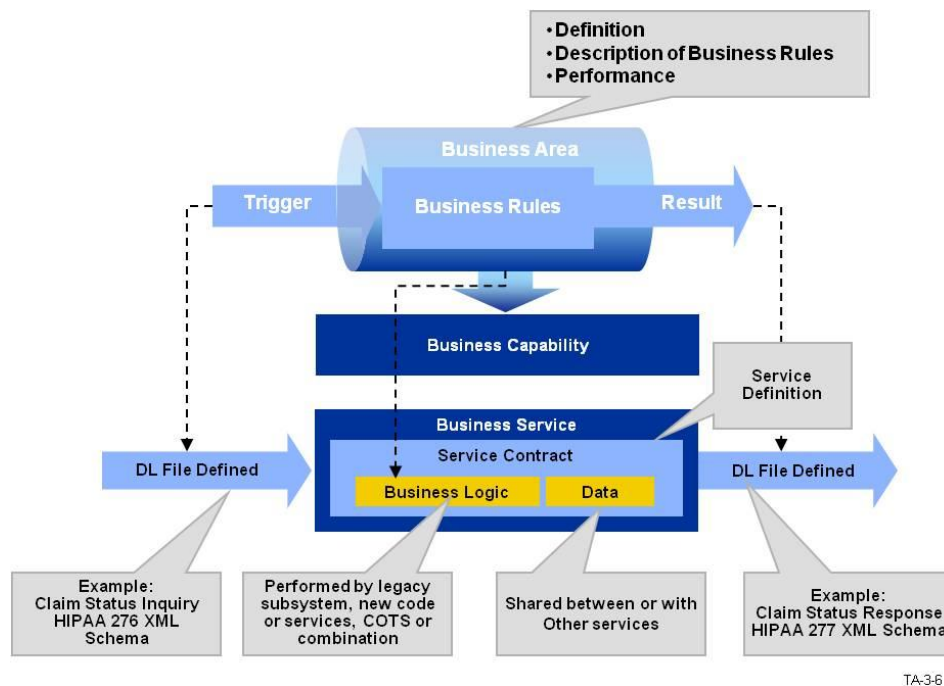


Figure 3-6. Relationship of Business Processes to Business Services

A complete BSDP contains the following parts:

- ❖ **Service Name Development** – Same as the business process name (e.g., verb, noun) to avoid confusion.
- ❖ **Configuration Data** – This data includes the following:
 - **Framework** – Defines the MITA LDM.
 - **Deployment** – Defines state-specific logical and physical service definitions.
 - **Version** – Release or development number of configuration data.
 - **Date** – Release or development date.
- ❖ **Service Contract Development** – Involves the following elements:
 - Purpose is a short one- to two-sentence description of what the service does derived from the business process definition and BCM.
 - Documentation of the functionality and capability provided by the service.
 - Listing of constraints on the service.
 - Identification of common service requirement and candidate areas for business service adaptability and extensibility.
 - Adaptability enables the customization of common services to meet the needs of a specific state. An example would be verifying provider credentials to one (1) licensing bureau for medical doctors and a different licensing bureau for natural doctors.

- 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 is adding the ability to verify that a provider qualifies to perform a specific service.

❖ **Formal Interface Definition** – Developed using the business process Triggers, the Results, and the MITA LDM. It also documents the interfaces and operations used by the service. Initially, MITA provides an informal textual description (i.e., template) of the services interface. As MITA matures, States or vendors will develop more WSDL interface descriptions.

WSDL describes a web service in two (2) fundamental stages: one (1) abstract and one (1) 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 independent of a specific wire format using a type system, typically W3C XML schema.

At a concrete level, a binding specifies transport and wire format details for one (1) or more interfaces. An endpoint associates a network address with a binding. Finally, a service groups together endpoints that execute a common interface.

❖ WSDL involves the following elements:

- **Interfaces** – A function library (or a module or a class) in a traditional programming language such as a WSDL interface describes the interfaces (i.e., connection points) exposed by a MITA Business Service.
- **Operations** – Similar to a function in a traditional programming language. An operation associates a message exchange pattern with one (1) or more messages. A message exchange pattern identifies the sequence and cardinality of messages sent and/or received as well as those who send and/or receive the messages logically. An interface groups together operations without any commitment to transport or wire format.
- **Messages** – Defines the data communicated with the service. These messages are input Triggers or output Results from the service. The messages use W3C XML Schema to describe them. The message is a combination of a MITA header and a standard payload. If possible, the payload message is in a standard format (e.g., Health Level Seven International (HL7) or ASC X12).
- **Parts** – Based on state- or vendor-specific solution set.
- **Services** – Based on state- or vendor-specific solution set.
- **Endpoints** – Based on state- or vendor-specific solution set.
- **Bindings** – Map of the actual protocol used for the messages.
- **Types** – Data contained within a message.
- **Documentation** – Is free-form text document service.

- ❖ **Use Case** – Documents the main success path and critical failure conditions and scenarios using UML.
- ❖ **Solution Set** – Based on state- or vendor-specific solution set.
- ❖ **Business Logic** – Describes the logic performed by the service and the behavior of the opaque (i.e., not transparent) service. Initially, States use free-form text from the business process definition, but the business rules specify business logic as the enterprise incorporates them.
- ❖ **Performance Standards** – Derived from the performance metrics defined in the business service definition and based on state- or vendor-specific solution set.
- ❖ **Test Scenarios, Data and Cases** – Used to validate compliance to the service contract are based on state- or vendor-specific solution set.
- ❖ **Map to MITA Data Models** – Traces 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. W3C XML Schema defines data in motion 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 execution details. This is so the individual SMA and/or vendor does not have to recreate the solution for the service. The Centers for Medicare & Medicaid Services (CMS) will establish repositories to track MITA Services and Solution Sets shared within the Medicaid Enterprise. The solution sets are pattern-specific and are platform- and technology-dependent:

- ❖ A solution set is a deployment of a MITA Business Service.
- ❖ Solution set mapping is in **Figure 3-7**.
- ❖ The SMA utilizes the service registry to determine whether there is already a definition of a service applicable to its specific environment.



TA-3-7

Figure 3-7. Relationship of Solution Sets to Business Processes

A business service solution set consists of the SMA deployment-specific BSDP. The SMA derives the BSDP from the MITA Business Service BSDP and adds the specifications to the MITA BSDP attributes (e.g., protocols, binding information and endpoint). The SMA BSDP provides the specifications for the deployed business service. In some cases, a code generator may use the Dynamic Link Library (DLL) file in the SMA BSDP to produce some of the required code. The system designer (i.e., the SMA or vendor) of the business service

is responsible for producing the BSDP for the solution if one does not already exist in the repository and service registry. When completed, the SMA or vendor will submit the solution sets to the repository and service registry so they are available for reuse by other States or vendors.

Business Service Flow

The objective of business services is to provide an independent version of a business process that can merge with other services to form composite business processes. Services containing the following architectural characteristics provide this independence:

- ❖ Loosely coupled services.
- ❖ No predefined predecessor or successor services to an individual service.
- ❖ Services configured using 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, the service contract defines access to an individual service using an appropriate DLL file. Orchestration is the process to define a flow linking several services together. States can achieve orchestration by using the latest version of the BPEL or the BPMN.

The BPEL describes 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 service interface link encapsulates the structure of the relationship at the interface level. 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, the BPEL also introduces systematic mechanisms for dealing with exceptions and processing faults.

Orchestration defines successor and predecessor services to a specific service. Since the orchestration is deployment specific, the SMA is responsible for developing the BPEL and/or the BPMN orchestration and submitting them to the CMS-planned repositories and service registries as part of a business services solution set. Once in the repository and service registry, the BPEL or the BPMN orchestration is available for reuse by other States.

Using TA Business Services

The MITA Business Services is a reference document that identifies the business interfaces exposed to other processes, the standard interface definition, and the description of the underlying business logic. States use it as a requirements document specifying the details for business services.