



CMS

CENTERS for MEDICARE & MEDICAID SERVICES

MITA Application Architecture

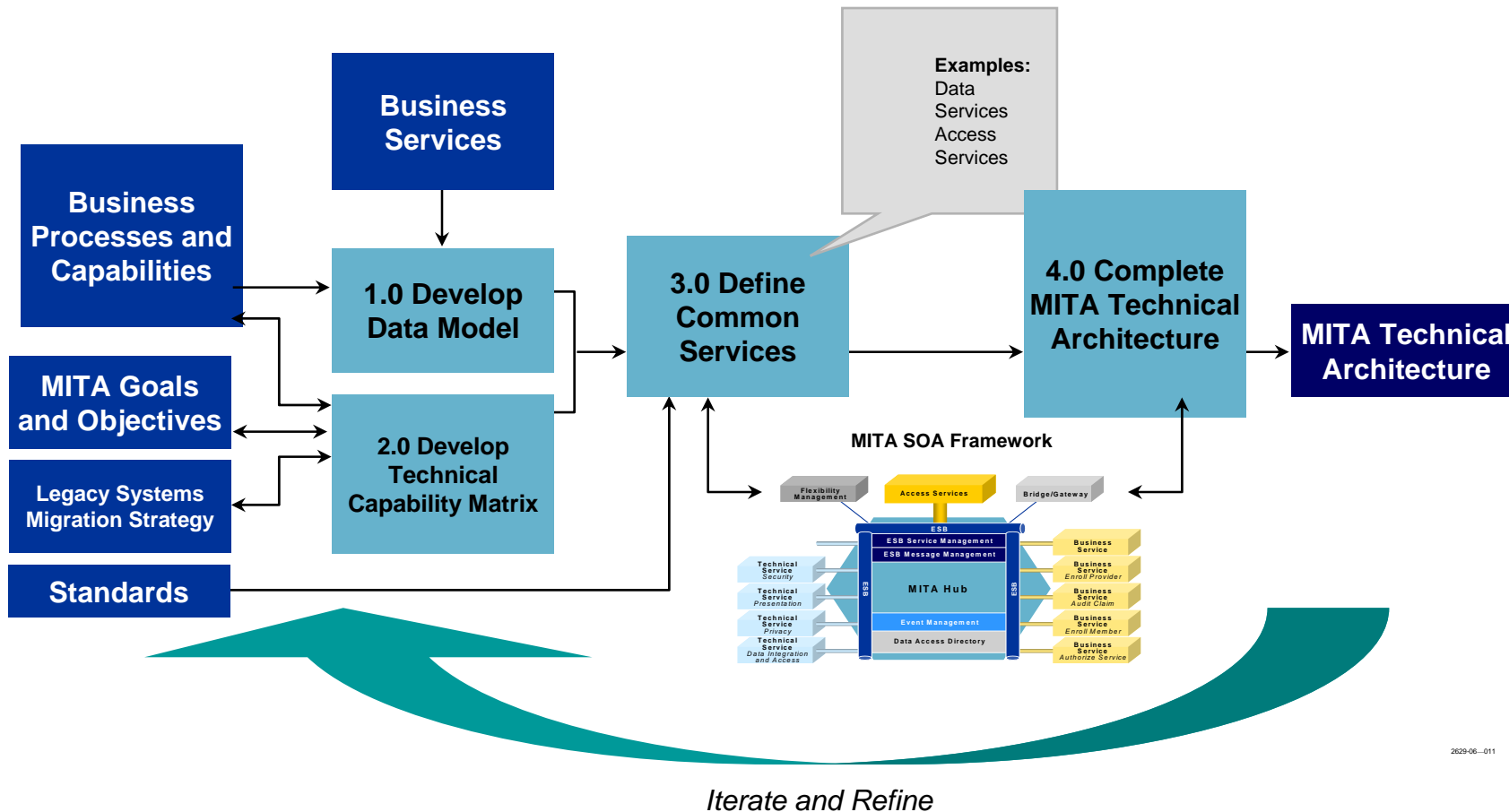
May 8, 2006



Key differences between MMIS and MITA based systems

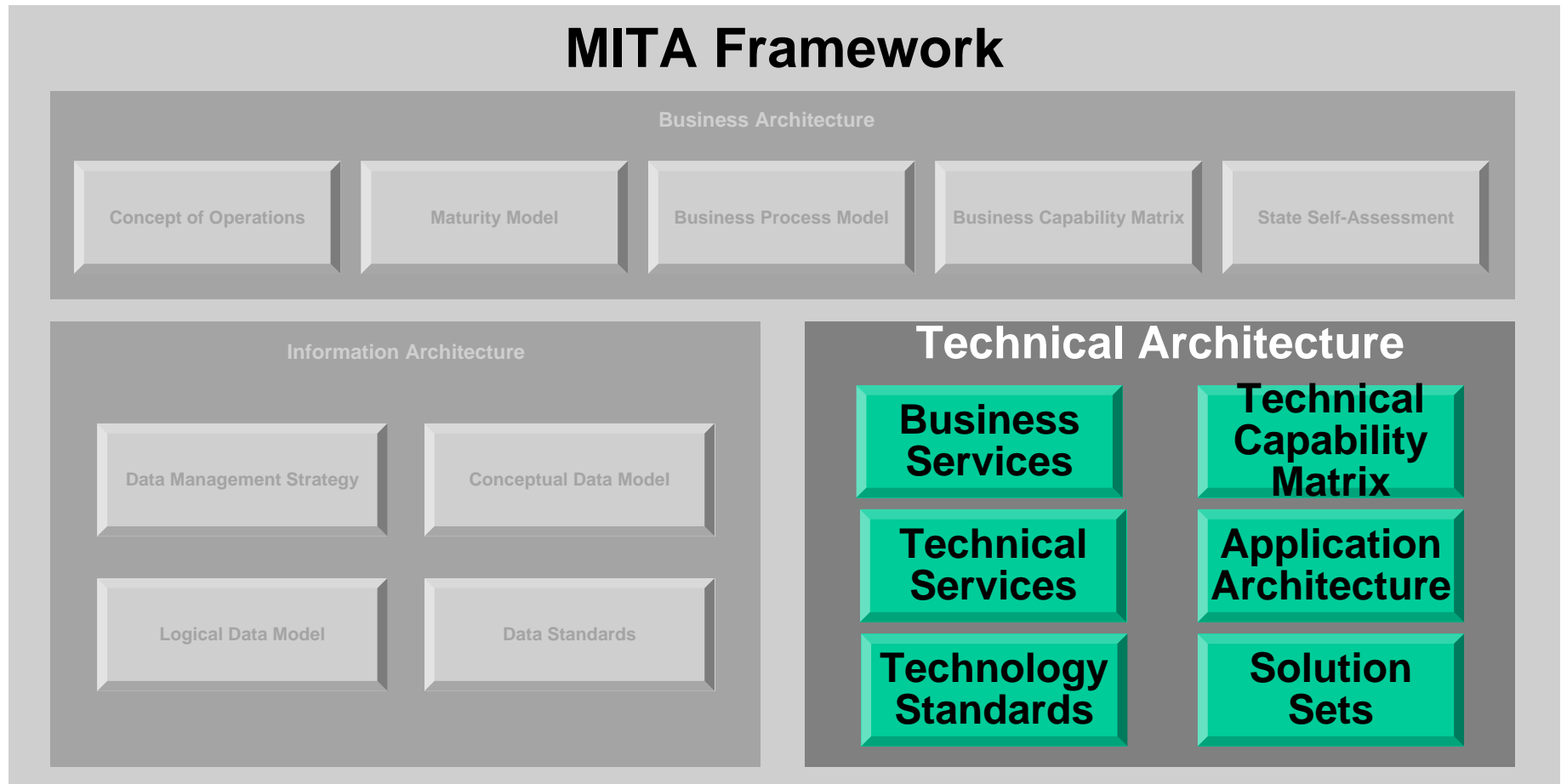
MMIS Issues	MITA Solution/Mitigation
<p>Difficulties in intra-State and inter-State data sharing because of lack of common data standards</p>	<p>To the greatest extent possible, MITA will rely on standards for health information and data exchange.</p>
<p>Difficulties in modifying multiple systems to accommodate business-required changes because of ad hoc, point-to-point interfaces</p>	<p>MITA is based on a service-oriented architecture (SOA) that defines common Business Services and Technical Services that can be modified relatively easily to accommodate changing business requirements.</p>
<p>Need for users to navigate through multiple functional systems to perform a single task</p>	<p>User tasks are designed as end-to-end processes invoked through a common user interface and implemented by orchestrating the necessary services across multiple systems transparently to the user. This eliminates the need for users to navigate through multiple systems.</p>
<p>Difficulties in inserting new technology because of platform dependency of MMISs</p>	<p>MITA Technical Services are designed with layers of abstraction that ensure their vendor- and platform-independence and simplify the insertion of new technology.</p>

Developing the MITA Technical Architecture

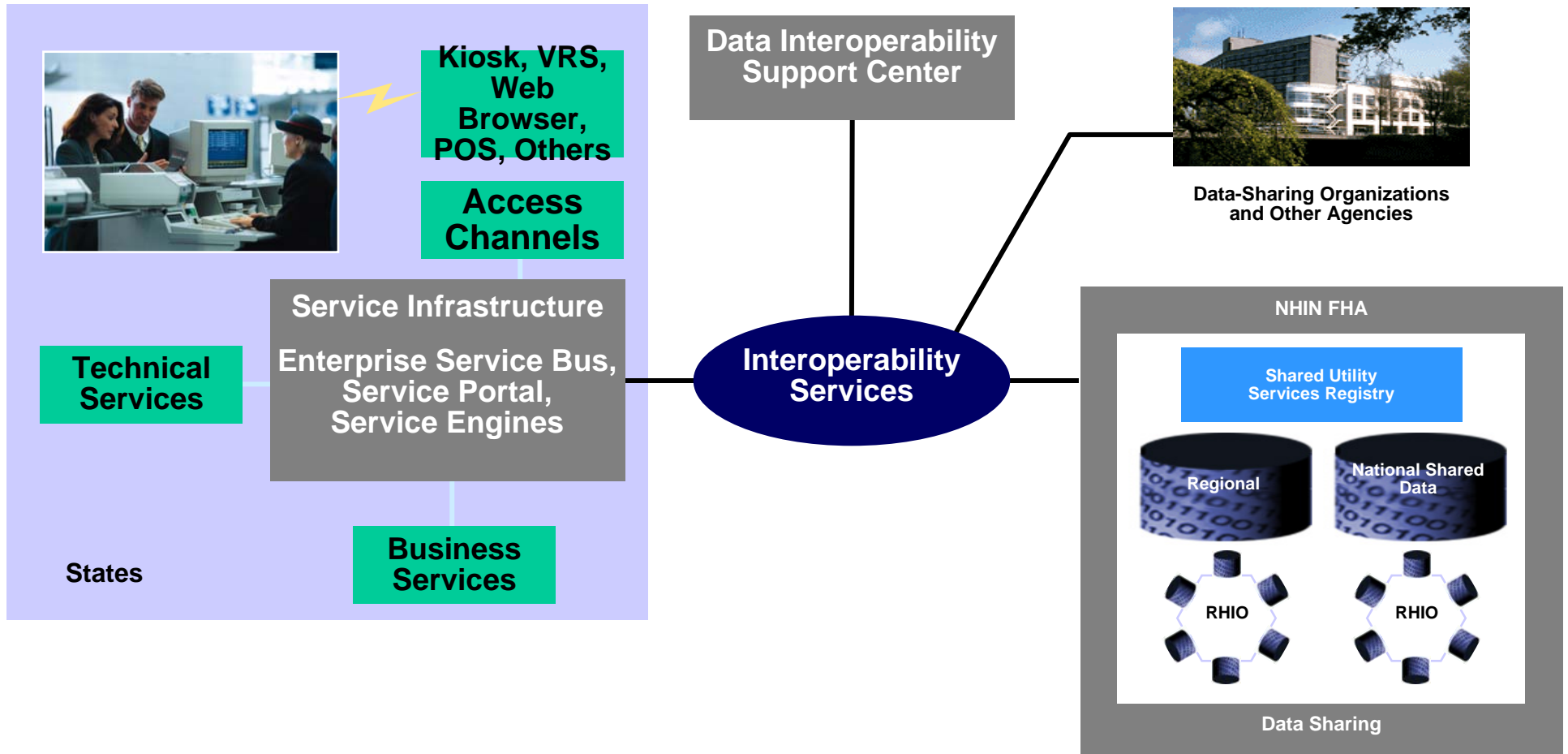


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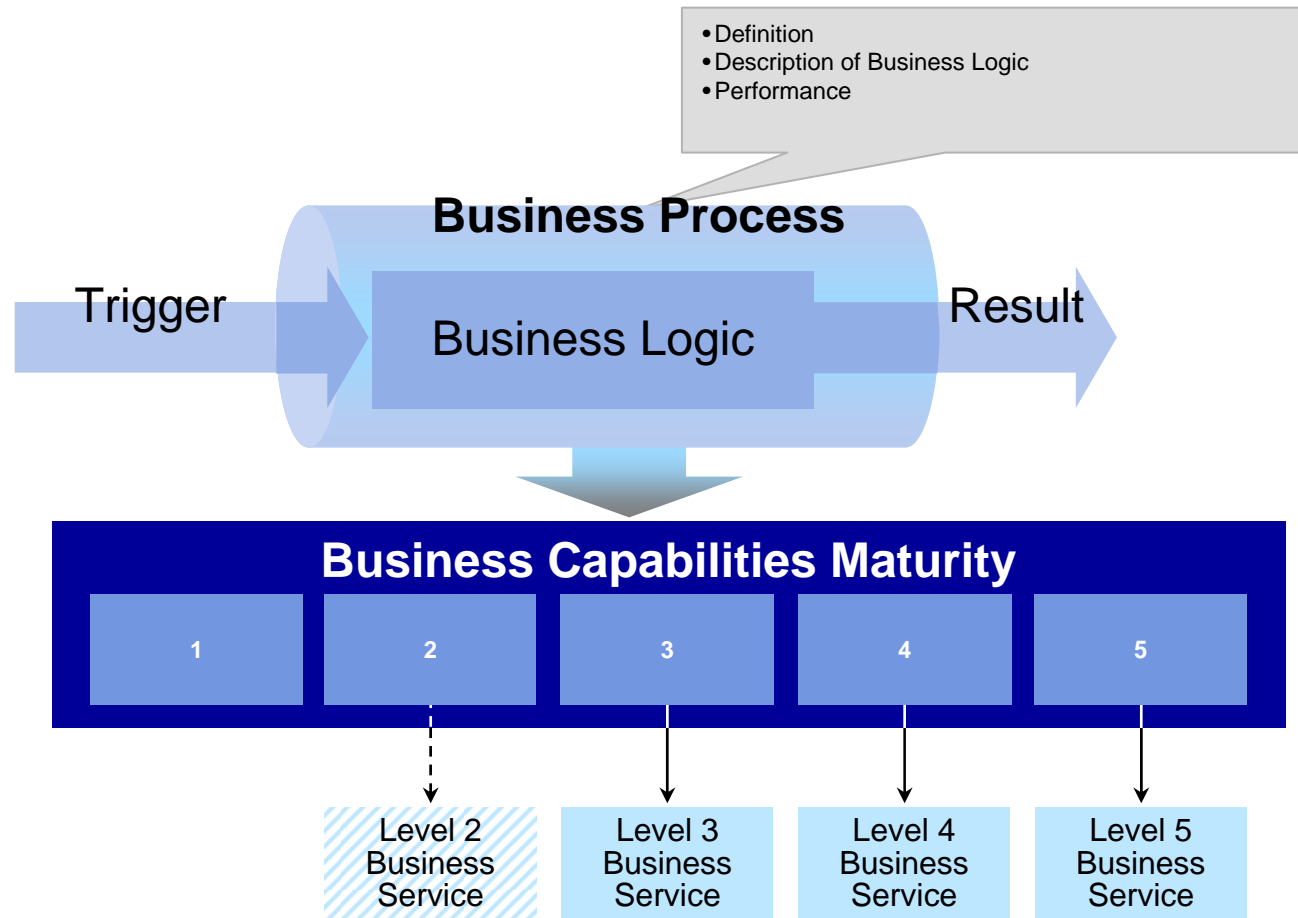
Overview of the MITA Framework Components



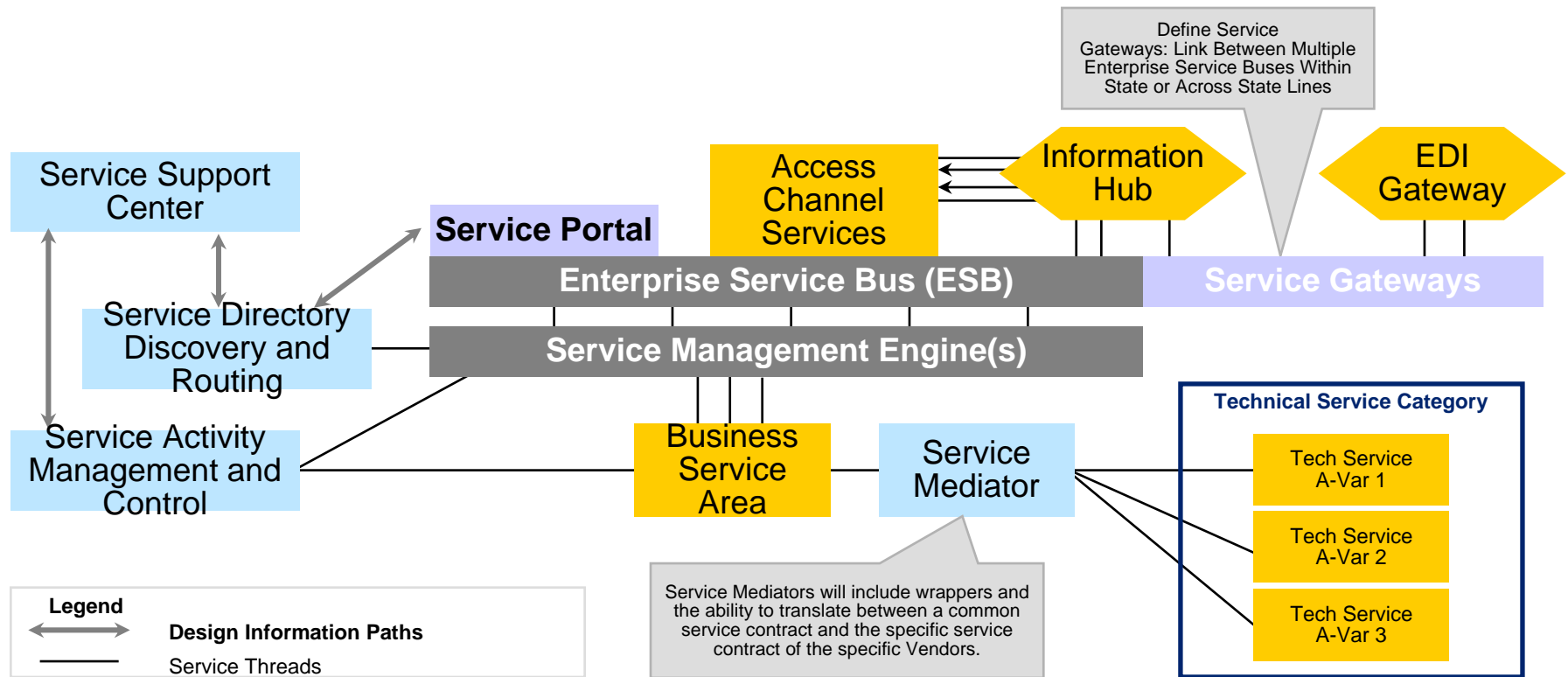
MITA Conceptual Technical Architecture Model



Business Process, Business Capability and Business Service Relationship

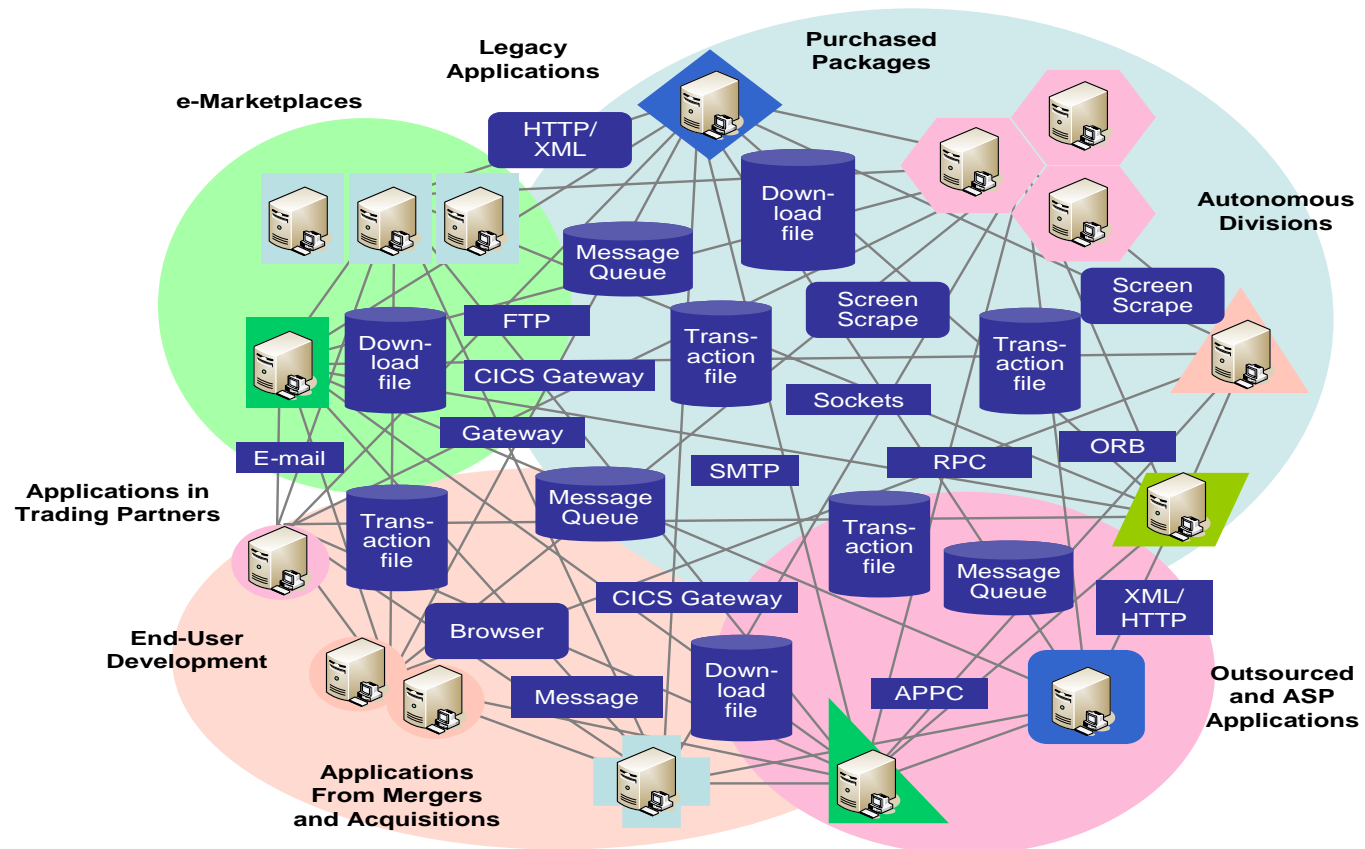


MITA Application Architecture



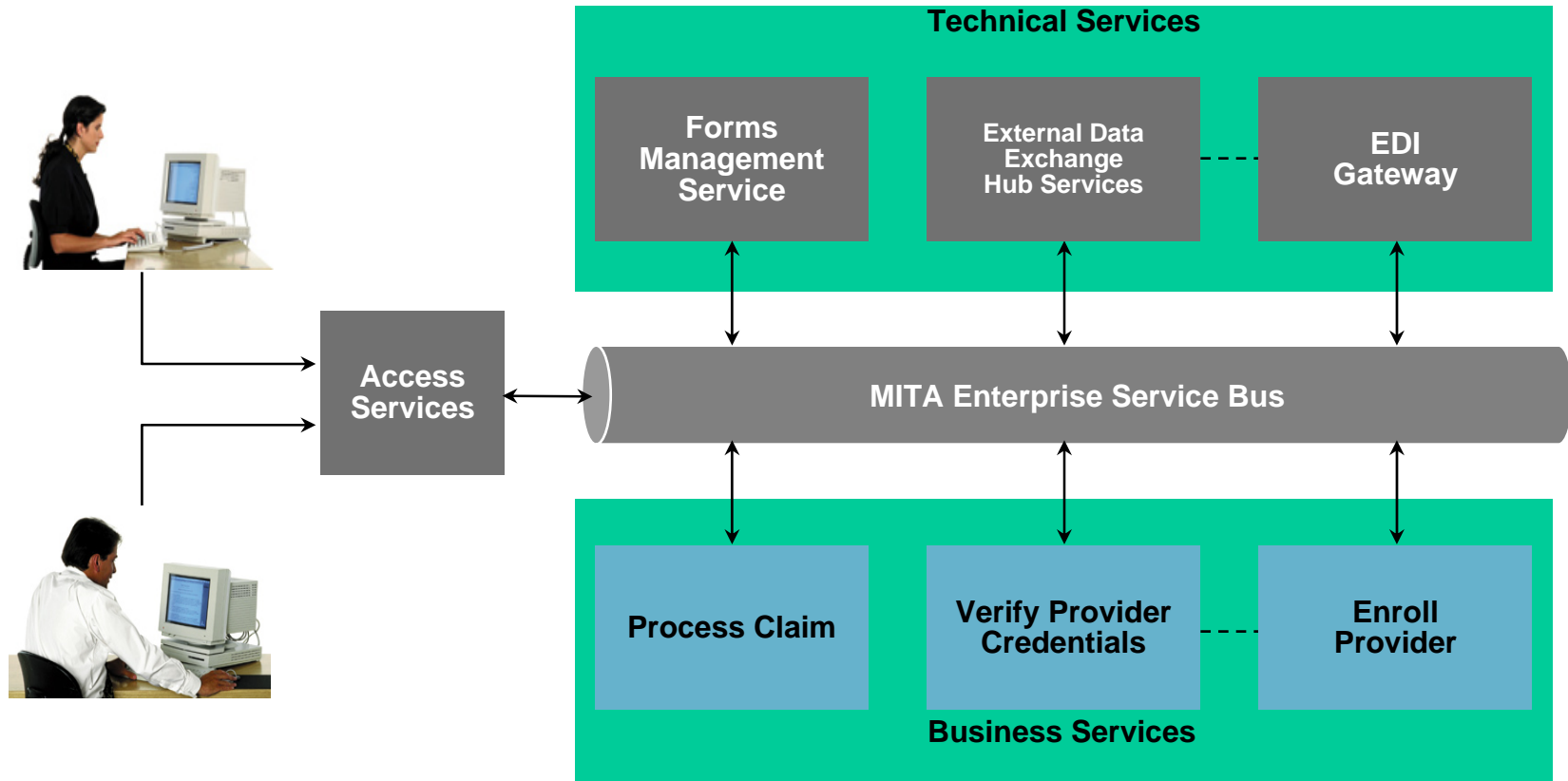
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The Typical State of Current IT Systems



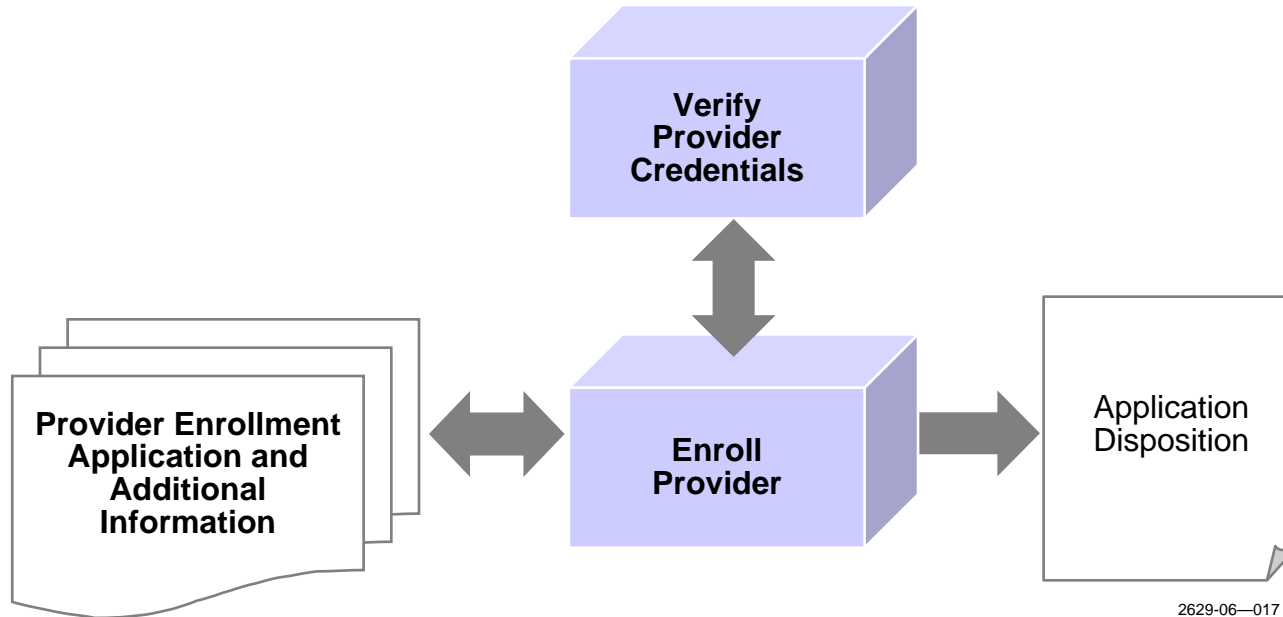
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The MITA Service Oriented Architecture



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An example of Business Services

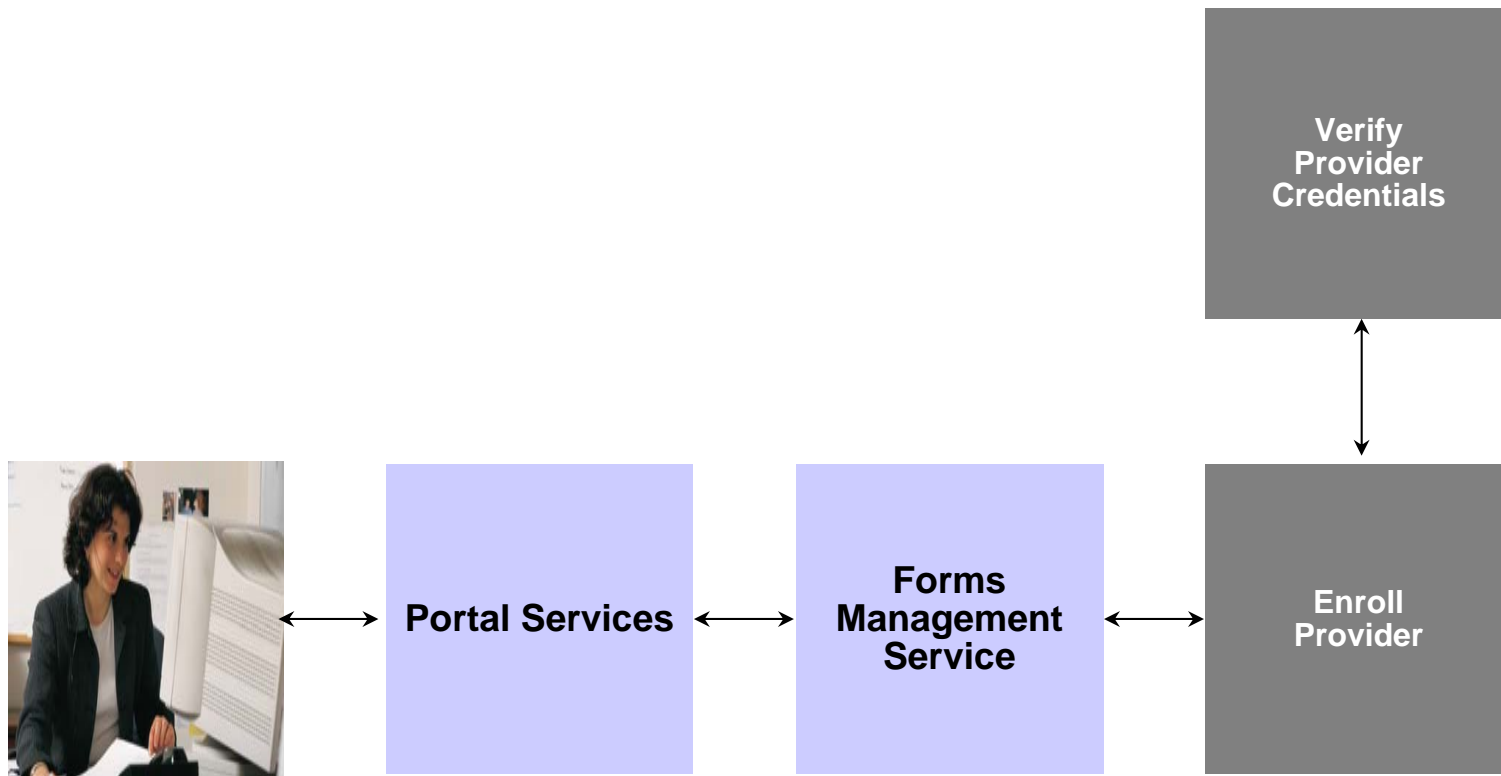




MITA
Medicaid
Information
Technology
Architecture

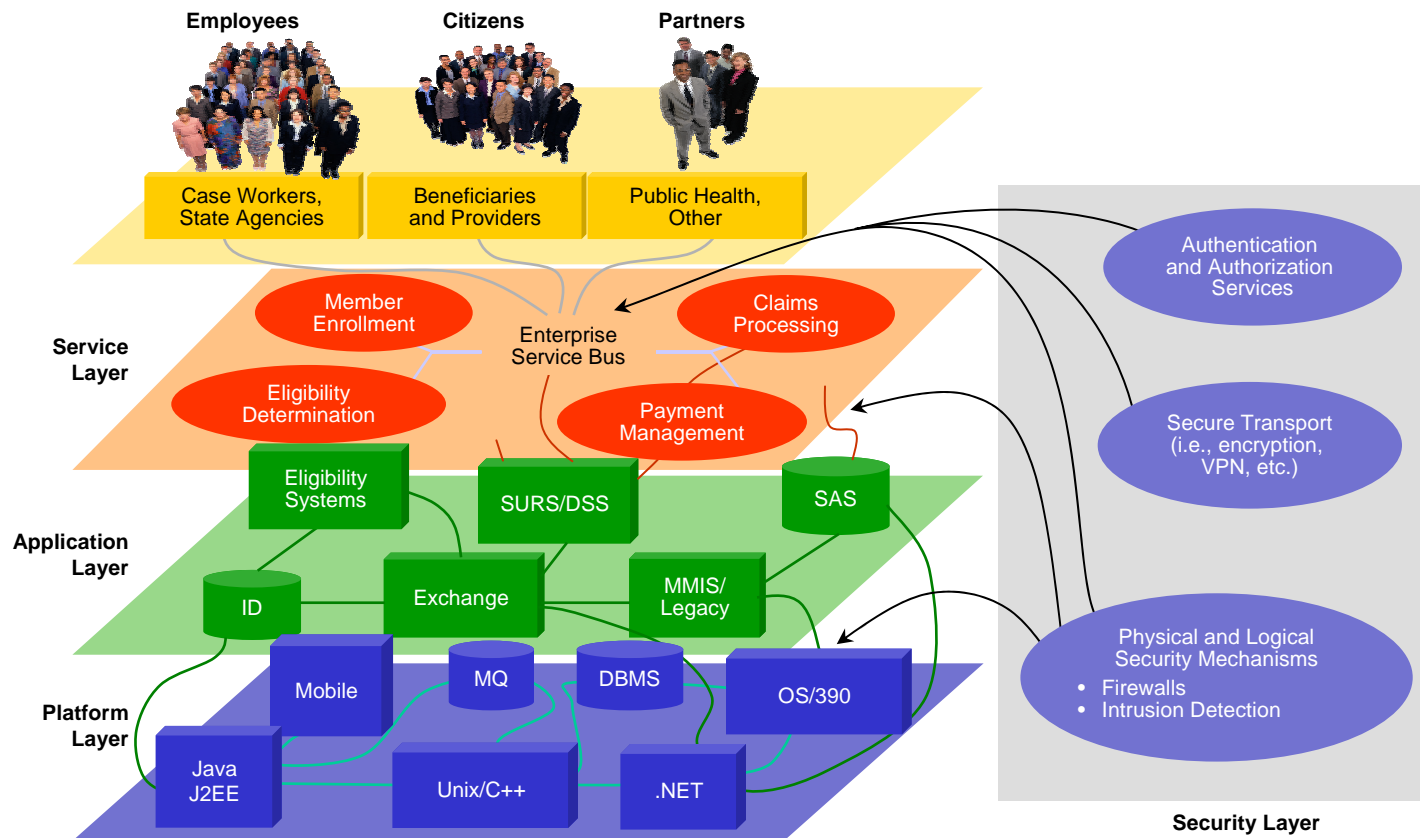


Examples of Technical Services and their interaction with the Business Services



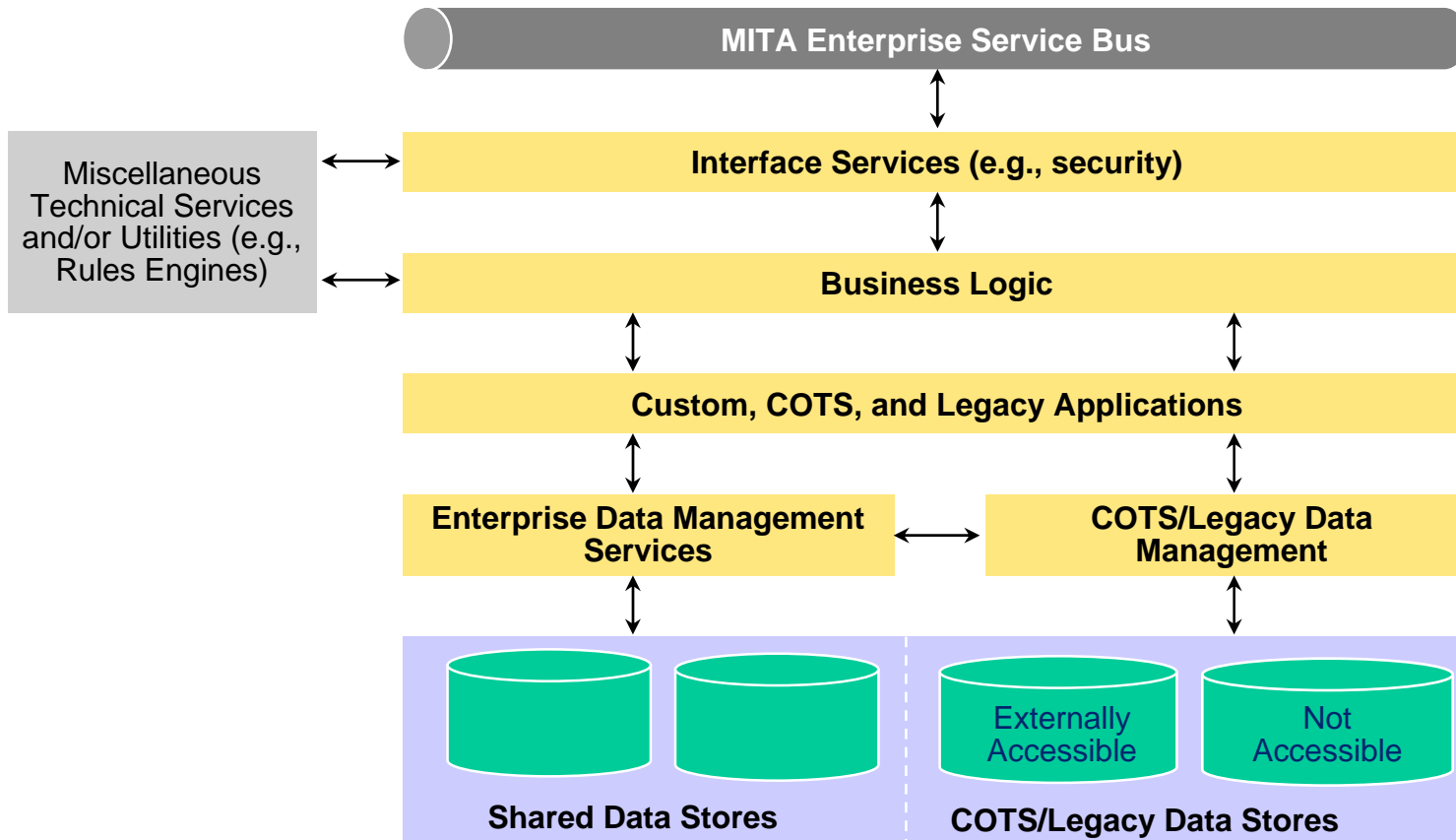
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SOA layers provide Platform Independence



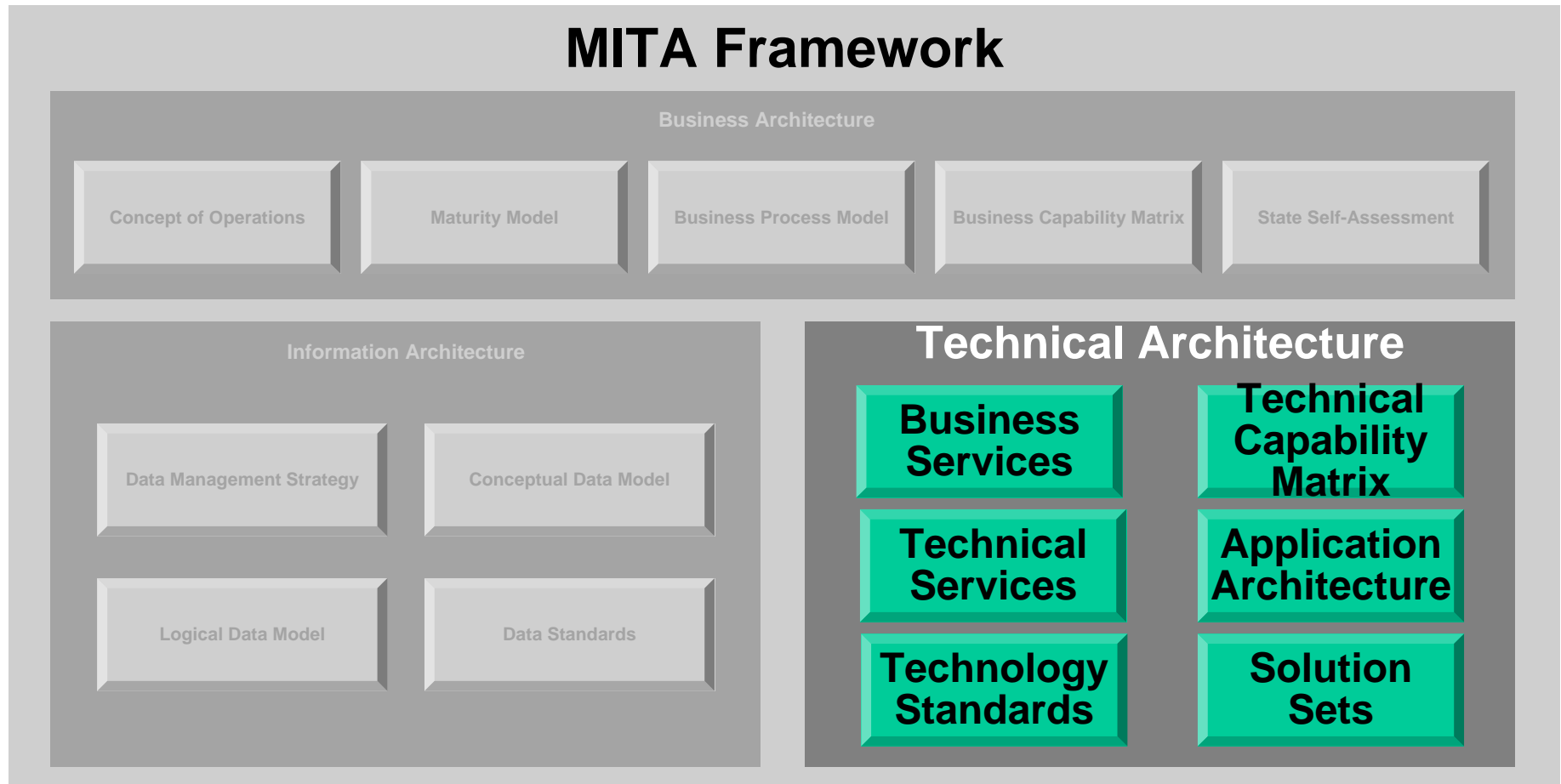
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The General Structure of Business Services

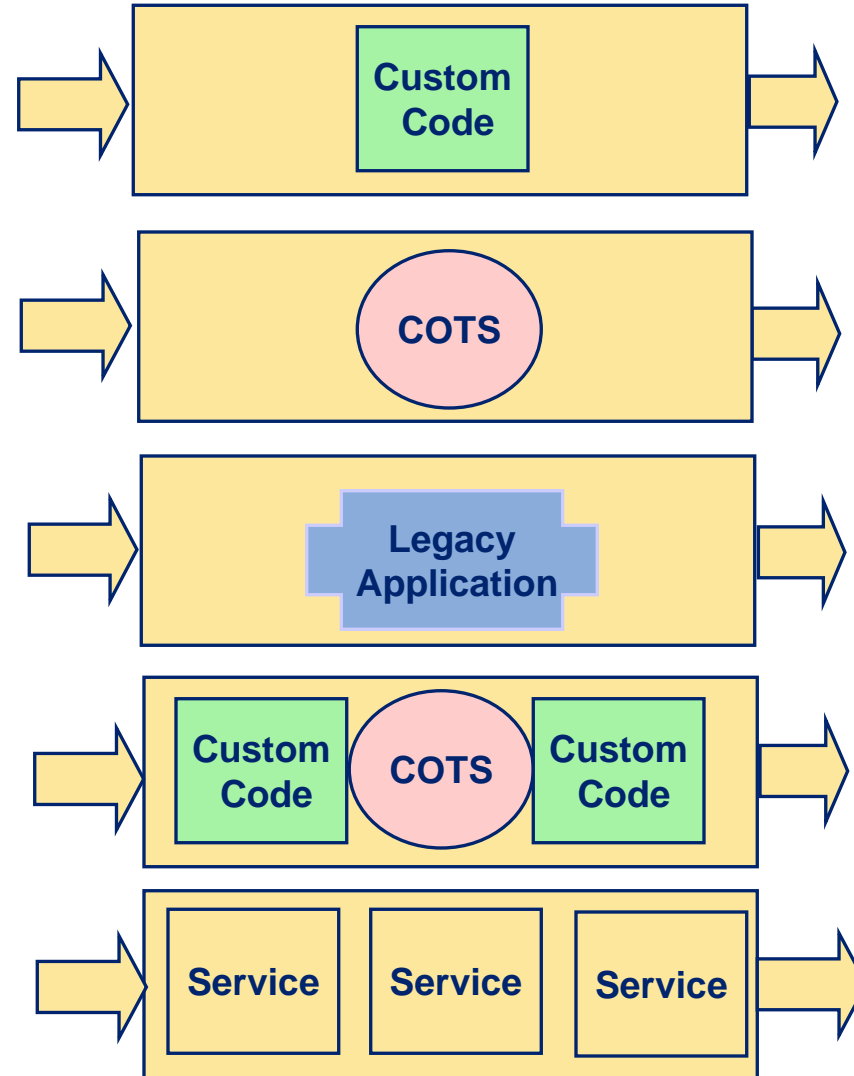


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Overview of the MITA Framework Components

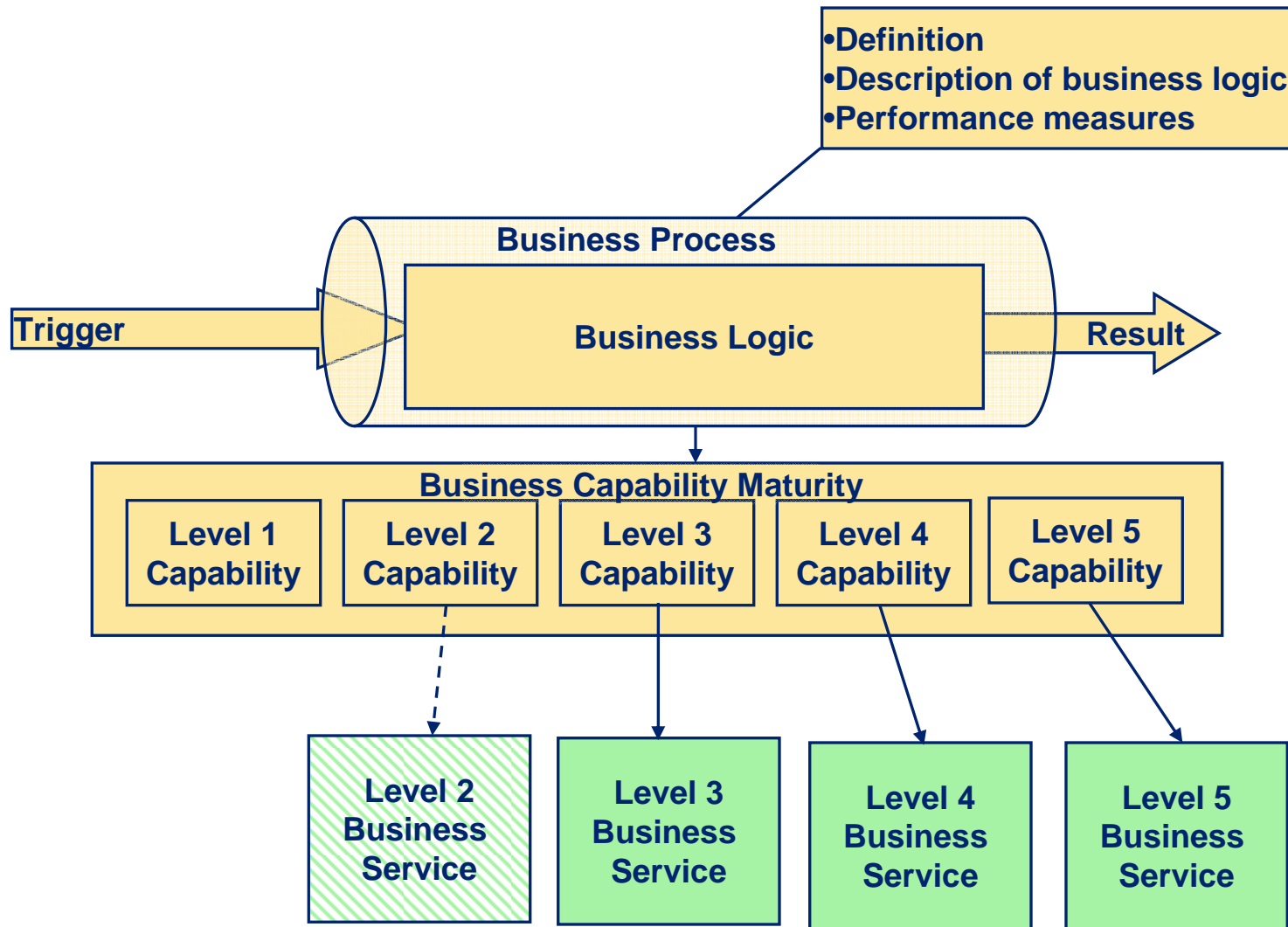


Black Box Concept of a Service

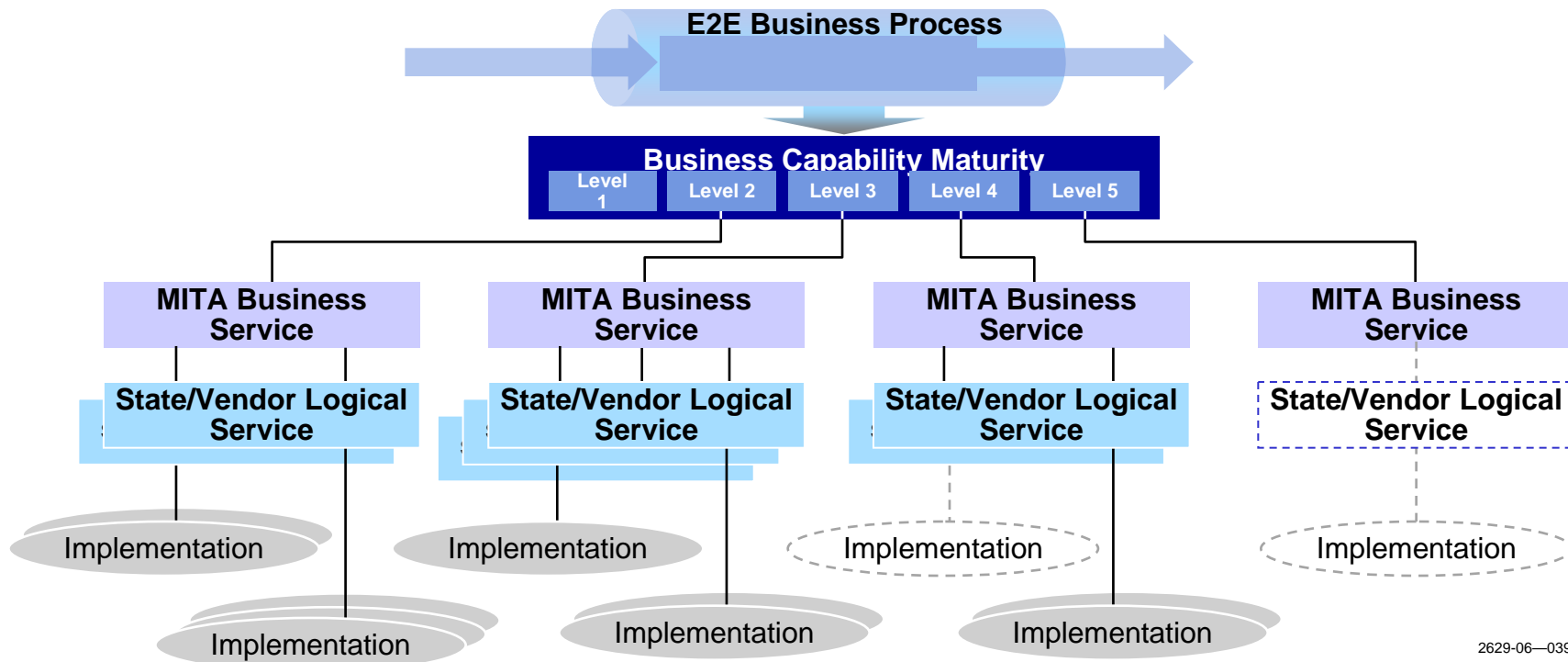




MITA Business Process, Business Capability Matrix, and Business Services



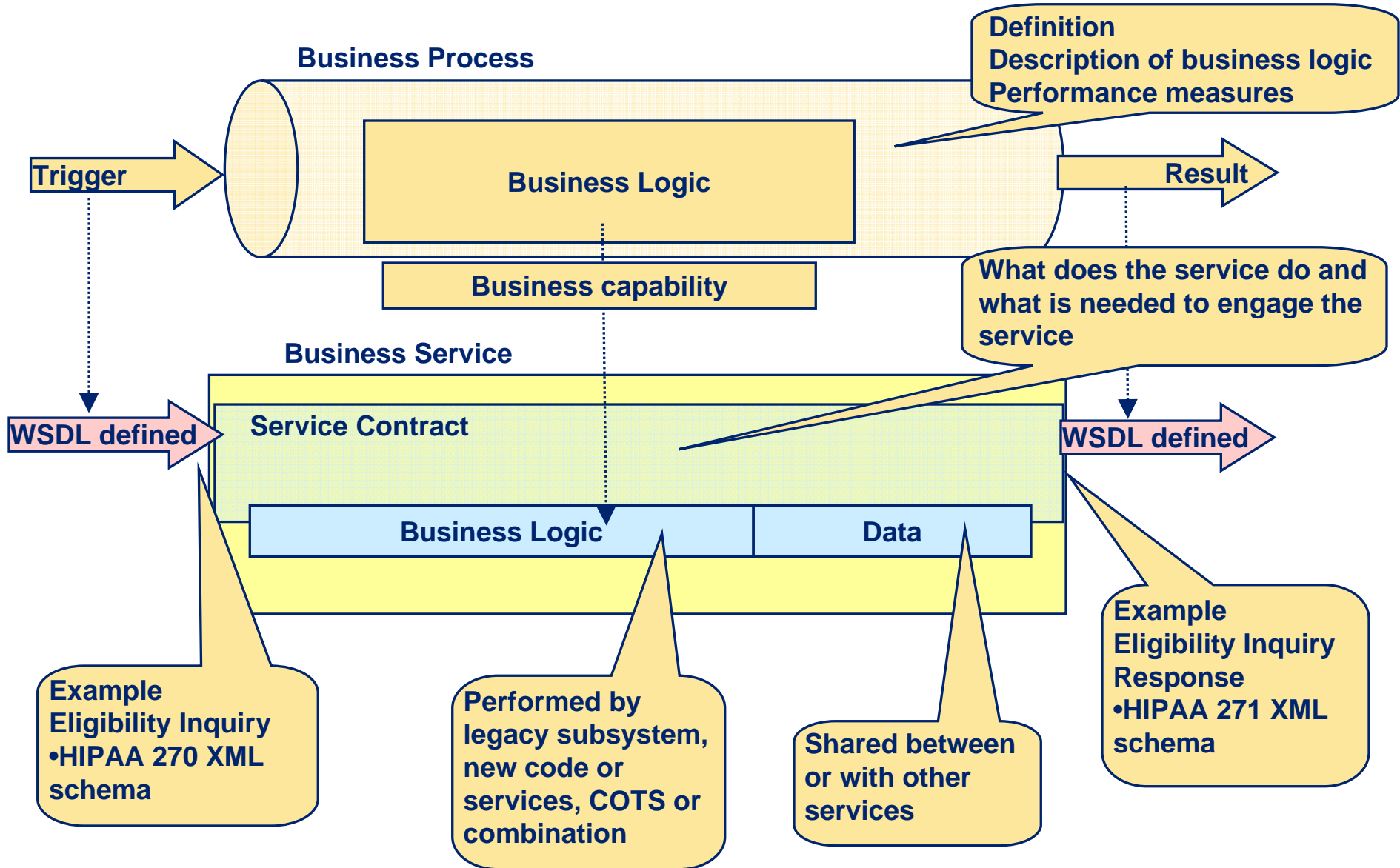
Relationship Between MITA Business Process and Implementation



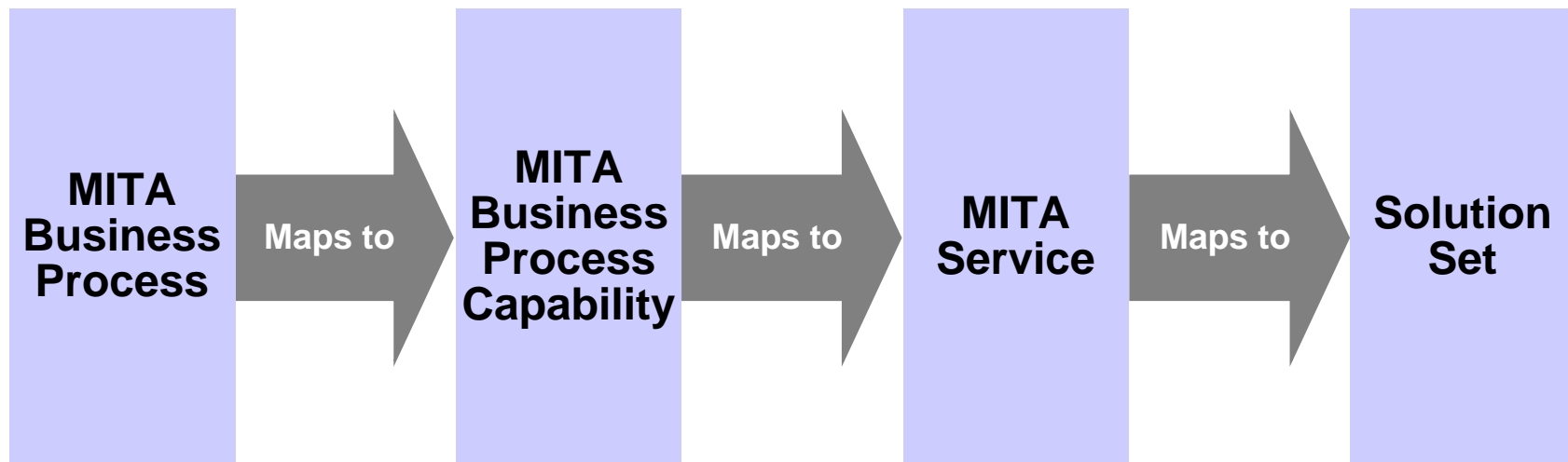
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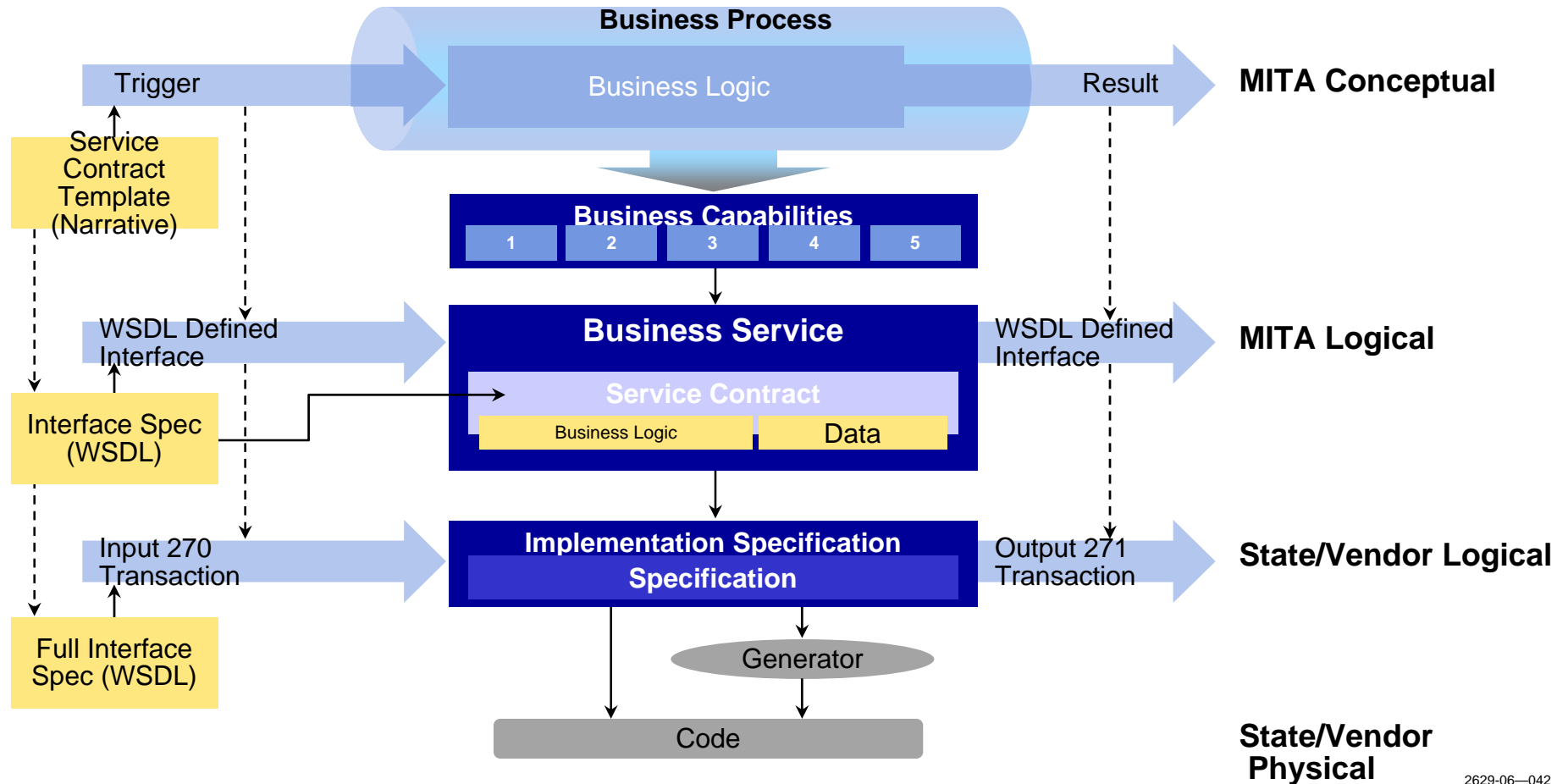
Business Process and Business Service Relationship



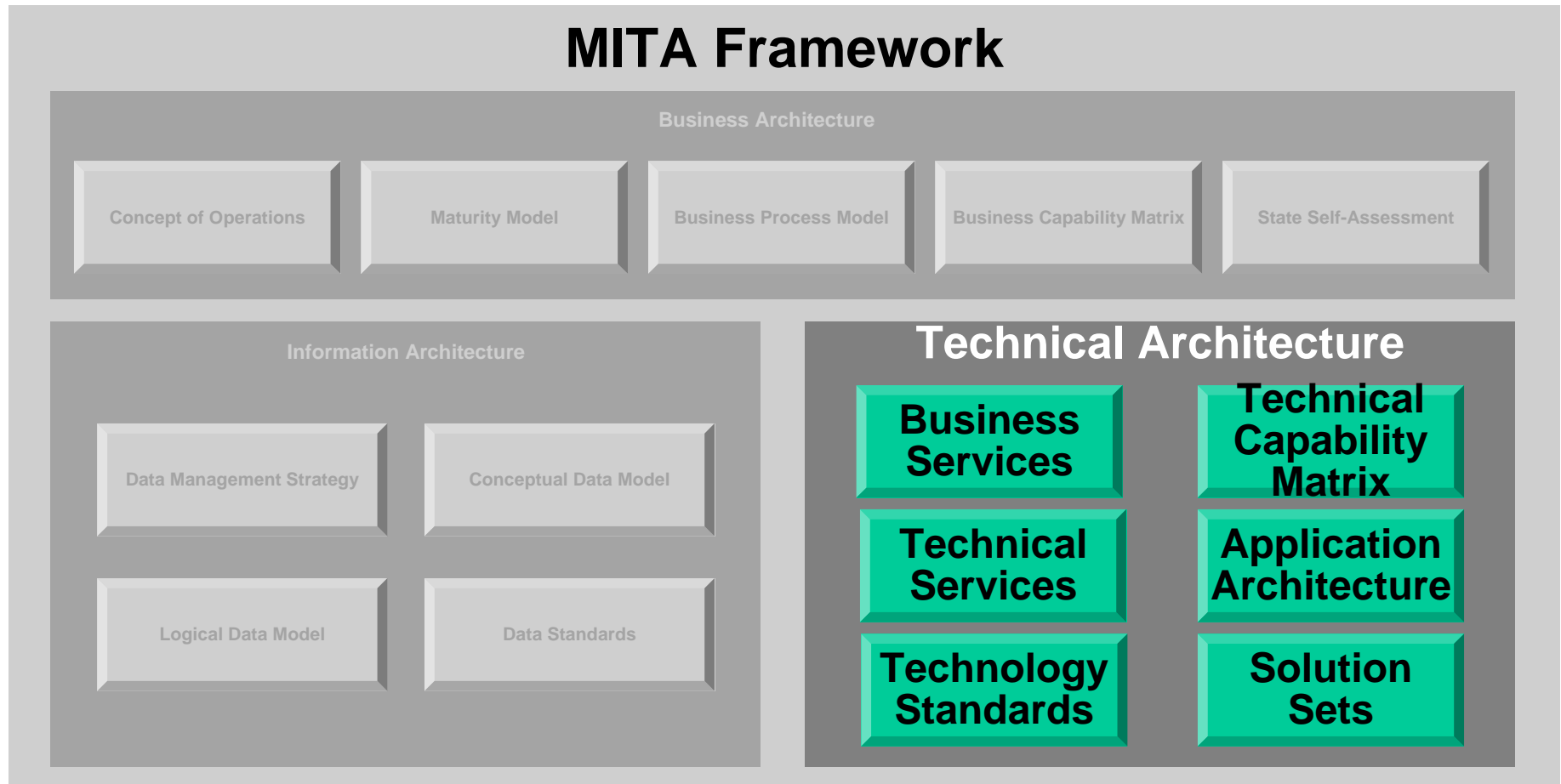
Relationship of Solution Sets to Business Processes



Business Process to Implementation



Overview of the MITA Framework Components





MITA Technical Capability Matrix

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>B.0 Business Enabling Services</u>					
B.1 Forms Management	Manual data entry on hardcopy forms	Online data entry on electronic forms			
B.2 Workflow Management	Manual routing of hardcopy files to individuals involved in processing	Electronic routing of files to business processes and individuals involved in processing Responsible for processing completion and other individual and business processes			
B.3 Business Process Management (BPM)	Manual, by user		Specification and management of business processes in conformance with MITA BPM standards (e.g., Business Process Execution Language [BPEL])		
B.4 Business Relationship Management (BRM)	Manual (e.g., by attaching annotations to case files)		Basic BRM, including tracking relationships between Medicaid system users (e.g., beneficiaries and providers) and the services they have requested and received	Advanced BRM, which includes basic BRM plus analytics support and personalization capabilities	

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
B.5 Foreign Language Support	Manual translation of messages into supported foreign languages		Foreign language translation support for real-time and offline interaction with beneficiaries in designated languages		
<u>B.6 Decision Support</u>					
B.6.1 Data Warehouse			Extracting, transforming, and loading data from multiple databases into a data warehouse that conforms with the MITA Logical Data Model		
B.6.2 Data Marts			Importing data into data marts that conform with the MITA Logical Data Model		
B.6.3 Ad hoc Reporting	Ad hoc reporting, typically using coded procedures	Ad hoc reporting against databases using COTS tools			
B.6.4 Data Mining	Data mining to detect patterns in large volumes of data, typically using coded procedures	Data mining to detect patterns in large volumes of data using COTS tools			
B.6.5 Statistical Analysis	Statistical analyses (e.g., regression analysis), typically using coded procedures	Statistical analyses of designated data (e.g., regression analysis) using COTS tools			



MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Applicable Sources	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
B.6.6 Neural Network Tools	MG2 Level 2	None	Analyses using neural network (e.g., learning) tools			

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Applicable Sources	Level 1 Capabilities	Level 2 Capabilities	Level 3	Level 4	Level 5
<u>A.0 Access Channels</u>						
A.1 Portal Access	<ul style="list-style-type: none"> 1. O4 2. MM Level 2 3. Enroll Provider, Level 2 4. Manage Applicant and Member Communications, Level 2 	Beneficiary and provider access to appropriate Medicaid business functions via manual or alphanumeric devices	Beneficiary and provider access to appropriate Medicaid business functions via portal with single online access point	Beneficiary and provider access to appropriate Medicaid business functions via portal with single online access point		
A.2 Support for Access Devices	<ul style="list-style-type: none"> 1. O4 2. MM Level 2 3. Enroll Provider, Level 2 4. Manage Applicant and Member Communications, Level 2 	Beneficiary and provider access to services via manual submission, alphanumeric (“green screen”) devices, or EDI	Beneficiary and provider access to services via browser, kiosk, voice response system, or mobile phone	Beneficiary and provider access to services online via PDA		

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>I.0 Interoperability</u>					
<u>I.1 Service-Oriented Architecture</u>					
I.1.1 Service Structuring and Invocation	Non-standardized definition and invocation of services	Service support using architecture that does not comply with published MITA service interfaces and interface standards	Services support using architecture that complies with published MITA interfaces and interface standards	Services support using a cross-enterprise services registry (to be verified)	
I.1.2 Enterprise Service Bus	None or non-standardized application integration	Reliable messaging, including guaranteed message delivery (without duplicates) and support for nondeliverable messages	MITA-compliant ESB	MITA-compliant ESB interoperable outside of a State Medicaid agency	
I.1.3 Orchestration and Composition	Non-standardized approaches to orchestration and composition of functions within and across the Medicaid Management Information System (MMIS)		MITA-standard approach to orchestrating and composing services		
I.2 Standards-Based Data Exchange	Ad hoc formats for data exchange		Data exchange (internally and externally) using MITA standards		Data exchange (internally and externally) in conformance with MITA-defined semantic data standards (ontology-based)
I.3 Integration of Legacy Systems	Ad hoc, point-to-point approaches to systems integration		Service-enabling legacy systems using MITA-standard service interfaces		

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>D.0 Data Management and Sharing</u>					
D.1 Data Exchange Across Multiple Organizations	Manual data exchange between multiple organizations, sending data requests via telephone or e-mail to data processing organizations and receiving requested data in nonstandard formats and in various media (e.g., paper)	Electronic data exchange with multiple organizations via a MITA information hub using secure data, in which the location and format are transparent to the user and the results are delivered in a defined style that meets the user's needs	Electronic data exchange with multiple organizations via a MITA information hub that can perform advanced information monitoring and route alerts/alarms to communities of interest if the system detects unusual conditions		
D.2 Adoption of Data Standards	No use of enterprise-wide data standards	Data model that conforms to the MITA model and maps data exchanged with external organizations to this model	Data model that conforms all shared data used by a State Medicaid agency's business processes to the MITA model	Data model that conforms all shared data used by a State Medicaid agency's business processes to the MITA model and includes standards for clinical data and electronic health records	Data model that conforms all shared data used by a State Medicaid agency's business processes to the MITA model and that includes national standards for clinical data and electronic health records and other public health and national standards

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>P.0 Performance Measurement</u>					
P.1 Performance Data Collection and Reporting		Collect and report using predefined and ad hoc reporting methods and currently defined performance metrics	Define, implement, collect, and report using a set of business process-related performance metrics that conform to MITA-defined performance metrics	Generate alerts and alarms when the value of a metric falls outside limits	
P.2 Dashboard Generation		Generate and display summary-level performance information (i.e., performance dashboards)	Generate and display summary-level performance information (i.e., performance dashboards) within a State Medicaid agency for all MITA-defined metrics		Generate and display summary-level performance information (i.e., performance dashboards) from external sources (e.g., other States and agencies) within a State Medicaid agency for all MITA-defined metrics

MITA Technical Capability Matrix (continued)

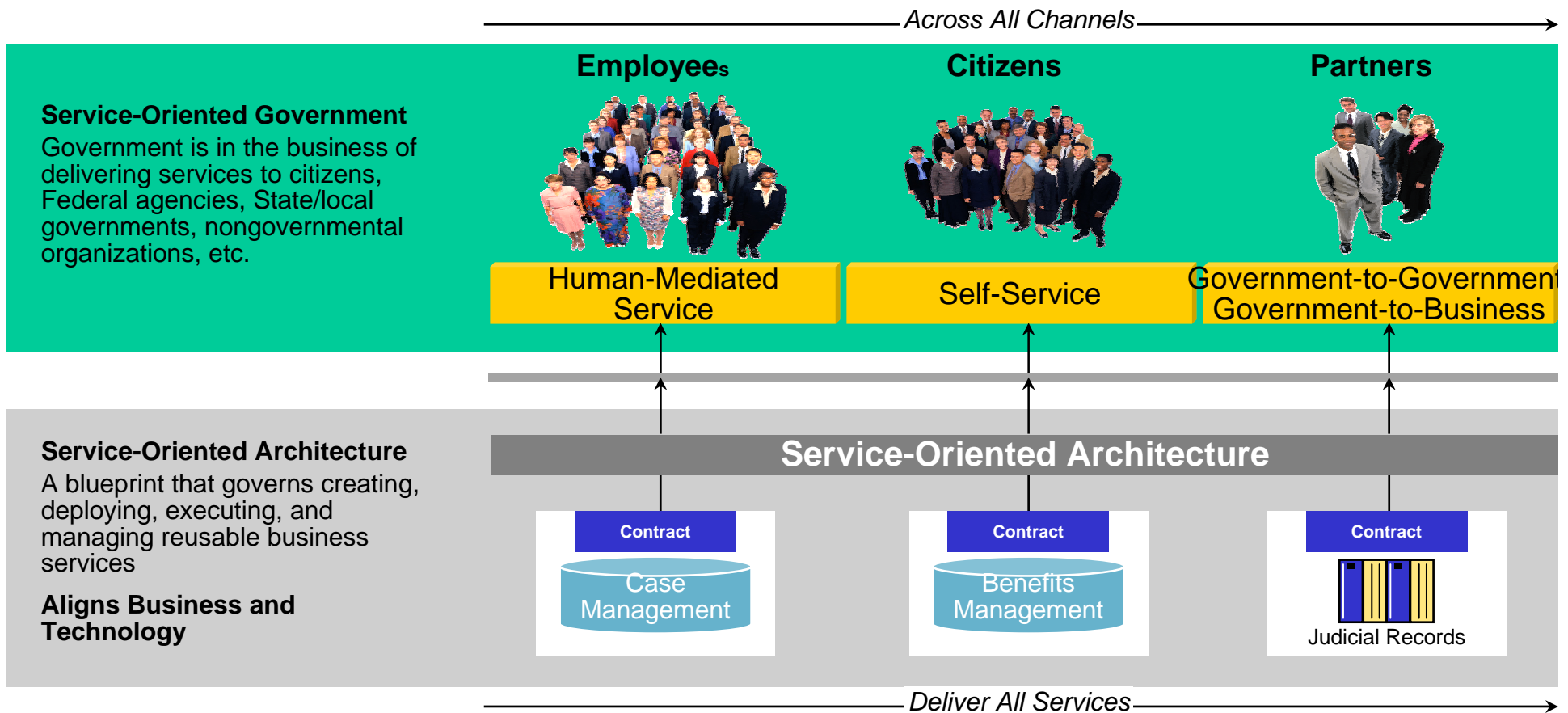
Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>S.0 Security and Privacy</u>					
S.1 Authentication	Access to MMIS system capabilities via logon ID and password		User authentication using public key infrastructure in conformance with MITA-identified standards		
S.2 Authentication Devices			Support for user authentication via kiosks based on fingerprints and delivery of results to authentication and authorization functions	Support for user authentication via SecureID tokens and delivery of results to authentication and authorization functions	Support for user authentication via kiosks based on retinal scans and delivery of results to authentication and authorization functions
S.3 Authorization and Access Control		User access to system resources depending on their role at sign-on			
S.4 Intrusion Detection	TBD	TBD	TBD	TBD	TBD
S.5 Logging and Auditing	Manual logging and analysis	Access to the history of a user's activities and other management functions, including logon approvals and disapprovals and log search and playback			
S.6 Privacy	Procedural controls to ensure privacy of information		Access restriction to data elements based on defined access roles		

MITA Technical Capability Matrix (continued)

Technical Area/Technical Function	Level 1 Capabilities	Level 2 Capabilities	Level 3 Capabilities	Level 4 Capabilities	Level 5 Capabilities
<u>F.0 Flexibility – Adaptability and Extensibility</u>					
F.1 Rules-Driven Processing	Manual application of rules (and consequent inconsistent decision making)		Linking a defined set of rules into business processes or using applications executed with a Basic Rules Management System (often called a Rules Engine)		
F.2 Extensibility	Extensions to system functionality that require pervasive coding changes		Services with points at which to add extensions to existing functionality (changes highly localized)		
F.3 Automate Configuration and Reconfiguration Services	Configuration and reconfiguration of distributed application that typically requires extensive hard-coded changes across many software components and/or applications across the enterprise (and with significant disruption)			Consistent distributed applications using common business change processes that coordinate between active components and ensure minimal disruption	Consistent distributed applications using common business change processes that coordinate between active components and ensure minimal disruption
F.4 Introduction of New Technology	Technology-dependent interfaces to applications that can be significantly affected by the introduction of new technology		Technology-neutral interfaces that localize and minimize the impact of the introduction of new technology (e.g., data abstraction in data management services to provide product-neutral access to data based on metadata definitions)		

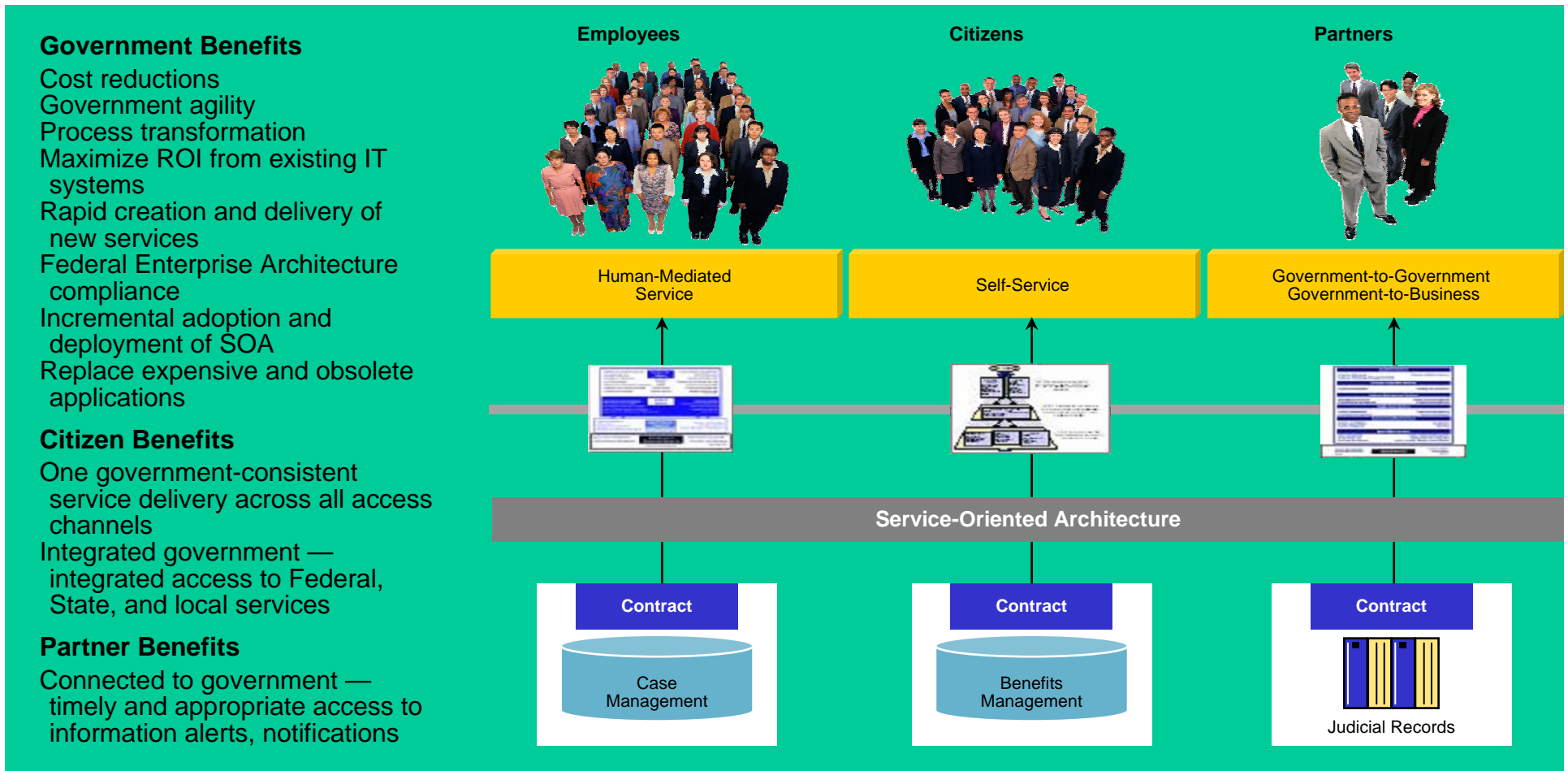
Service Oriented Architecture Approach

Service-Oriented Architecture



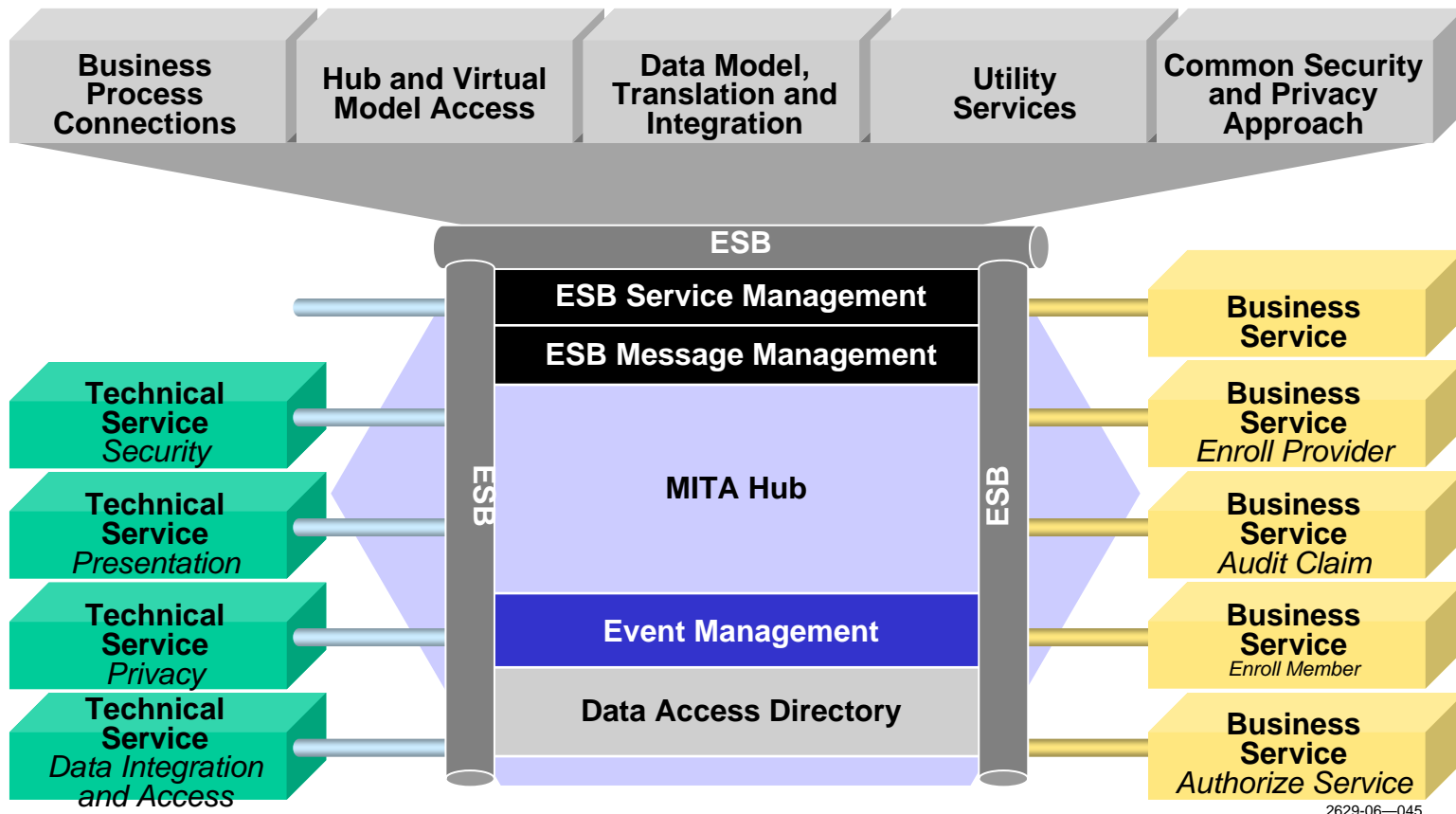
Service Oriented Government and Architecture

Business Impact — Enterprise SOA





Conceptual Interoperability Capability



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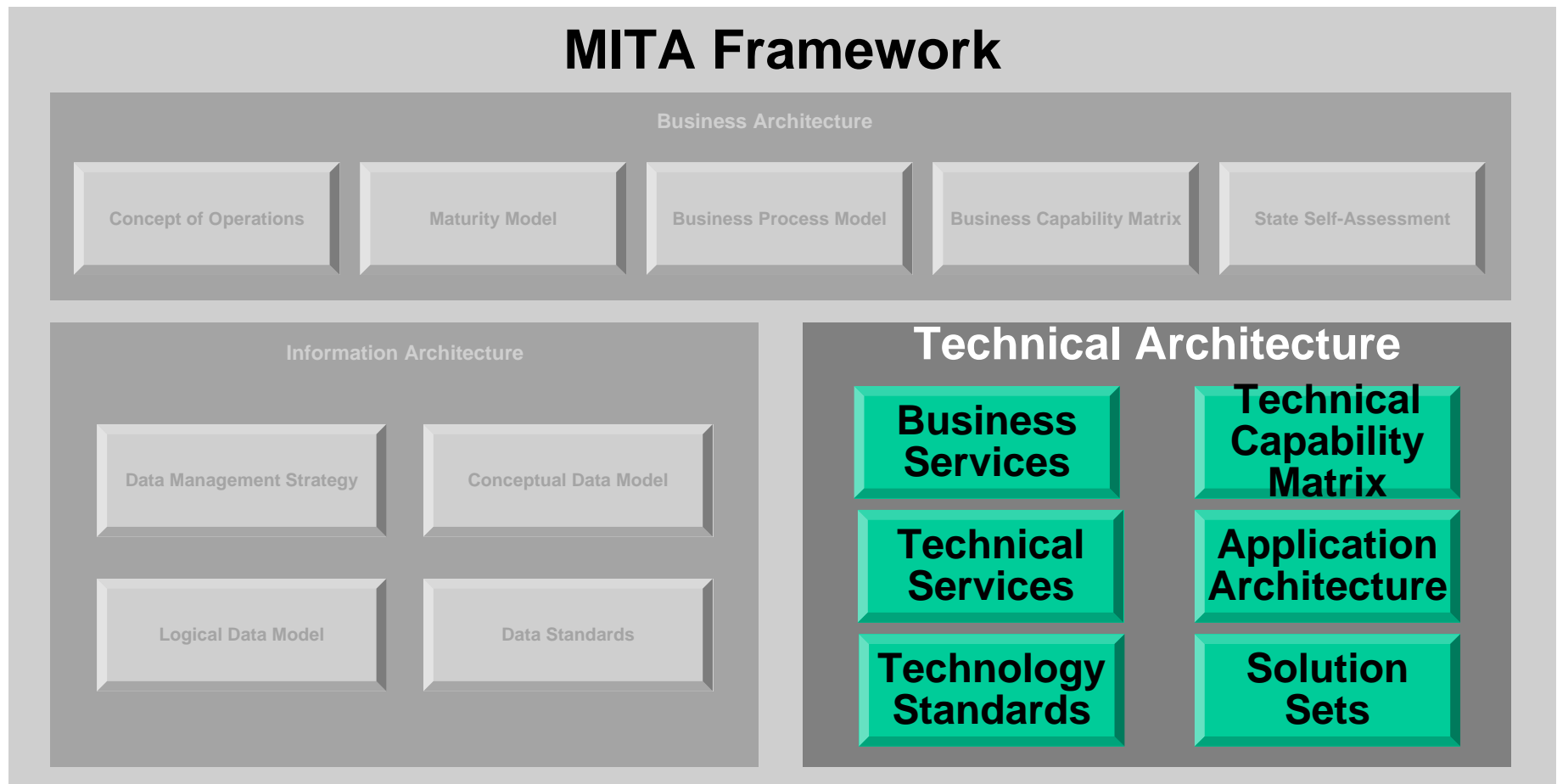
The Interoperability Technical Area

Question	Answer
<i>Why is this technical area important to MITA?</i>	The interoperability technical area describes the business capabilities and technical functionality necessary to achieve efficient system-to-system interactions within Medicaid programs and between Medicaid and other external initiatives for MITA.
<i>Who should understand this technical area?</i>	Designers and implementers should understand the concepts presented in the interoperability model to incorporate those concepts into system designs.
<i>How will this model be used?</i>	The interoperability technical area will provide guidance and recommendations that support the development and implementation of services and data that can be shared among the MITA community, while still allowing States to retain their autonomy. The States can follow the model to achieve cross-organizational information sharing through a common approach.
<i>How will it be refined and updated?</i>	The interoperability technical area will be reviewed along with the rest of the MITA Framework. Based on the findings of this review, changes may be made to the capabilities and services. Detailed interoperability guidelines and standards will be selected or defined.
<i>How will it support ongoing business decision making?</i>	New IT procurements should adopt these concepts of MITA interoperability.

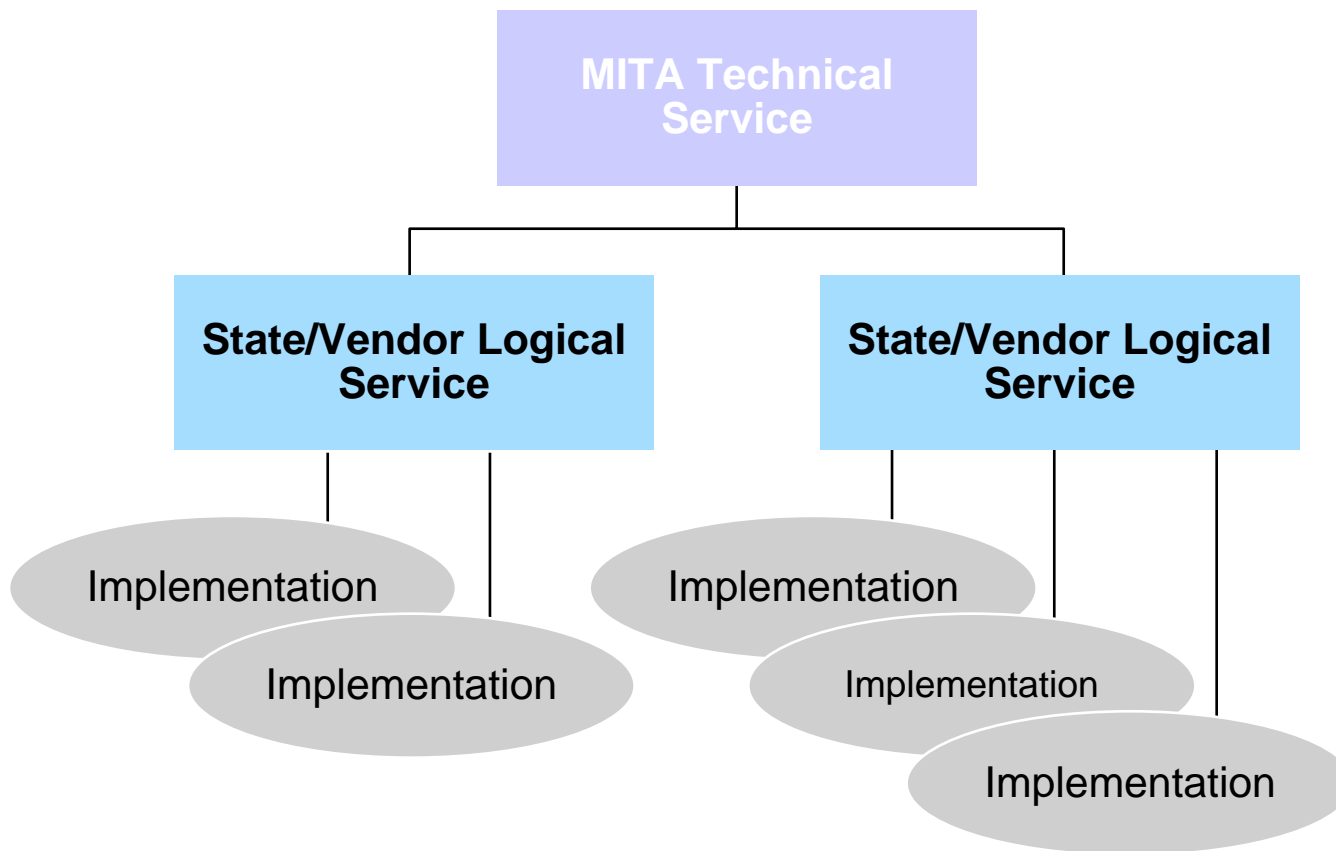
The Data Access Technical Area

Question	Answer
<i>Why is this technical area important to MITA?</i>	The data access technical area describes the data access capabilities and functionality necessary to achieve efficient service-to-data interactions within Medicaid programs and between Medicaid and other external initiatives for MITA.
<i>Who should understand this technical area?</i>	Designers and implementers should understand the presented concepts in order to incorporate those concepts into system designs.
<i>How will this model be used?</i>	This model provides guidance and recommendations that support the development and implementation of data access services that can be shared among the MITA community, while enabling States to retain their autonomy. The States can use the services to achieve cross-organizational information sharing through a common approach.
<i>How will it be refined and updated?</i>	The technical area will be reviewed along with the rest of the MITA Framework. Based on the findings of this review, changes may be made to the capabilities and services. Detailed interoperability guidelines and standards will be selected or defined.
<i>How will it support ongoing business decision making?</i>	New IT procurements should adopt these MITA data access concepts.

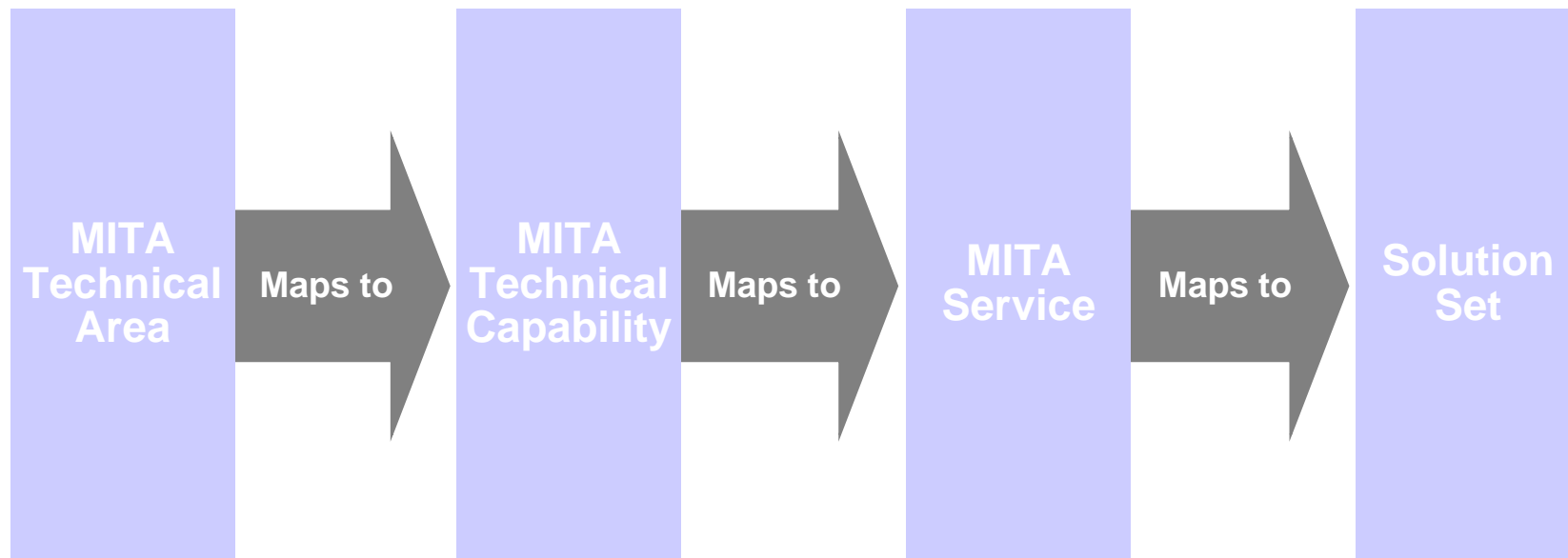
Overview of the MITA Framework Components



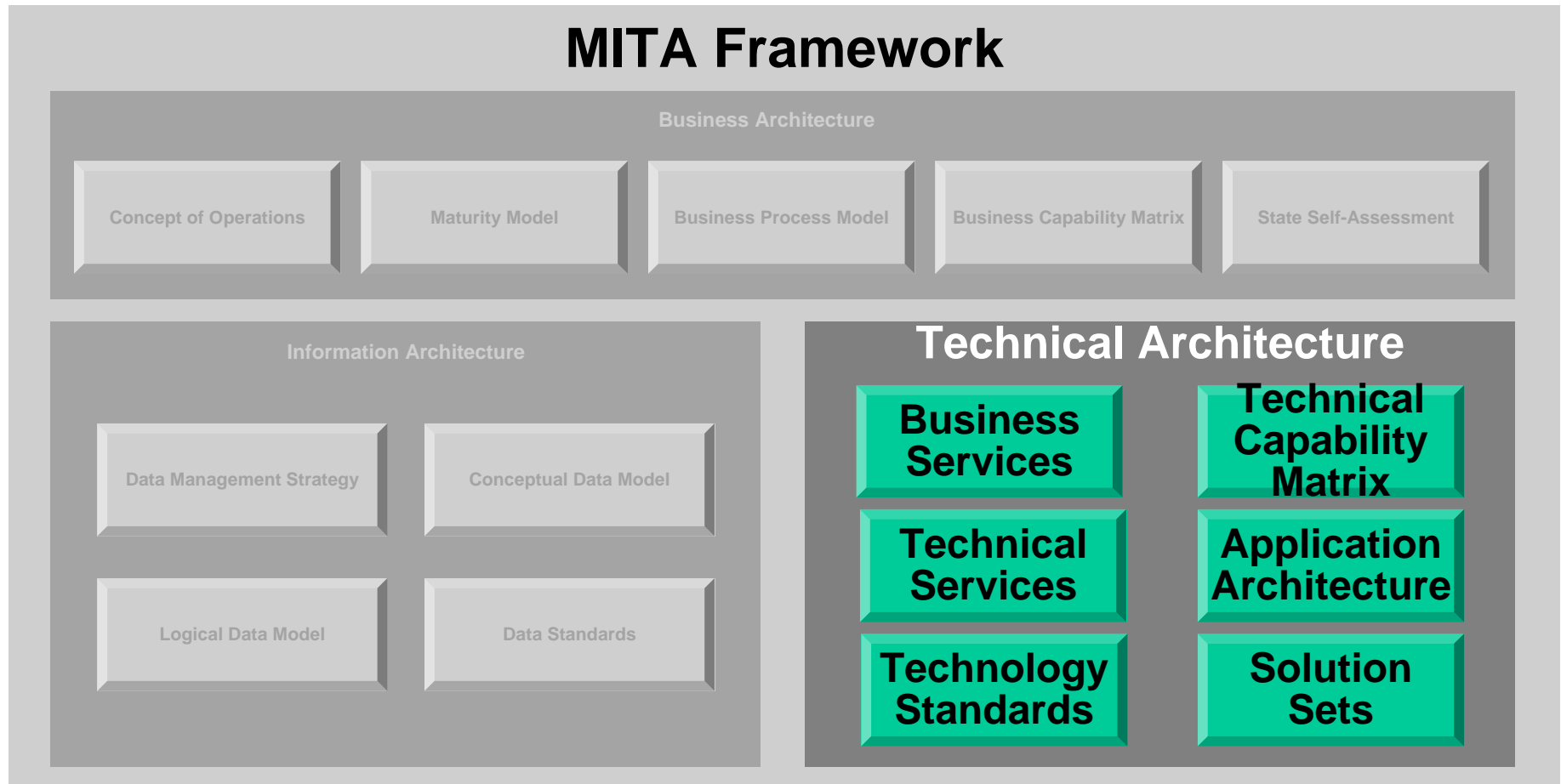
Technical Service Implementations



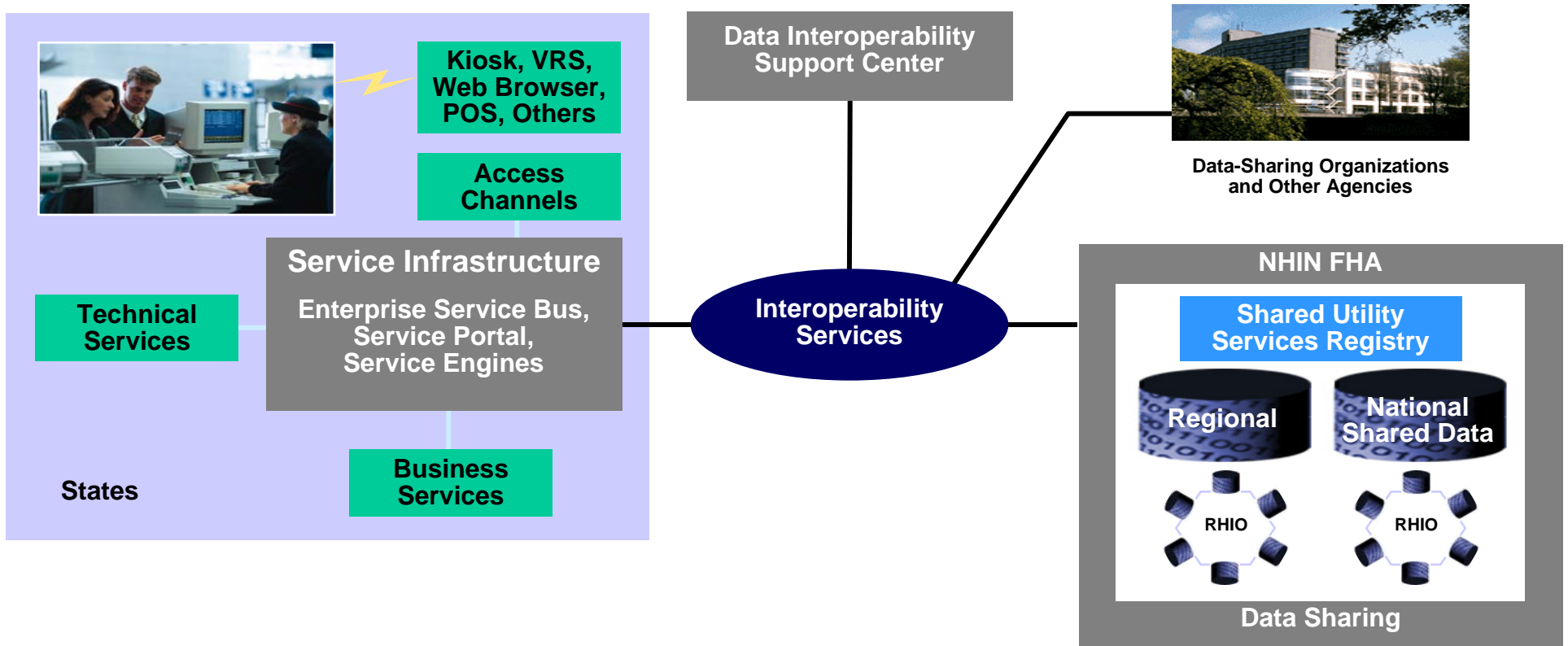
Conceptual Relationship Between Technical Solution sets and Technical Areas



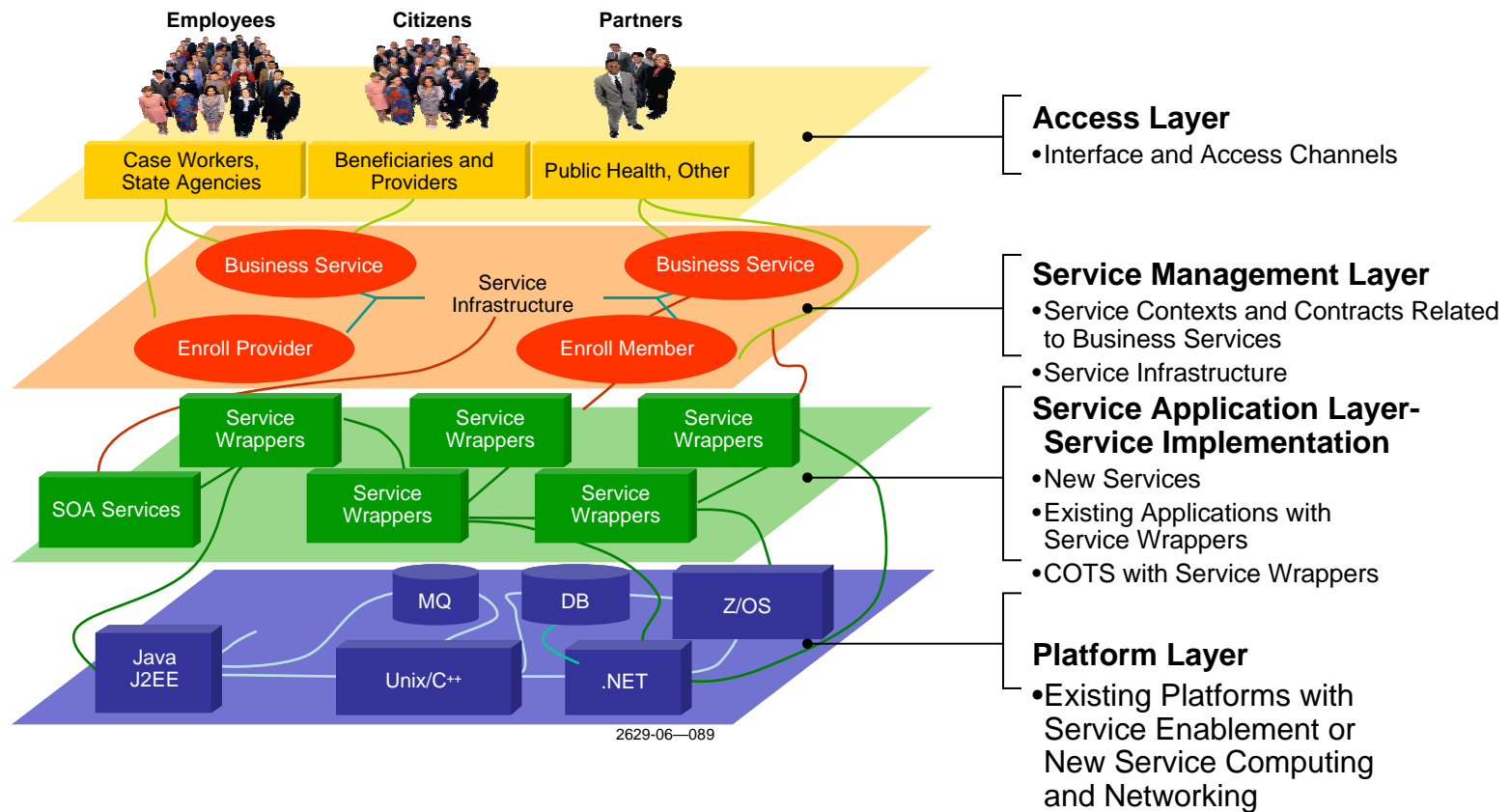
Overview of the MITA Framework Components



Conceptual Technical Architecture Diagram

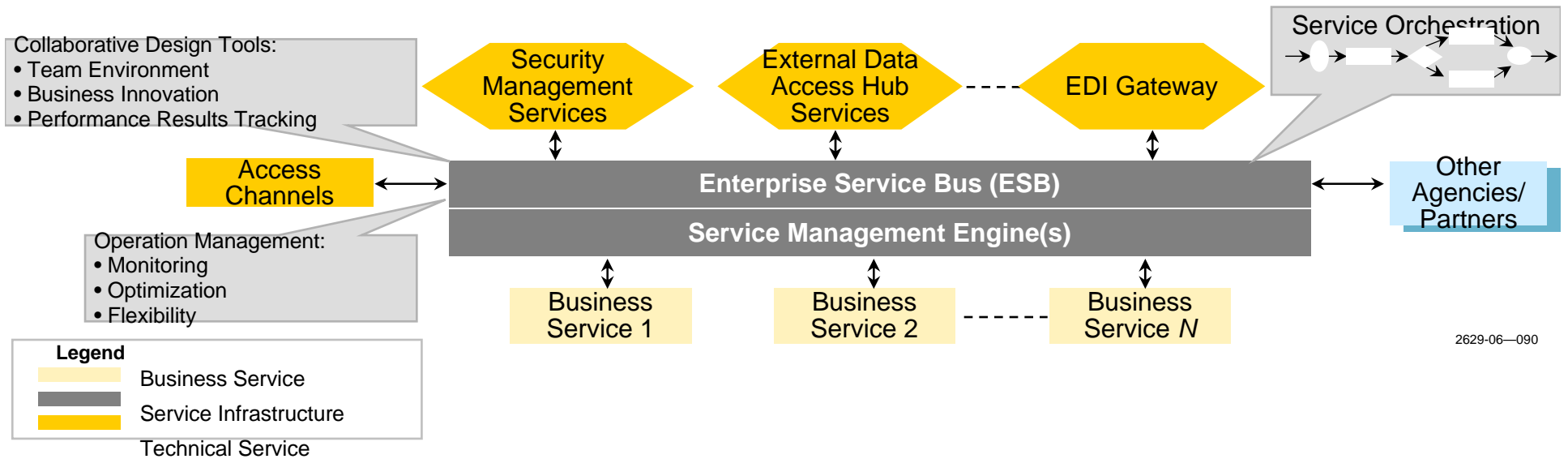


Multilayer Application Architecture Model



Multilayer Application Architecture Model

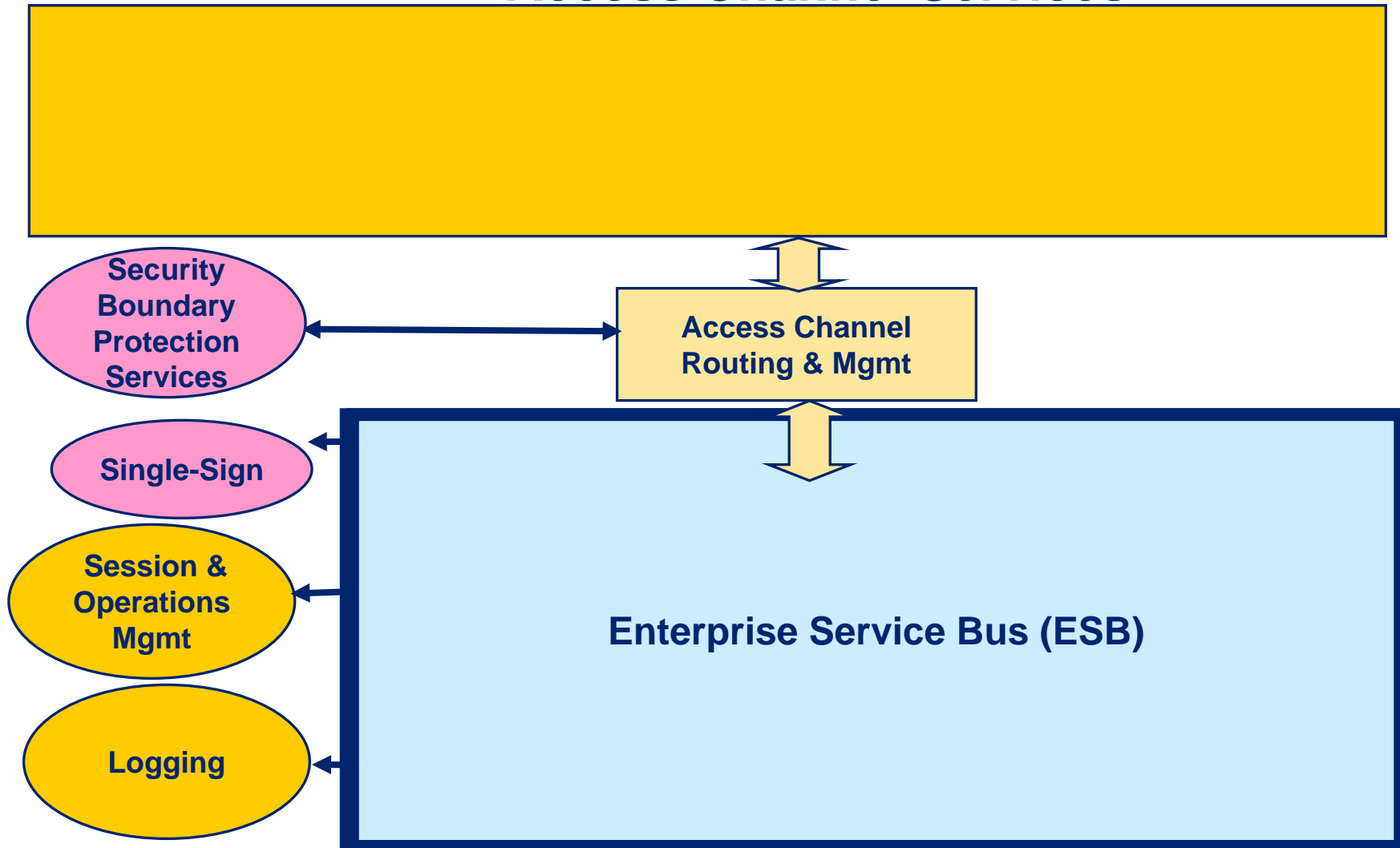
Service Infrastructure



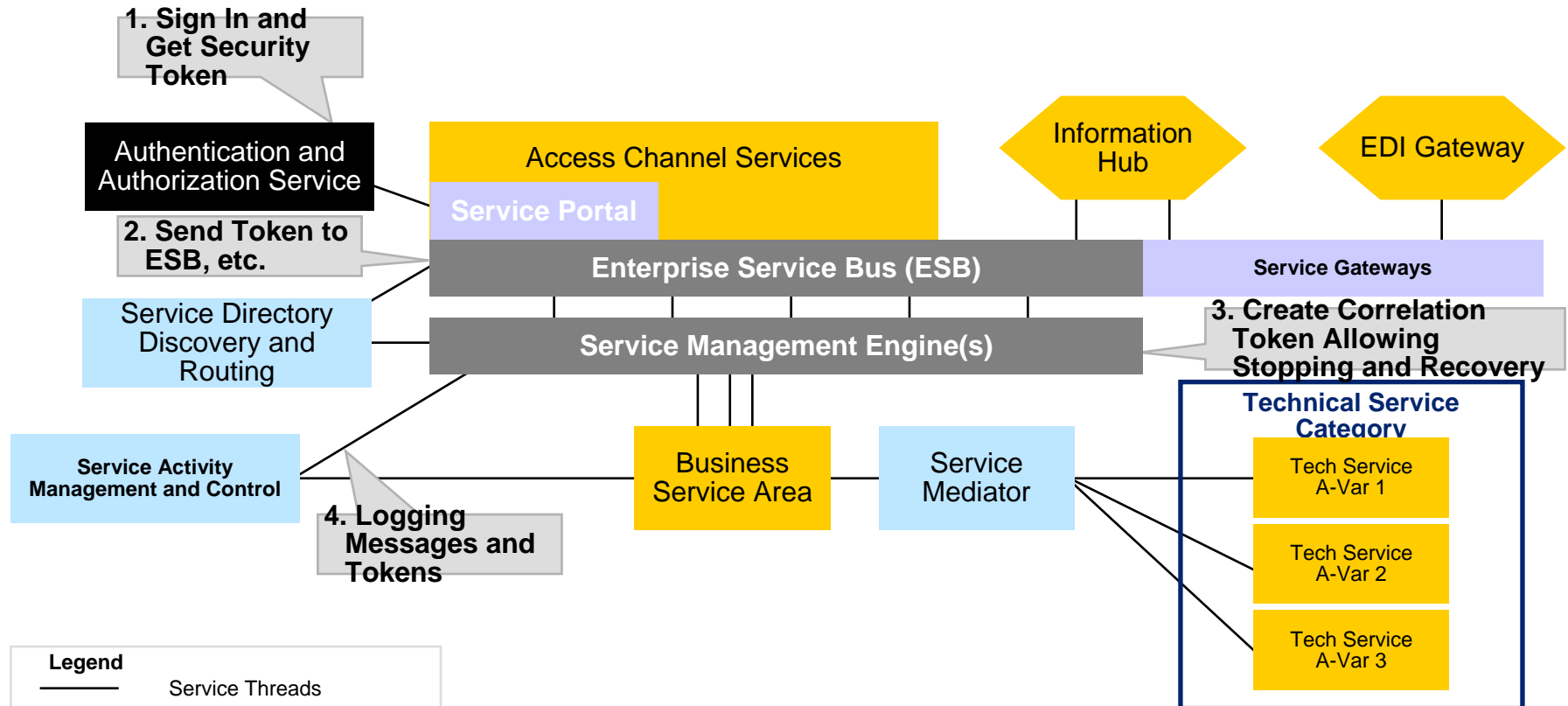
Service Infrastructure

Enterprise Service Bus and Access Channel Services

Access Channel Services



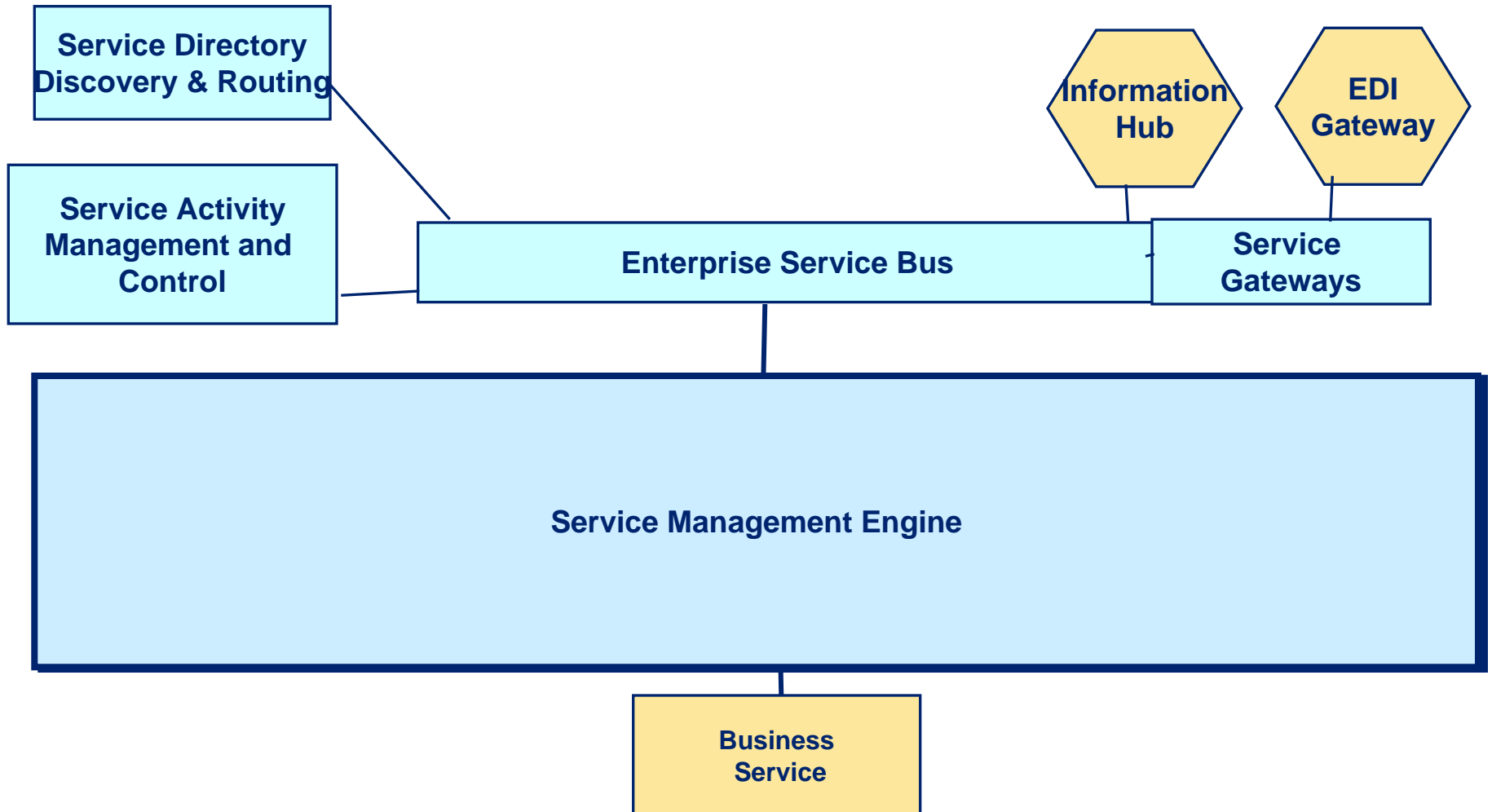
Service Infrastructure's Operation Concept of Security



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Service Infrastructure — Security

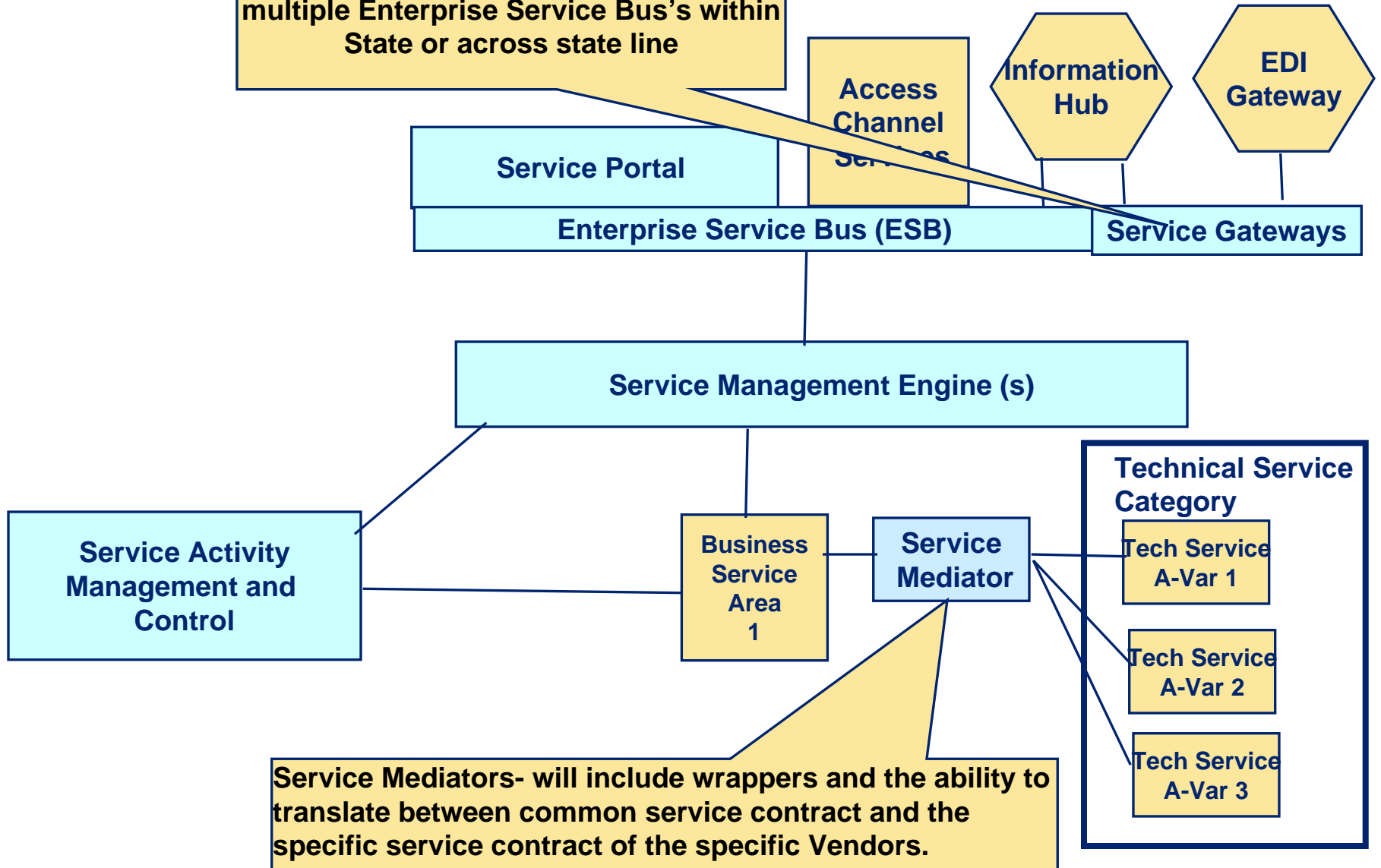
Service Infrastructure - Service Management Engine





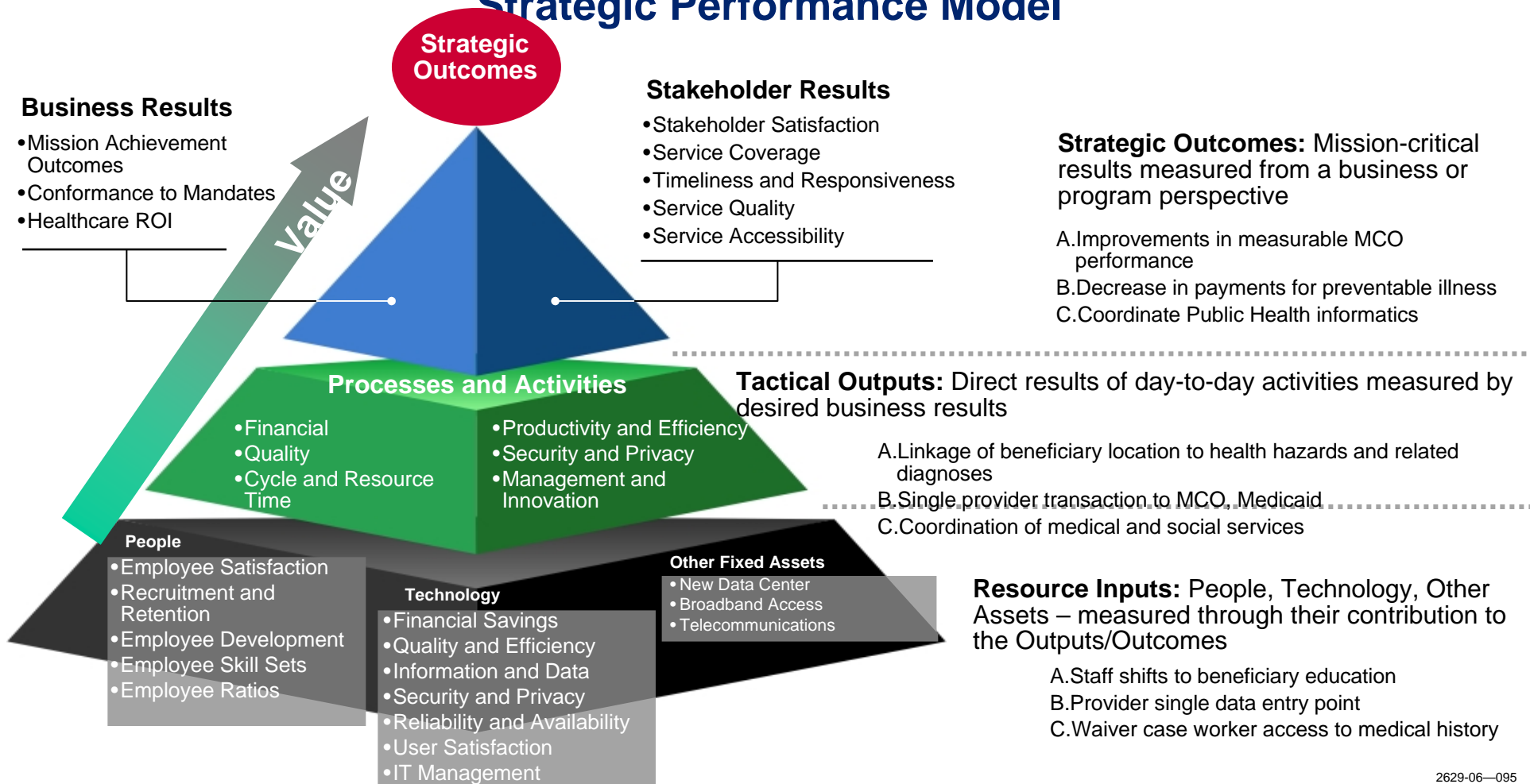
Service Gateways and Service Mediators

Define Service Gateways: Link between multiple Enterprise Service Bus's within State or across state line



Service Mediators- will include wrappers and the ability to translate between common service contract and the specific service contract of the specific Vendors.

Strategic Performance Model



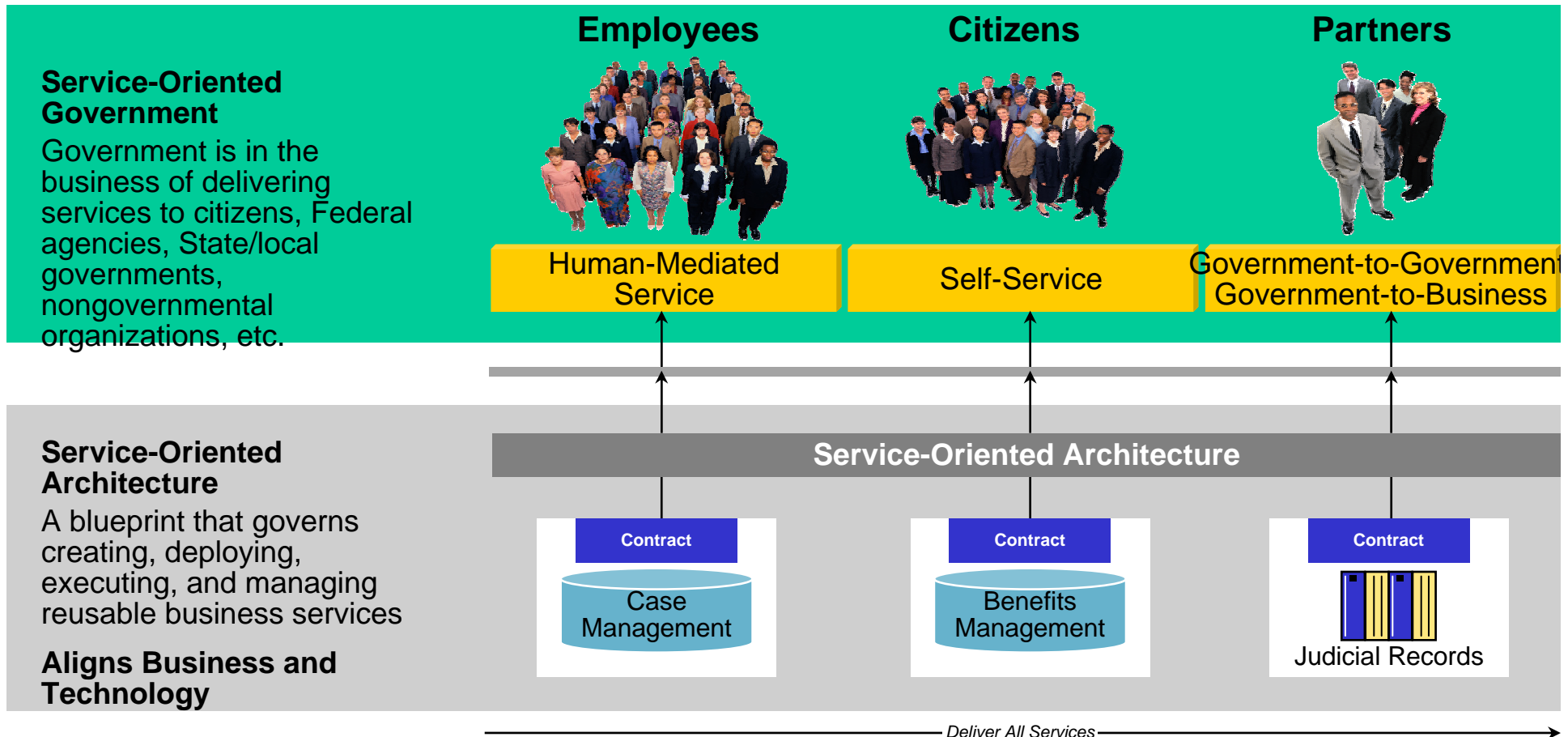
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Measurements are taken at every level: Strategic, Tactical, Resources

Service Oriented Architecture

Service-Oriented Architecture

Across All Channels

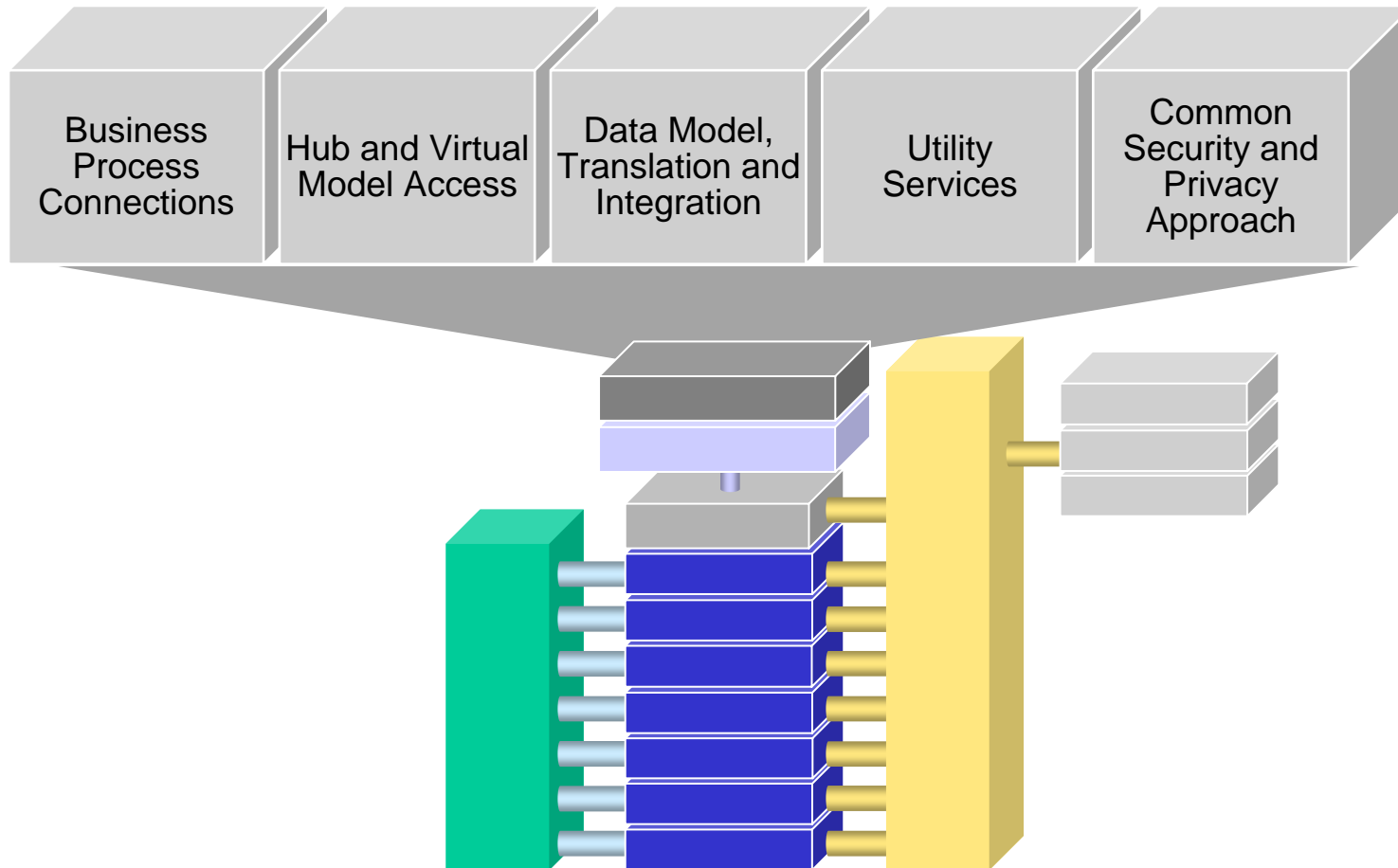


The Access Channel Model

Question	Answer
<p>Why is the Access Channel Model important to MITA?</p>	<p>The Access Channel Model shows multiple access channels supported by utility services. Easy data access will transform the Medicaid business. The key concept is the importance of separating access channels from interoperability channels.</p>
<p>Who should understand the Access Channel Model?</p>	<p>Designers and implementers of systems should evaluate possible access channels and interoperability channels to make data as readily available as possible.</p>
<p>How will the Access Channel Model be used?</p>	<p>System designers and implementers should adopt an architecture that separates access channels from interoperability channels and uses common utility services to simplify development. These utilities may be nationally shared or shared within a State or among certain Medicaid systems.</p>
<p>How will the Access Channel Model be refined and updated?</p>	<p>The Interoperability Portfolio will update the Access Channel Model. Detailed interoperability guidelines and standards will be selected or defined.</p>
<p>How will the Access Channel Model support ongoing business decision making?</p>	<p>New IT procurements should adopt the concepts of isolating access and interoperability through the use of utility services</p>

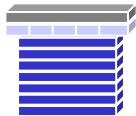


Conceptual Interoperability Model



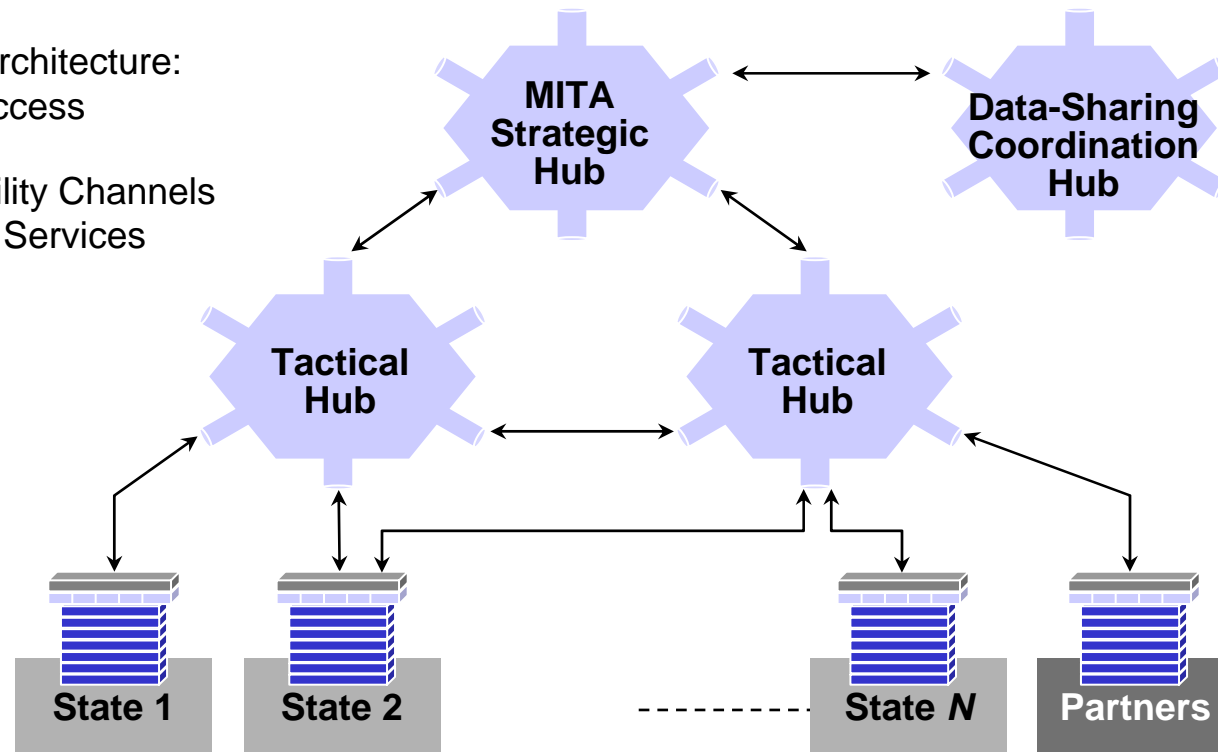
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Logical Interoperability Model



Application Architecture:

- Common Access Channels
- Interoperability Channels
- Initial Utility Services



2629-06-097

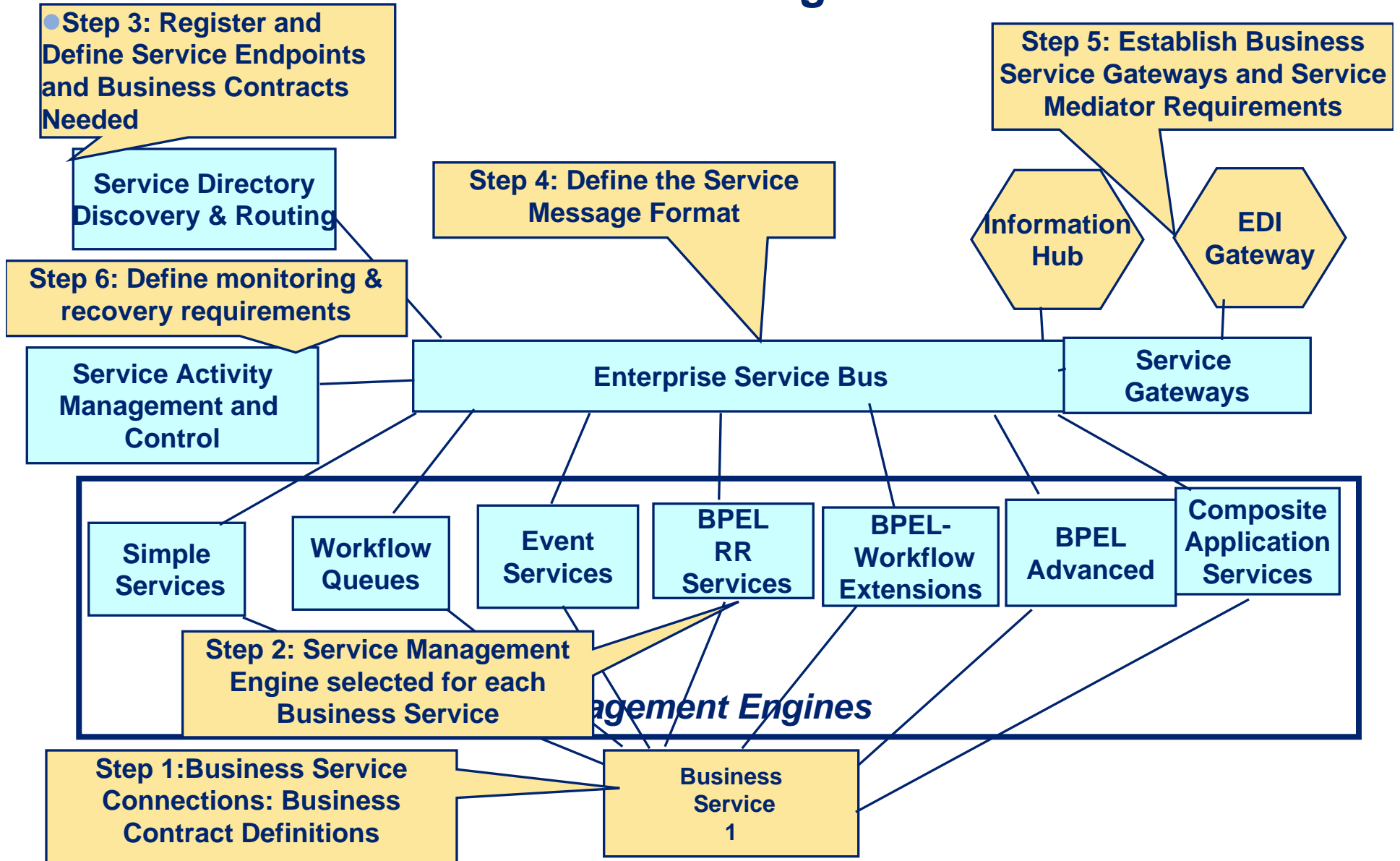
The Interoperability Model

Question	Answer
Why is the Interoperability Model important to MITA?	The Interoperability Model describes the business capabilities and technical functionality necessary to achieve efficient system-to-system interactions within Medicaid programs and between Medicaid and other MITA initiatives.
Who should understand the Interoperability Model?	Designers and implementers should understand the concepts in the Interoperability Model and incorporate them into system designs.
How will the Interoperability Model be used?	The Interoperability Model will provide guidance and recommendations that support the development and implementation of services and data that the MITA community can share, although States will retain their autonomy. States can follow the model to achieve cross-organizational information sharing through a common approach.
How will the Interoperability Model be refined and updated?	The Interoperability Portfolio will update the Interoperability Model. The next steps will be development of detailed interoperability specifications.
How will the Interoperability Model support ongoing business decision making?	New IT procurements should adopt these concepts of MITA interoperability.

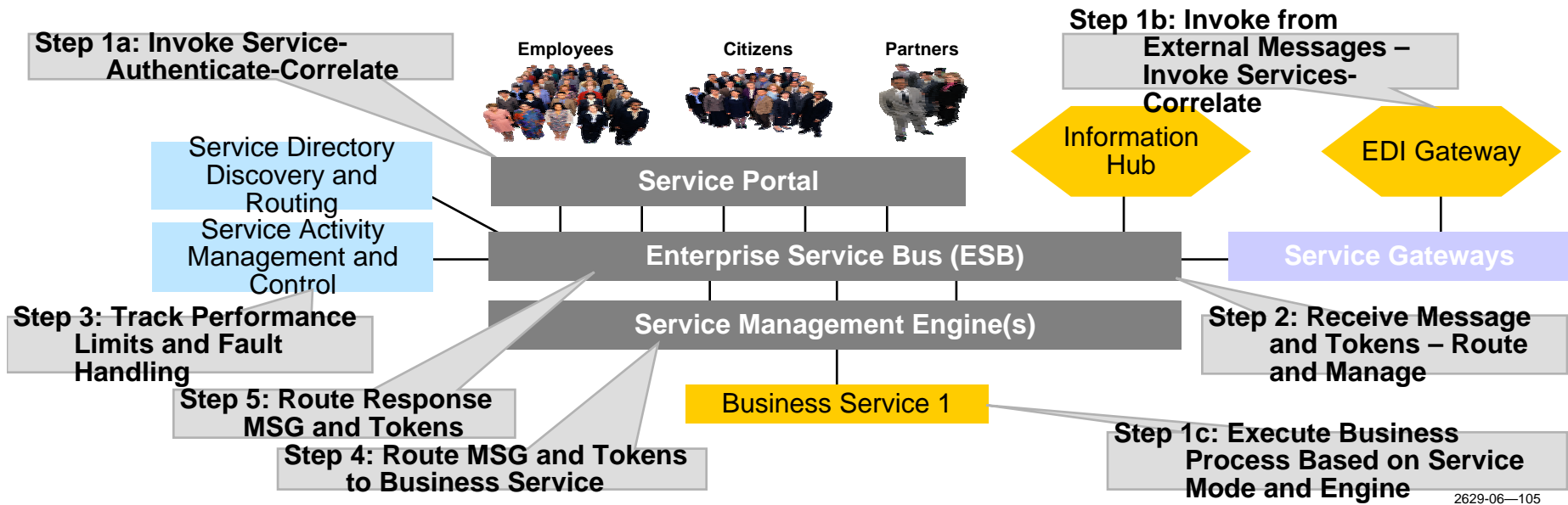
Description of Candidate Future Interoperability Activities

Activities	Description
Refine Interoperability Models by defining interoperability channels	Define specific interoperability channels for the business and technical levels, giving attention to both healthcare protocol calls and transport, service, and message protocols.
Define Interoperability Standards	Identify initially preferred standards and other standards
Interface Specification Project	Define business area interfaces and create interface specifications.
Logical Hub Definition and Development Project	Create a sample hub for a specific purpose and with limited participation and use it as a generic design for hub configurations.
Message Exchange Formats Project	Define external initiative message exchange formats.
Define and Develop Interoperability Utility Services	Define in greater detail the utility services and related interoperability channels needed for interoperability. Develop a basic set of interoperable utility services and connect to the related S&P utility services and those involved with adaptation and flexibility.
Hub Development Project(s)	Select a business problem for interoperability, both as an external initiative and as an internal business improvement. The series of tactical, strategic, and data coordination hubs will be developed.

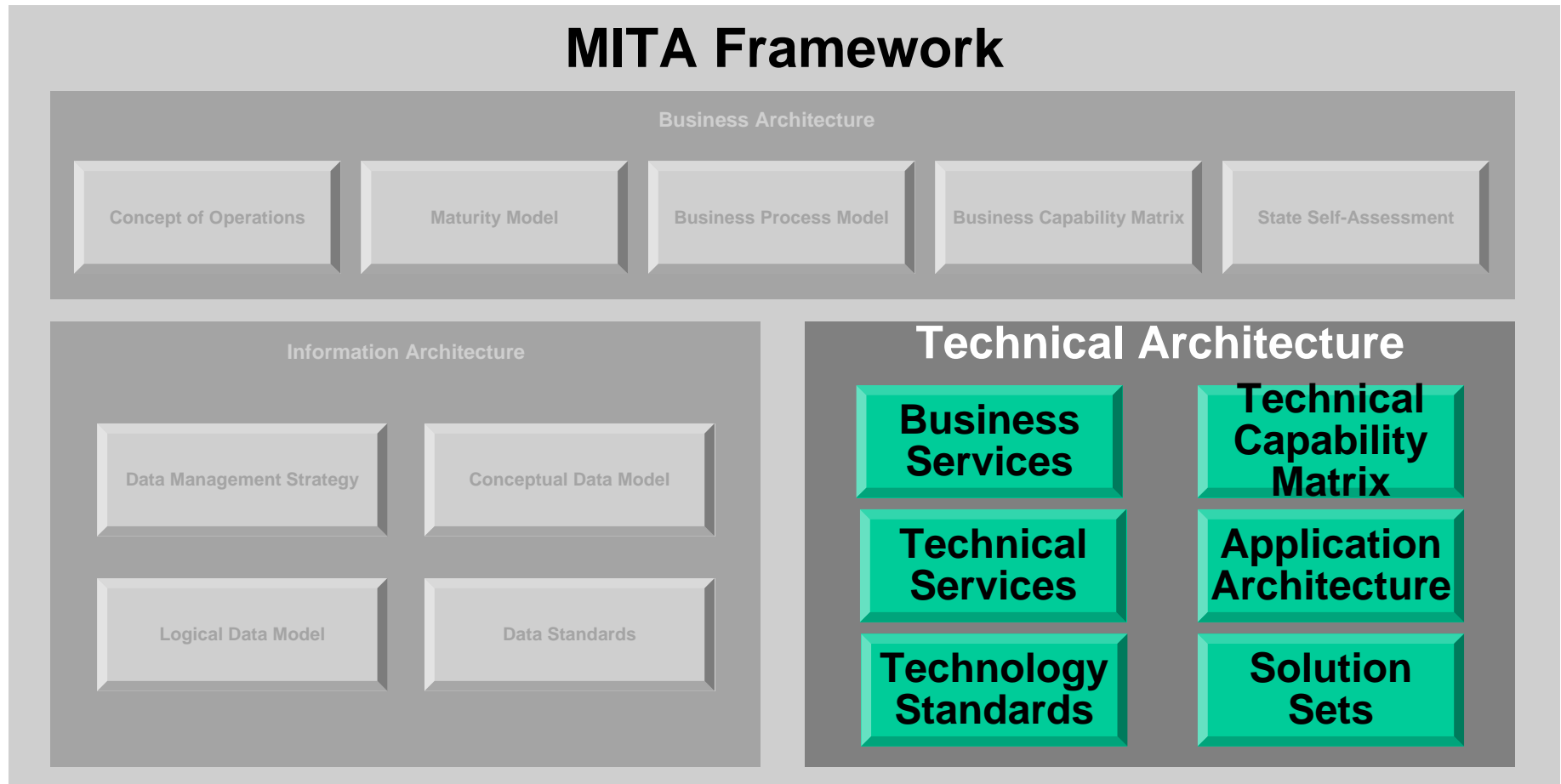
Service Infrastructure – Adding a Business Service



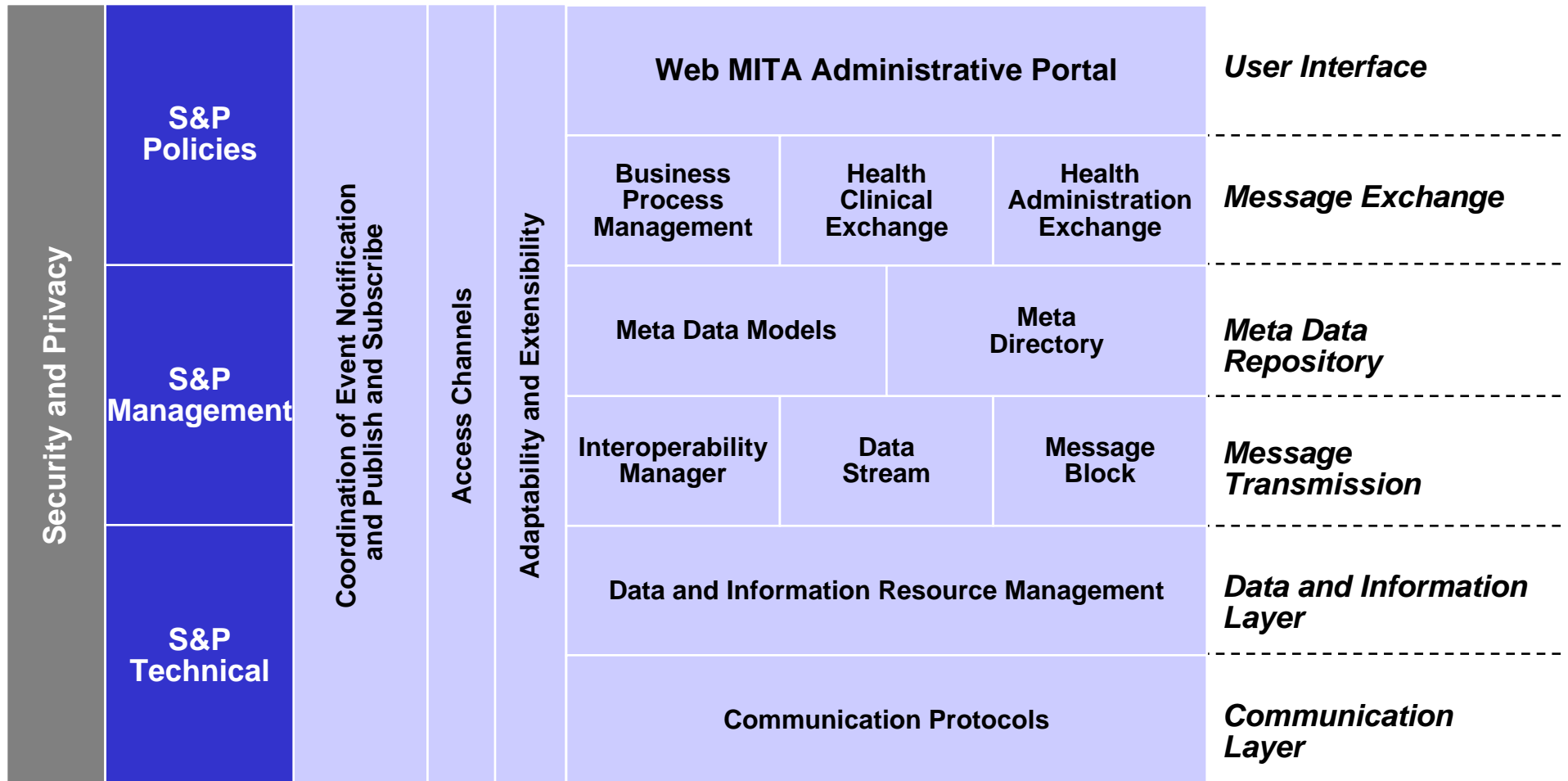
Service Infrastructure – Service Invocation and Execution



Overview of the MITA Framework Components



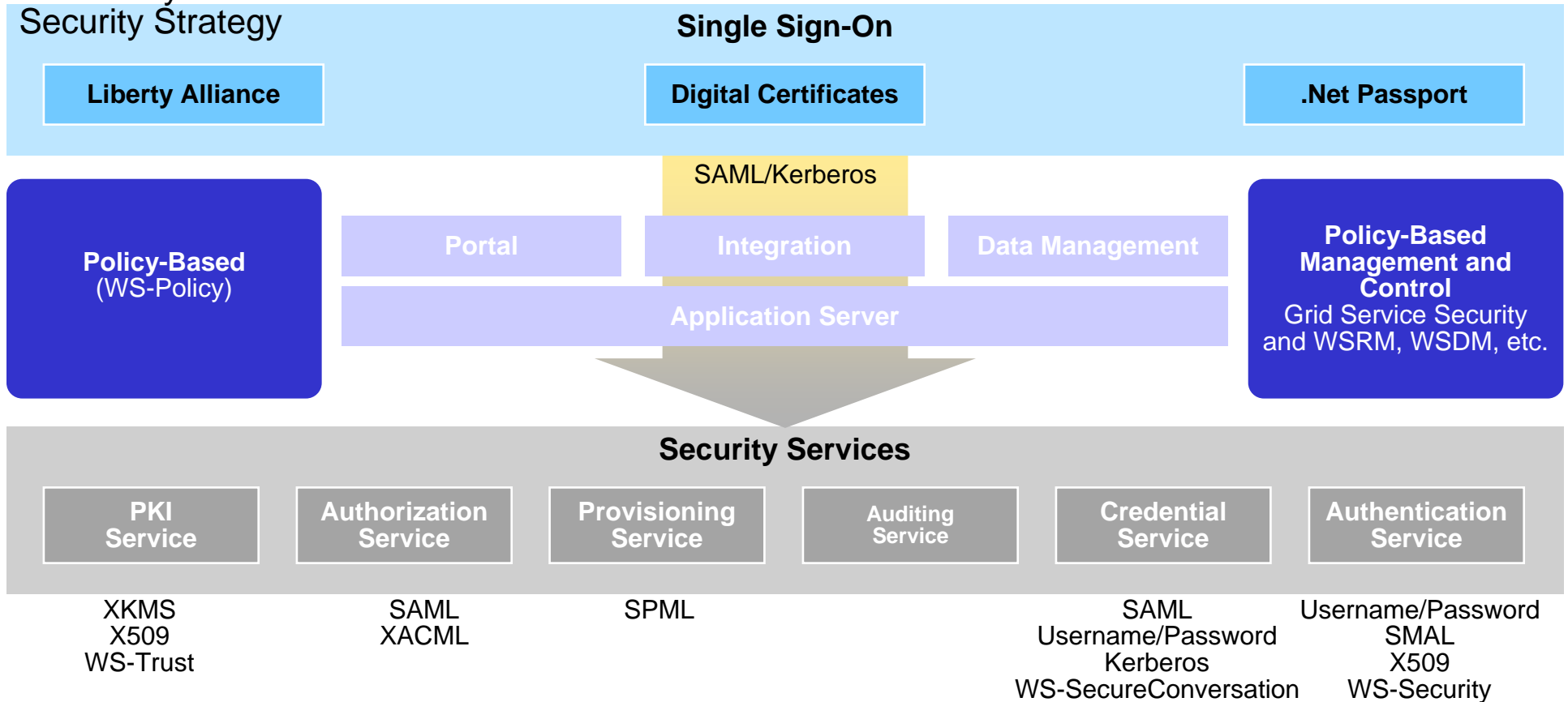
MITA Standard Reference Model



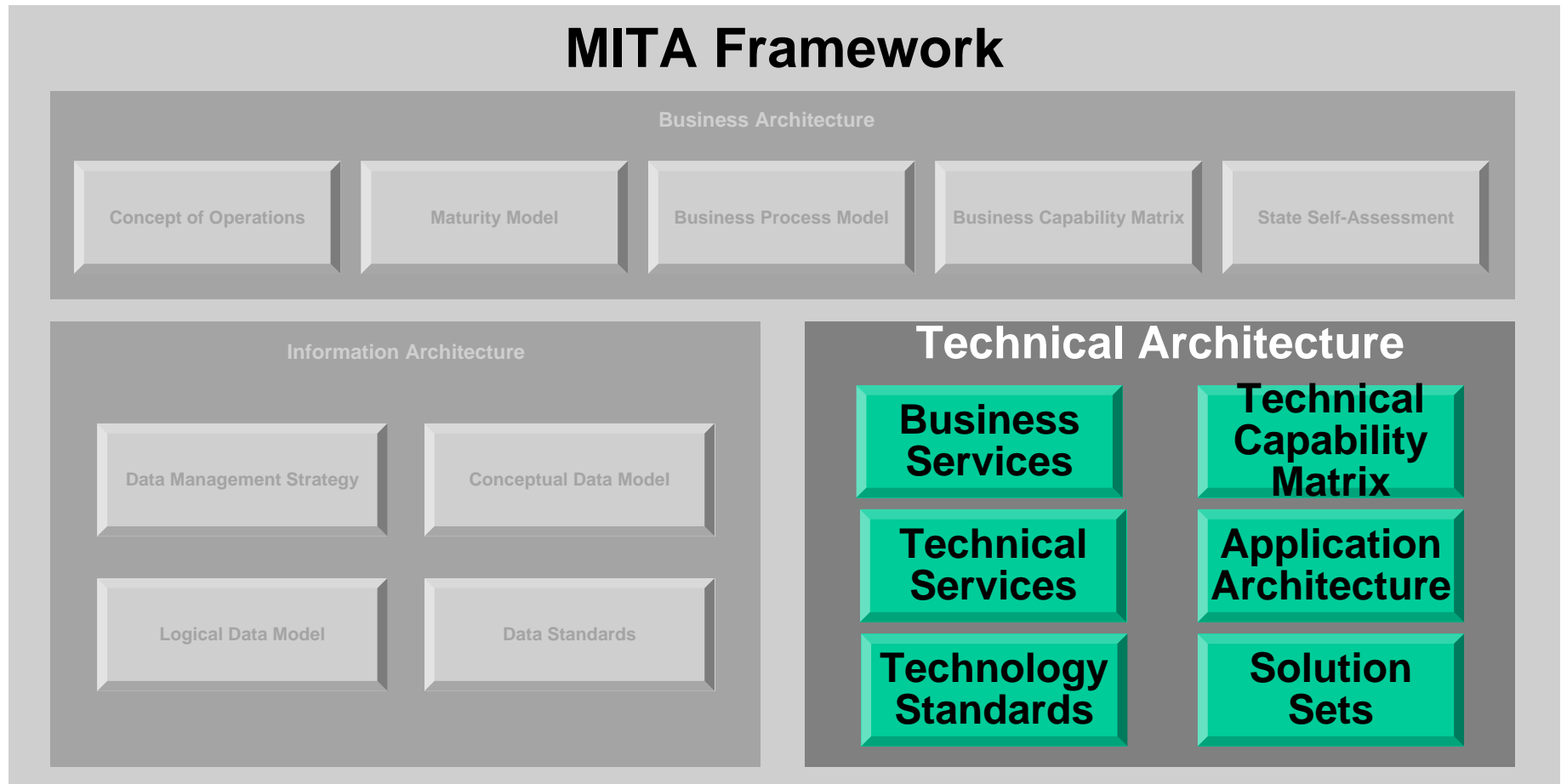
Standards Definition Template	
Title	Standards title
Category	The appropriate solution sets (this links to a technical area)
Objective	The purpose of the standard (i.e., why do we need to have this standard?)
Source: (Standards Body)	The name of the standards body or organization responsible for the standard Example: www.w3c.org
Type	The people who care about and use the standard or how broadly it is applied (<i>Basic</i> means the standard applies to just about everybody, while <i>Advanced</i> applies to people with more complex needs)
Versions and Status	The recommended version number and any available information about upcoming versions and enhancements Example: Version
Applicability	Summary of the content/focus of the standard
References	Links to Web sites where the latest information can be found
Relationships to Other Standards	Other standards that rely on or impact this standard
Key Terms	Terms and definitions that are critical to understanding the standard

Technology and Standards in Context

Taxonomy of Standard-Based Security Strategy



Overview of the MITA Framework Components





MITA
Medicaid
Information
Technology
Architecture

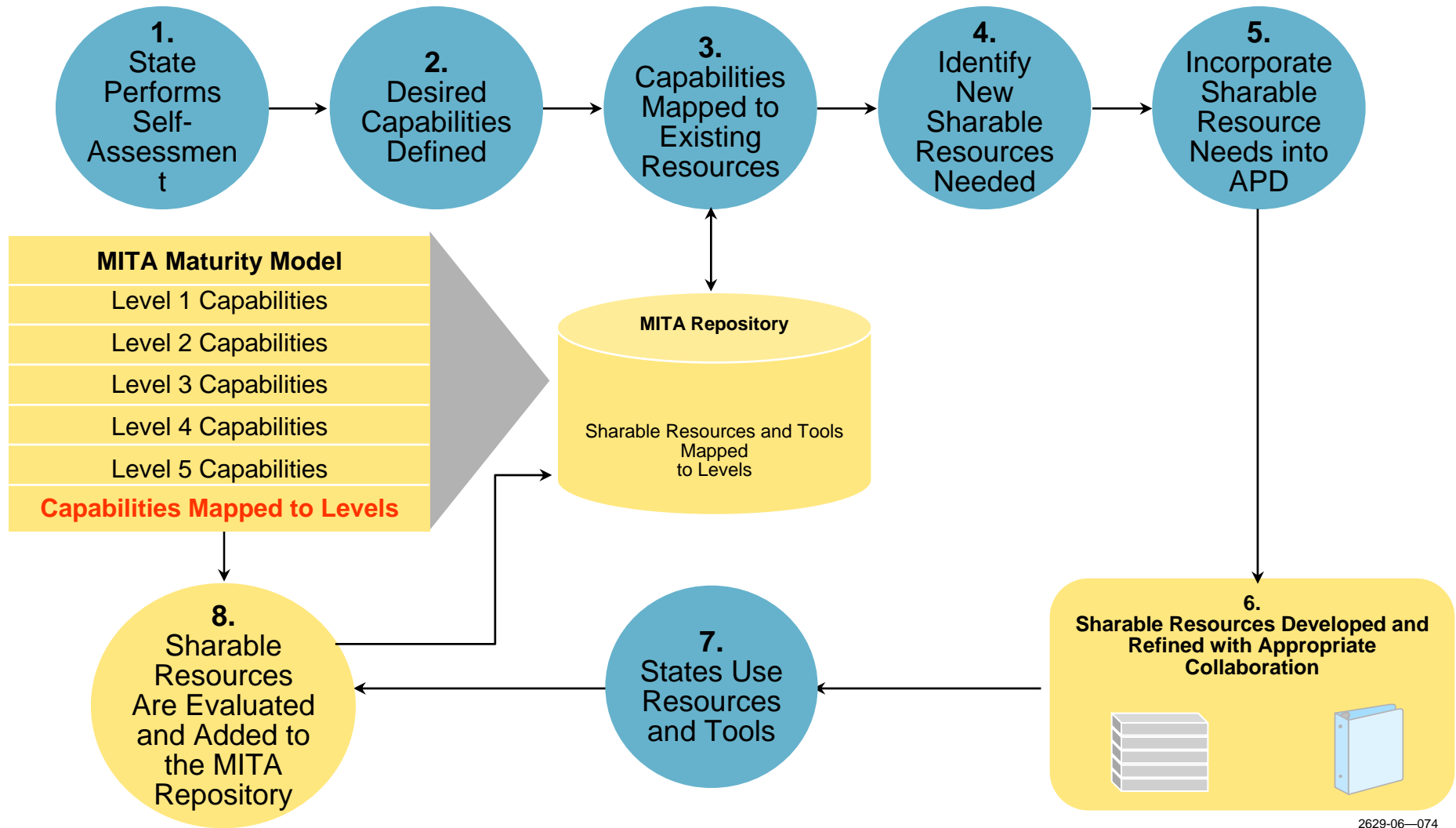


MITA Solution Set Template

MITA Solution Set Template	
Identifier	<i>Unique identifier</i>
Solution Set Name	Brief name for the solution set
Portfolio	Name of the area to which the solution set belongs
Applicable Capabilities	Capability that the solution set implements or is a part of
Service (s) Implemented	Name (s) of the MITA business and/or technical services implemented
Use	Intended use of the template (e.g., “Does it apply to design?” and “Does it point to reusable components
Level	Level in the MITA BCM
Owner	Individual or organization responsible for the contents of the solution set
Keywords	Keywords from stakeholder goals, capabilities, and technical solution
Functional Summary	Summary description of the functions performed by the solution set
Stakeholder Needs	Description of the business or technical goal
Applicable Patterns	List of industry-recognized approaches or other patterns and links or references to additional materials

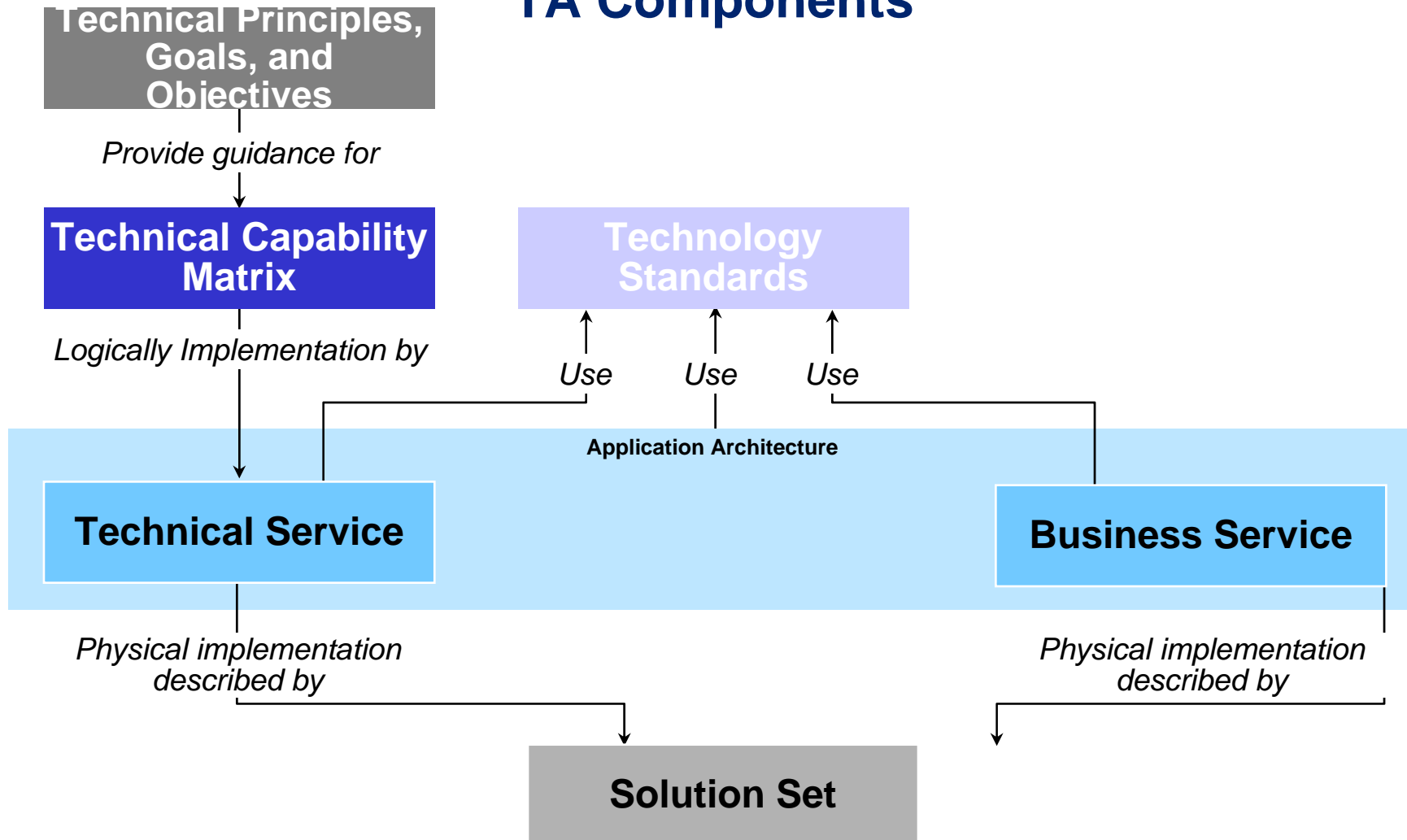
Association with Other Solution Sets (Indicates how this solution set is related to solution sets from other portfolios listed below)	
Interoperability	
Data Management	
Data Sharing	
Security and Privacy	
Adaptability and Extensibility	
Performance Metrics	
Business Area Improvement	
Other Links	Links to solutions in the repository, national standards documents, or other reference materials
COTS Status	Identification of available or emerging COTS software that might provide the functionality addressed by the solution set
Detailed Description	
	Detailed description of the functionality provided by the solution set
Attachments	
	Detailed information that further describes the solution (e.g., documents, spreadsheets, or links to Web sites)

Solution Set Utilization Process



2629-06-074

TA Components



Summary of the Components of the MITA TA

Component	Description	Role in the IA
<p>MITA Principles, Goals, Objectives</p>	<p>A set of technical principles to guide the development of the MITA TA. These principles, along with the MITA business goals, are used to define a set of supporting technical goals — the MITA technical goals. The MITA technical goals have been further refined into a specific list of objectives — the MITA technical objectives.</p>	<p>Provide the basis and direction to all decisions related to the technical enablers of MITA.</p>
<p>Business Services</p>	<p>A specific type of Web service that provides Medicaid-specific business functionality. Each business service represents a single business process at a single capability level. The service’s interface is specified using WSDL.</p>	<p>Exposes business processes and capabilities with standard interfaces to the entire Medicaid enterprise.</p>
<p>Technical Capability Matrix</p>	<p>The Technical Capability Matrix is a grid that shows each technical function as it may be transformed over time due to changes in business requirements or in technology.</p>	<p>Each technical capability at each level is traceable to either the Business Capability Matrix or the technical principles, goals, and objectives.</p>

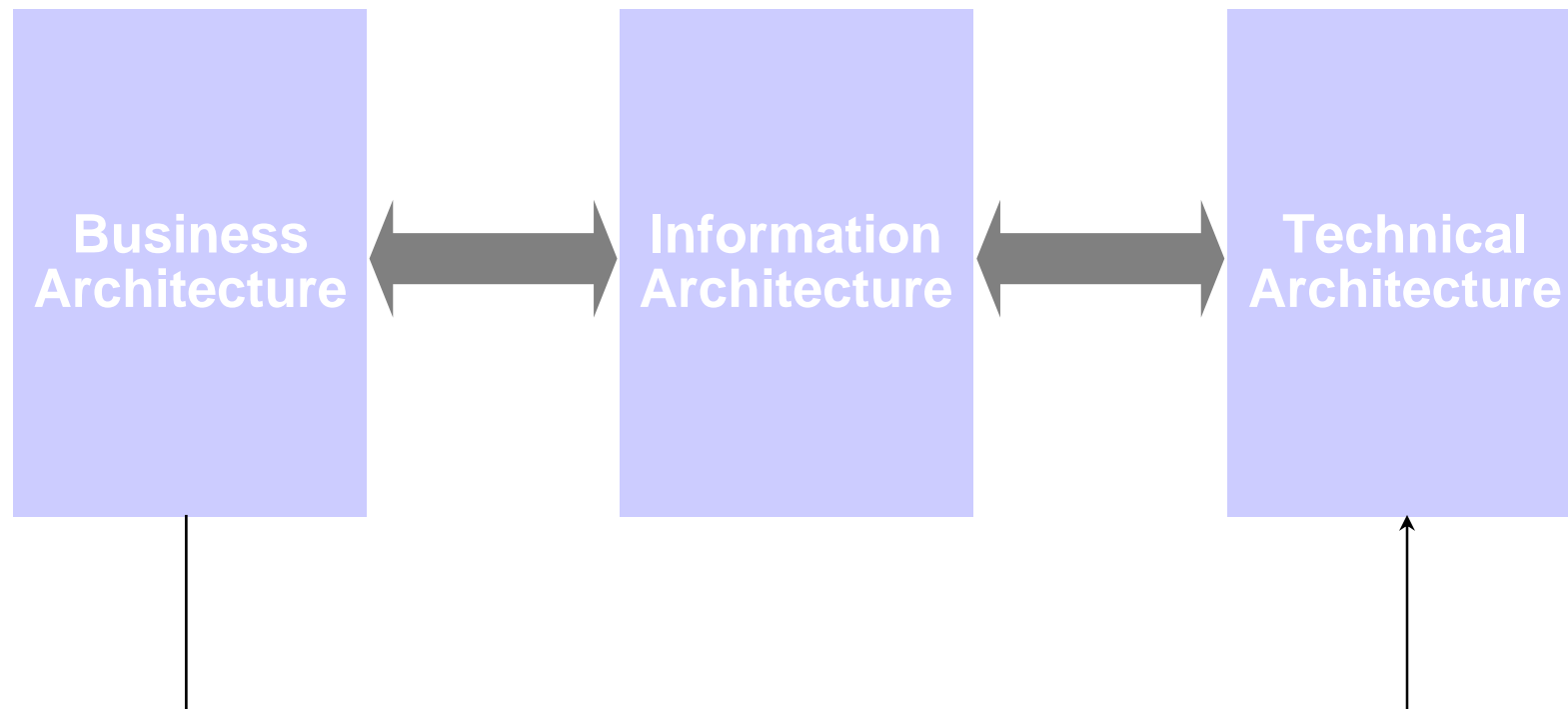
Summary of the Components of the MITA TA (continued)

Component	Description	Role in the IA
<p>Technical Services</p>	<p>A specific type of Web service that provides non-Medicaid-specific technical functionality. These functions can be thought of as system level or utility functions. An example of this type of functionality would be a technical service that provides an authorization or encryption functionality. Each technical service represents a single technical function at a single capability level. The service's interface is specified using WSDL.</p>	<p>Technical functions and capabilities with standard interfaces to the entire Medicaid enterprise.</p>
<p>Application Architecture</p>	<p>Application architecture defines the relationship among the various services and provides an infrastructure that allows them to execute. This infrastructure includes mechanisms to orchestrate the processing flow and workflow. A couple of key components of the application architecture are the enterprise service bus and service management engines.</p>	<p>Defines the overall technical structure of a Medicaid enterprise and provides the infrastructure that allows all of the components to operate successfully.</p>

Summary of the Components of the MITA TA (continued)

Component	Description	Role in the IA
Technology Standards	<p>A set of technology standards to be used in defining the various components of the technical architecture.</p>	<p>Aligns MITA with the other government and industry initiatives and standards.</p>
Solution Sets	<p>A description using a standard template of the physical implementation of a service. These templates define the metadata required to describe a specific implementation of a service. Each service may have one or more solution sets based on the actual physical implementations. This could be due to different technologies used for implementation (i.e., .NET or J2EE) or different performance characteristics of the service (one implementation could handle very high volumes at a high cost, while a second implementation could handle moderate volume at a lower cost).</p>	<p>Provide a resource for sharing physical implementation among States.</p>

MITA Framework Architecture Relationship Diagram





State Medicaid Agency use of the TA

- **To determine whether a service or infrastructure already exists and can be used for their specific implementation.**
- **in the Advance Planning Document (APD) process to define what a State is planning to develop.**
- **by the States as requirements in their RFPs.**



CMS use of the TA

- to provide leadership in establishing the MITA guidelines and promoting them among States.
- to create the standards that Medicaid programs must meet in the future.



Vendor use of the TA

- as a reference in planning their research and development activities
- to determine what services need to be developed as well as the specific interface requirements for that service.
- to provide the description of how the services are linked together and the underlying infrastructure required
- to Provide a common understanding of direction envisioned by CMS, and how their products align with the MITA business and technical capabilities
- to supply States solution sets, using the MITA template, describing their specific implementations. These solution sets will then be submitted by States to MITA for inclusion in the MITA repository