Prepared for the:
Administration for Children and Families (ACF)

National Human Services Interoperability Architecture

Overview Viewpoint Description

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Prepared by:
The Johns Hopkins University
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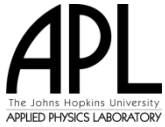

Draft Issue

It is important to note that this is a draft document. The document is incomplete and may contain sections that have not been completely reviewed internally. The material presented herein will undergo several iterations of review and comment before a baseline version is published.

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Note: This document and other NHSIA-related documents are available for review from the Administration for Children and Families (ACF) Interoperability Initiative website. The URL for the site is currently: http://transition.acf.hhs.gov/initiativespriorities/interoperability. When ACF completes the migration to their new website the URL is expected to be http://www.acf.hhs.gov/initiativespriorities/interoperability.

Review and comments to this document are welcome. To comment, please contact Joseph Bodmer at joseph.bodmer@acf.hhs.gov or 202-690-1234.

Mr. Kim Richeson
The Johns Hopkins University Applied Physics Laboratory
11100 Johns Hopkins Road
Laurel, MD 20723
Phone: 240-228-6000
E-Mail: Kim.Richeson@jhuapl.edu

Revision History

Version	Date	Description of Change	Reference	Edited Location	Executor	Approval
D0.1	2011-09	Deliver first version.			KER	
D0.2	2012-07	Updated with minor technical edits. Made 508-compliant.	Content, editorial		KER	
D0.2-E01-APL	2012-07-13	Removed references to "nationwide".	Editorial	Section 3.1 and Table 8.1	KER	
D0.3	2012-09	Incorporated changes from D0.2-E01-APL and reflected new structure for Project Viewpoint.	Content, editorial	As shown above; Chapter 8	VBB	

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1 NHSIA Project Summary

The National Human Services Interoperability Architecture (NHSIA, pronounced niss'-e-a) is being developed by the Administration for Children and Families (ACF) as a framework to support integrated eligibility determination and information sharing across programs and agencies, improved delivery of services, prevention of fraud, and better outcomes for children and families. It will consist of business, information, and technology models to guide programs, states, and localities in the efficient and effective delivery of services.

Currently, systems supporting ACF programs are often "siloed", meaning they are vertically integrated to support delivery of a narrow range of services, and are not interfaced or well integrated with other systems that deliver related services to the same community. Siloed systems may provide excellent service within their scope. However, from the perspective of the whole environment, they may be characterized by redundant data entry, duplicate processing, inability to exchange information, susceptibility to duplicate and fraudulent payments, and unnecessarily complicated and expensive operations. The desired state is to have an environment characterized by interoperability. Interoperable systems share information and processes to efficiently deliver integrated services to the client community. Interoperability can be achieved via the design and implementation of an overall NHSI Architecture, which defines the principles, standards, services, security, and interfaces to be followed by the component elements within the total system of systems.

NHSIA Challenge – Develop a national architecture to enable information exchange across currently siloed federal, state, local, and private human service information systems.

NHSIA is intended to serve multiple audiences at all levels of government and private organizations. Its audience includes Federal Government departments and agencies; state, local and tribal governments; private companies; and non-profit organizations. The individuals most impacted by the implementation of the architecture will be caseworkers and the client community, but the benefits of NHSIA will be apparent to states, program managers, technology and security staffs and other departments and agencies that work with ACF and their common client base. They will all benefit from the guidance it provides to transforming business processes and supporting information technology.

The NHSI Architecture will be built to comply with recognized security and information exchange standards for safely and securely sharing information across organizational and jurisdictional boundaries and all levels of government. The National Information Exchange Model (NIEM), as defined and governed by the

Department of Homeland Security, is one example of the standards that will be used in building this architecture.

1.1 NHSIA Project Objectives

The primary objective of the project is to build a business and information technology architecture to improve the delivery of services funded and regulated by the ACF. The key features of this improvement include:

- Interoperability of business processes and systems across human services
- Improved program integrity via better information sharing, enabling improved identification, eligibility screening, and fraud detection
- "No Wrong Door" for clients
- Case worker-oriented systems

The Federal Enterprise Architecture (FEA) Practice Guidance[1] defines a very simple model for using architecture to improve performance of an agency, illustrated in Figure 1-1. NHSIA will reflect the ACF strategies such as:

- Interoperability across Health and Human Services
- No Wrong Door
- Interoperability across Federal Departments
- Data Integrity and Fraud Prevention.

Through the NHSIA Project, ACF will build architectural models that describe how to translate these strategies into practice. These models will provide the basis for ACF management to make decisions that lead to the desired results. The architecture will also provide guidance to state, local, and tribal governments, security and technology managers, and program leaders to ensure that the components come together in an interoperable manner.

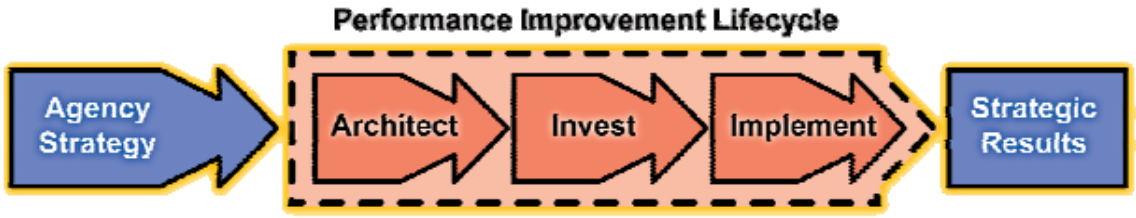

Figure 1-1. Performance Improvement Lifecycle

[1] FEA Practice Guidance, Federal Enterprise Architecture Program Management Office, OMB, November 2007.

The expected **outcome or product** from the NHSIA project is a national architecture to guide federal, state, and local governments and private institutions and vendors in improving information sharing across human service programs and systems. The expected ultimate **impact** of using NHSIA is improved effectiveness and efficiency in providing human services.

1.2 NHSIA Project Phases

The first phase of the NHSIA project was government fiscal year 2011. A preliminary version of NHSIA was published at the end of this phase, in September 2011. This material was updated and extended and an updated version was provided in May 2012. At this point, NHSIA should be considered as a very rough first draft that is intended for review by and feedback from the state and federal human service community. The final NHSIA will evolve based on feedback from the community.

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2 Overview Viewpoint

2.1 Introduction

Viewpoint Definition

The Overview Viewpoint will provide an introduction to and high-level summary of the architecture.

Intended Use

The primary audience for this viewpoint is stakeholders who will use the architecture. This includes planners, program managers, portfolio managers, CIOs, and developers associated with any of the NHSIA elements.

The Overview Viewpoint artifacts can be grouped into three categories as illustrated in Figure 2-1. The first category defines the expectations for the NHSIA: Objectives, Scope, Benefits. The second category summarizes the architecture framework chosen to structure the architecture description. The third outlines key items that influenced the development of the architecture.

Overview Viewpoint Artifacts

- NHSIA Project Objectives
- NHSIA Objectives
- Scope & Context
- Expected Benefits
- Architecture Framework
- Key Concepts
- Guiding Principles
- Architecture Drivers
- Barriers and Constraints

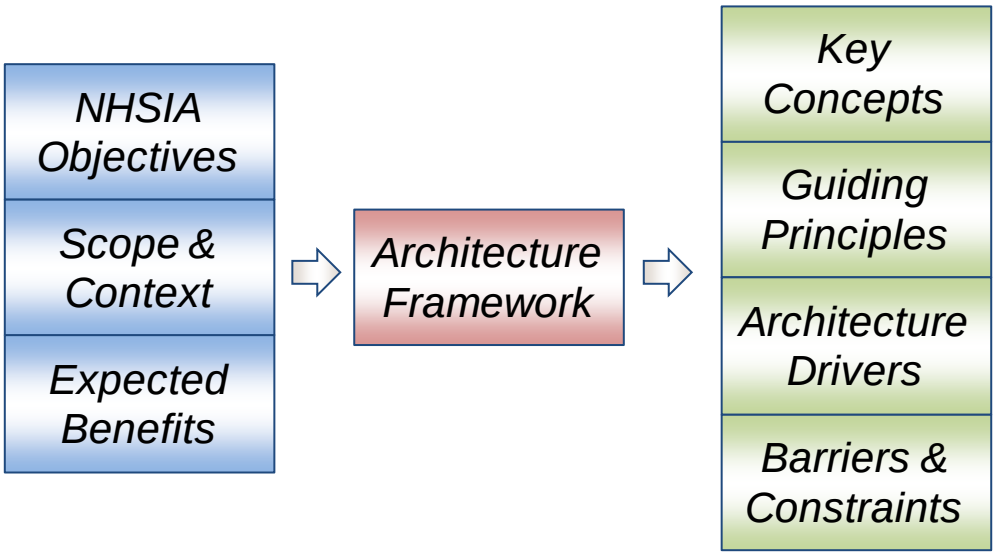

Figure 2-1. NHSI Architecture – Overview Viewpoint Artifacts

The NHSIA project is developing an architecture to provide a description of human service operational processes, systems, services and interfaces that can be used to support development and deployment of human service capabilities. This architecture will be used:

- As an information technology (IT) portfolio management tool for the ACF
- As business process and IT architectural guidance to state, local, and tribal governments, private companies, and non-profit organizations
- To coordinate development and deployment activities across the ACF community
- To support specifying and allocating requirements
- To support the development of standards
- For developing a transition strategy and roadmap for transitioning from the as-is to the to-be environment
- As a basis for performance assessment
- As a basis for risk management
- To identify possible areas for development of common IT services

2.2 NHSIA Objectives

NHSIA will provide a basis for common understanding, interoperable systems, standards, and reuse. Specific NHSIA objectives are to:

- Establish a common vocabulary for conversations among human service agencies, programs, and supporting IT teams
- Provide a business and technical framework for stakeholders to independently develop interoperable systems
- Promote sharing and reuse of processes, applications, services, data, and infrastructure across all human service domains and programs by …
  - Describing a service-oriented environment
  - Leveraging lessons learned
  - Leveraging proven architectural patterns
  - Leveraging activities in the health and education domains
- Promote the development and use of standards for data exchange
- Promote the development of standard data structures required to enable data exchange (e.g., client and provider registries)
- Provide a technical approach for stakeholders to improve both implementation and operational efficiency and effectiveness

NHSIA will provide a basis for common understanding, interoperable systems, and reuse.

The immediate impact of having an architecture will be to provide a basis for developing a common understanding, interoperable systems, standards, and

reusable components. The impact of building services following the guidance provided by the architecture will be improved effectiveness and efficiency in providing human services. Specific improvements anticipated through application of the architecture are discussed under "Expected Benefits" below.

2.3 NHSIA Context and Scope

An early step in developing an enterprise architecture is to define the scope of the enterprise. The NHSIA scope is large, encompassing many people, organizations, activities, and systems. Figure 2-2, Figure 2-3, and Figure 2-4 illustrate the NHSIA context and scope. These figures show a simple model of human services at a very high level of abstraction. At its essence, human services are about people and organizations using systems built with modern technologies to collect and share information to take some action related to administering or delivering human services. The detailed lists in the figure provide a starting point for understanding the context and scope of NHSIA. Not everything in the figure is within the scope of NHSIA, but everything has some role in providing or using information that is in the scope of NHSIA. For example, the Courts are shown as an organization in the figure. We do not consider the courts within the scope of NHSIA. But the courts provide information to elements within the NHSIA scope and use information provided by elements of NHSIA.

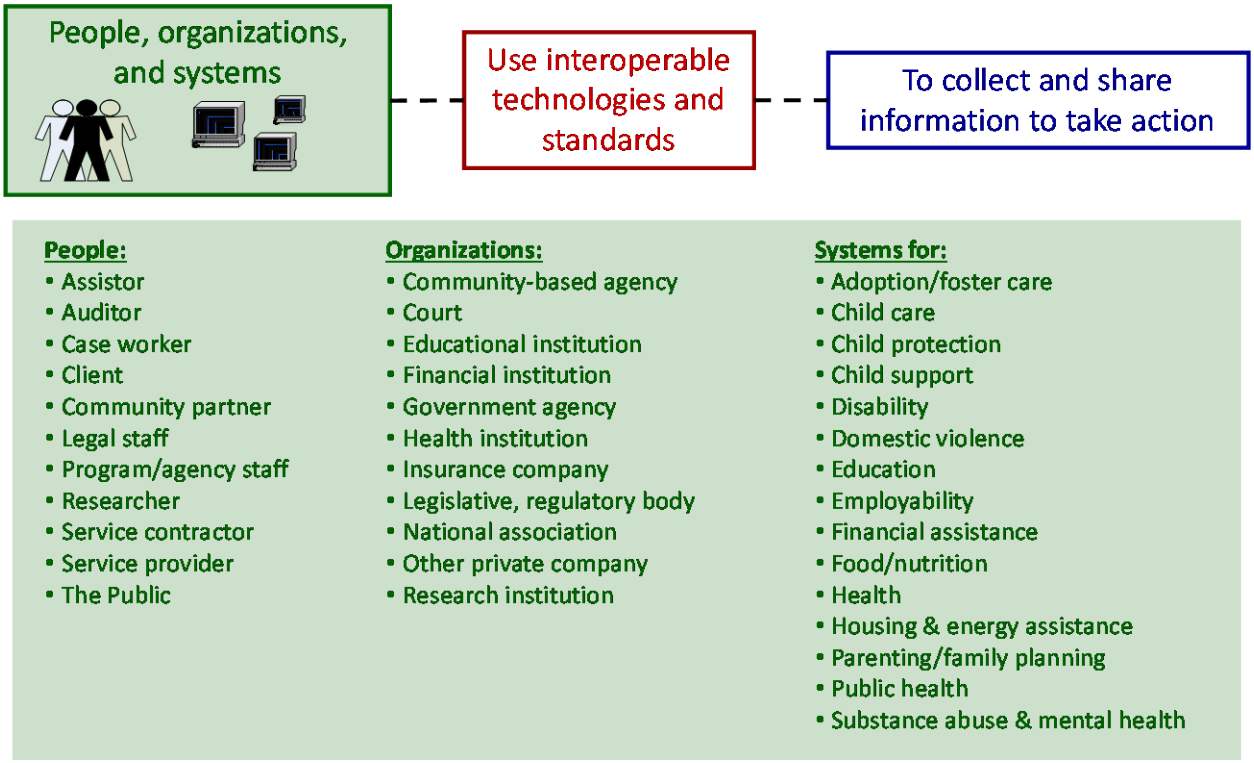

Figure 2-2. NHSIA Context and Scope (1 of 3)

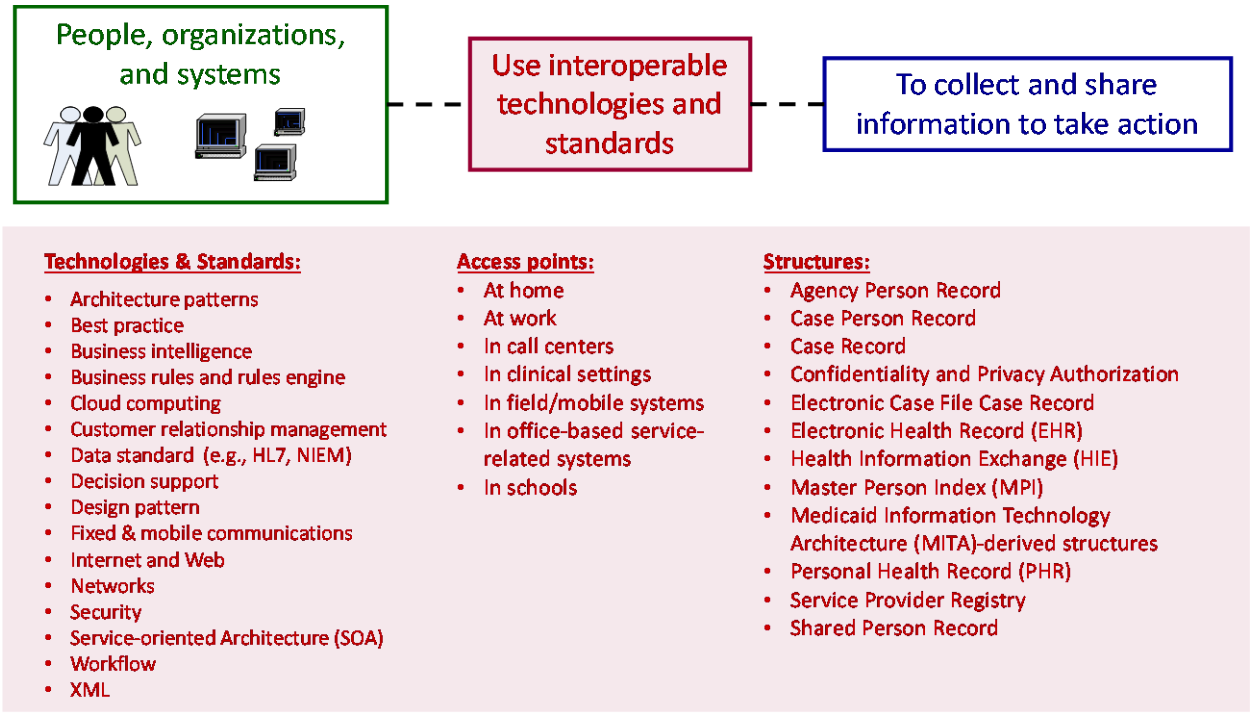

Figure 2-3. NHSIA Context and Scope (2 of 3)

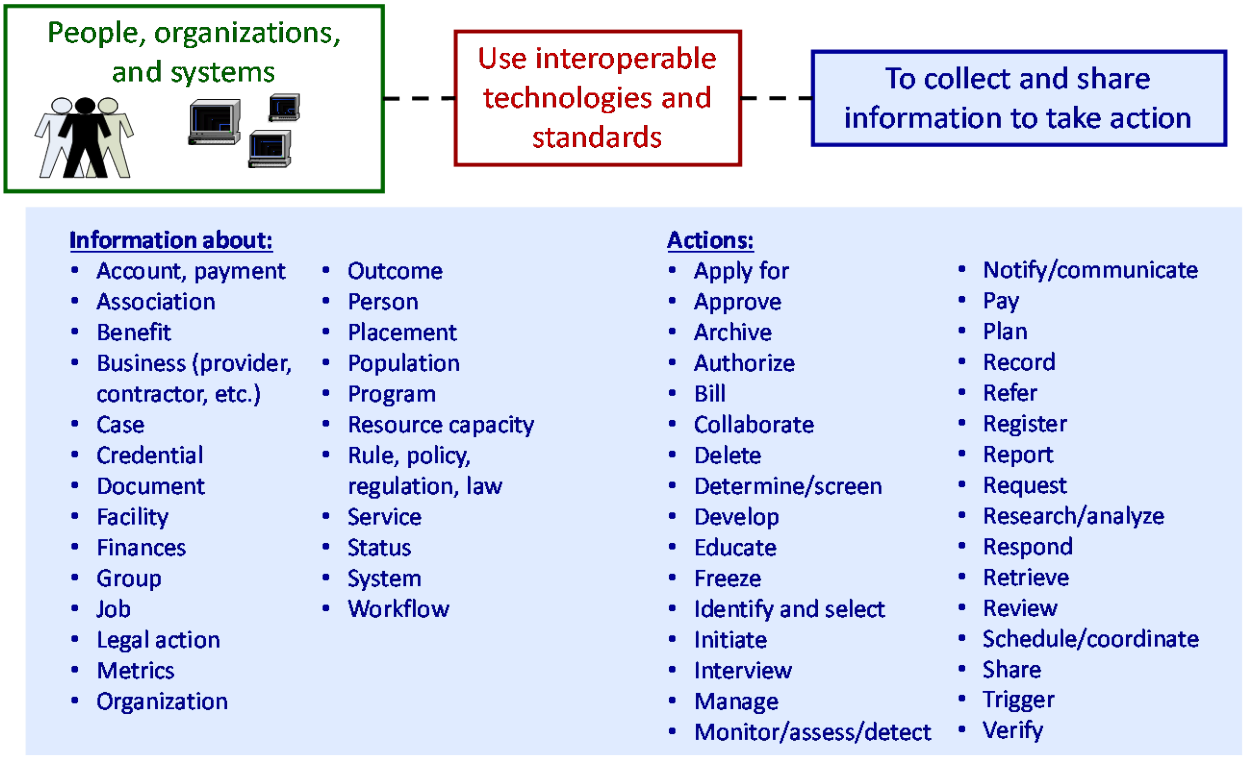

Figure 2-4. NHSIA Context and Scope (3 of 3)

Service Domains and Population Types

The human services enterprise consists of a collection of dozens of programs. The Administration for Children and Families administers on the order of 60 programs. Not all states and counties participate in all of these, but there are additional programs at the state and county level. NHSIA is meant to be program-agnostic. In other words, NHSIA is intended to provide a generic framework that can be applied to all human service programs. These programs can be grouped based on the type of service they provide into these service domains:

- Adoption/foster care
- Child care
- Child protection
- Child support
- Disability
- Domestic violence
- Education (life-time scope)
- Employability
- Financial assistance
- Food/nutrition
- Health
- Housing & Energy Assistance
- Parenting/family planning
- Public Health
- Substance Abuse and Mental Health

A community can be divided into subsets of population groups of people with similar situations that may be better served with programs targeted specifically at them. For example, refugees and immigrants may need services delivered by personnel who speak their native language. A list of specific population types that may have special program needs include:

- Children and families
- Developmentally disabled
- Homeless
- Immigrants
- Low income
- Physically disabled
- Refugees
- Seniors
- Seriously ill
- Students
- Tribal
- Unemployed
- Veterans

- Youth/adolescents

Primary and Secondary NHSIA Stakeholders

NHSIA stakeholders have been grouped into two categories: primary and secondary. The primary stakeholders are those people and organizations who seek, receive, manage, and provide human services. These may include people or organizations and the systems they use:

- People
  - Individuals seeking information about human services (the public)
  - Individuals/families who are receiving human services (clients)
  - Staff who plan, coordinate, and provide services (assistor, caseworker, eligibility worker, service provider, community partner)
  - Staff responsible for administering, managing, and monitoring human services agencies and programs (administrator, analyst, auditor, manager, planner, supervisor)
- Organizations
  - Government agencies (federal, state, local, tribal) that administer, manage, provide, and monitor human services programs
  - Community-based agencies that administer, manage, provide, and monitor human services programs
- Systems that support those people and organizations, and the IT staff responsible for the systems

Secondary stakeholders are users of information maintained by the primary stakeholders' systems or providers of information needed by the primary stakeholders including:

- People
  - External auditor
  - Legal staff
  - Researcher
  - Service contractor
- Organizations
  - Court
  - Educational institution
  - Financial institution
  - Non-human services government agency
  - Health institution
  - Insurance company
  - Legislative, regulatory body
  - National association
  - Other private company
  - Research institution

- Systems that support those people and organizations, and the IT staff responsible for the systems

Levels and Categories of Stakeholders and Users

Figure 2-5 illustrates another way to categorize stakeholders, based on the type of public or private institution they serve. Stakeholders may serve in the public sector at the federal, state, tribal, or local level. Regional coalitions may be formed among states or among localities. Stakeholders may work for private entities that provide services.

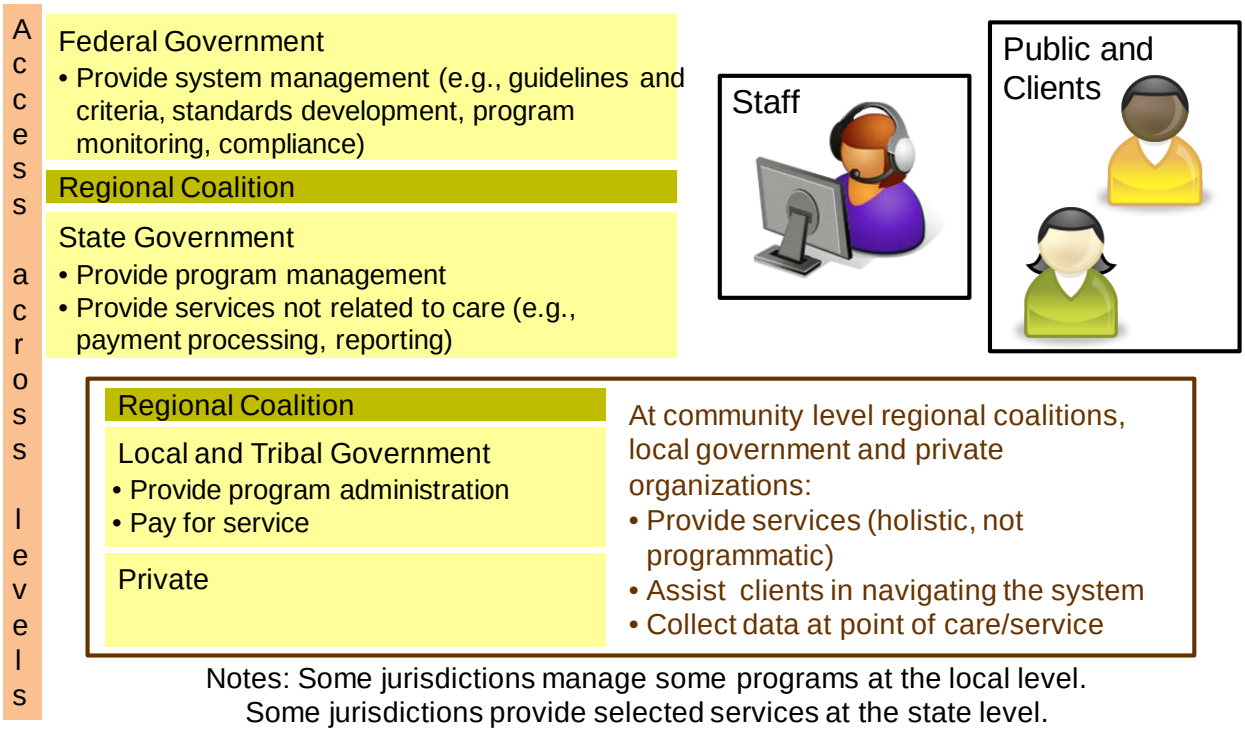

Figure 2-5. Levels and Categories of Stakeholders and Users

2.4 Expected Benefits

The direct product of the NHSIA project is a set of documentation that describes the National Human Services Interoperability Architecture. There are two types of benefits expected from the NHSIA project. The first are the benefits of simply having an architecture; these are summarized in the objectives of the NHSIA project [2.2 NHSIA Objectives]. These allow stakeholders to do a better job of planning and coordinating improvements to processes and information technology.

The second are the real benefits of an architecture, which are only obtained if it is followed and used to guide the implementation of business process and information

technology improvements by stakeholders. The expected benefits of implementing an architecture that follows the NHSIA guidelines are to achieve:

- Interoperability of IT elements and associated business processes
- Improved care provided to clients by holistically addressing their needs – e.g., "no wrong door"
- Comprehensive, integrated support for client-oriented case workers at point of service
- Incremental insertion of new services and technology
- More flexible, adaptive systems
- Reduced cost of operation and maintenance for all levels of government and the private sector through sharing and reuse of services, data, and IT resources
- Reduced fraud through automated and coordinated enrollment, verification and eligibility determination
- Greater availability of timely program data for evaluating program performance
- Better connections between human services and health and education services, and improved ability to leverage advances made in those areas

The benefits of NHSIA accrue to stakeholders who follow its guidance to implement processes and systems.

2.5 Architecture Framework

An architecture is a description of the components, structure, and unifying characteristics of a system. An enterprise architecture is a rigorous, comprehensive description of an enterprise, including mission and goals; organizational structures, functions, and processes; and information technology including software, hardware, networks, and external interfaces.

NHSIA can be thought of as a multi-enterprise or community architecture.

An architectural framework is a structure for describing an architecture. A framework must be carefully chosen to suit the objectives of each specific architecture to be developed. Numerous generic frameworks have been defined by governments, private consultants, and systems integrators. These generic frameworks are intended to be tailored to specific applications. The proposed approach will adapt the frameworks defined by the Federal Enterprise Architecture (FEA) and the DoD Architectural Framework (DoDAF). We also analyzed the Medicaid IT Architecture (MITA) Framework and are adapting its applicable features and incorporating it into NHSIA.

2.5.1 Levels of Architecture

NHSIA is an enterprise architecture, the enterprise being the provision of human services across the nation. This national enterprise is large, and comprises many lower level enterprises. Therefore, NHSIA can be thought of as a multi-enterprise or community architecture.

NHSIA will be part of a very roughly hierarchical set of related architectures as illustrated in Figure 2-6. The scope, level of detail, and content of these architectures often do not dovetail in a simple, structured way. Nevertheless, NHSIA should be developed with an understanding of these related architectures to ensure interoperability and avoid duplication. The architectures are federated; each level has a scope and purpose and is defined to an appropriate level-of-detail as summarized in Figure 2-6 [2].

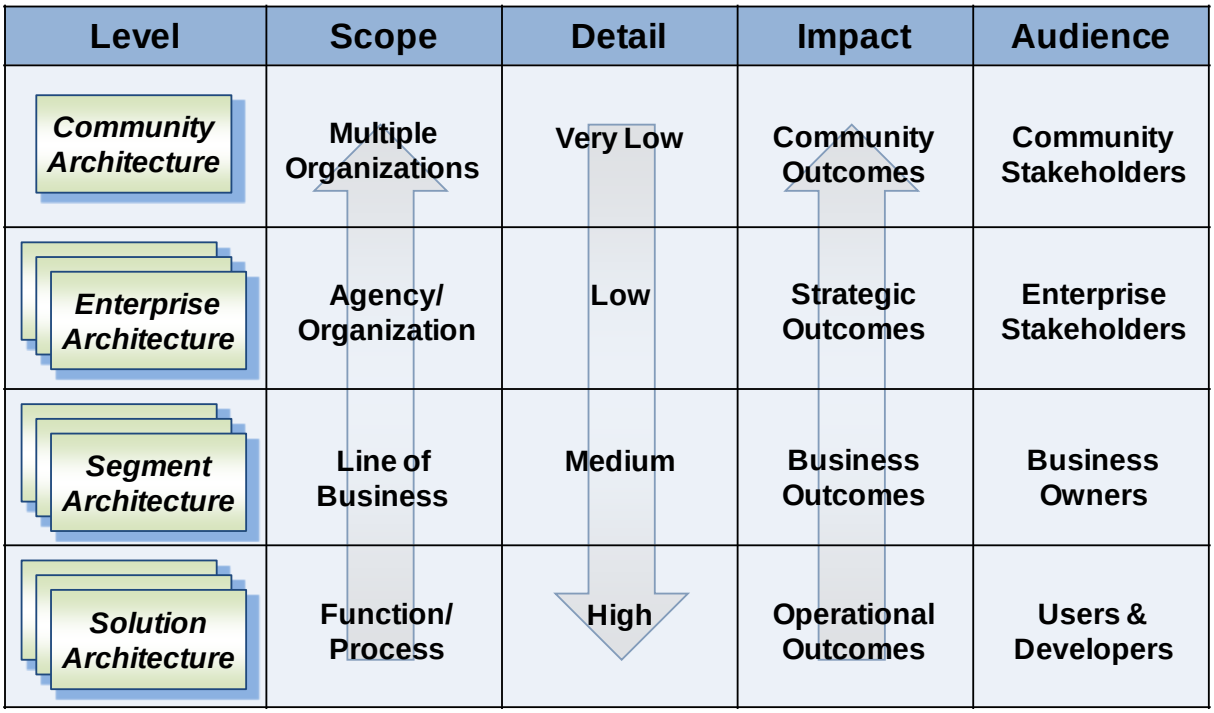

Figure 2-6. Architecture Levels and Attributes

2.5.2 Architecture Viewpoints

A best practice in architecting is to describe an architecture in terms of multiple viewpoints. Each viewpoint serves the needs of a specific user, such as an executive manager making investment decisions, an operational user of the systems, or a systems developer designing data structures, services, and applications.

[2] Figure adapted from FEA Practice Guidance, Federal Enterprise Architecture Program Management Office, OMB, November 2007.

The DoD Architecture Framework (DoDAF) [3] has evolved over a decade to include multiple viewpoints. NHSIA has adapted DoDAF to include the viewpoints shown in Figure 2-7. The adaptations include merging the DoDAF Systems and Services viewpoints into a single Systems Viewpoint and pulling out an Infrastructure Viewpoint as a separate item from the systems viewpoint.

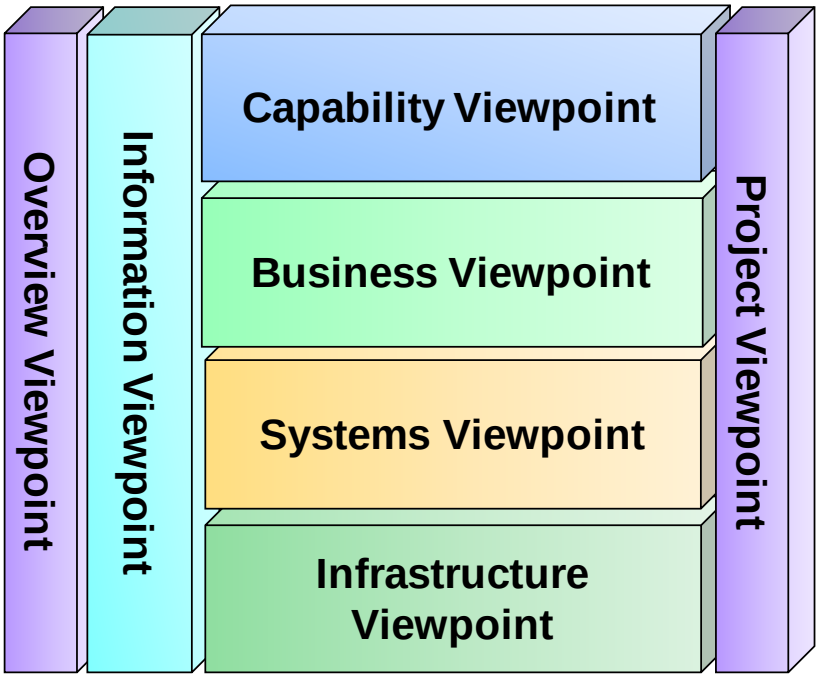

Figure 2-7. Architecture Viewpoints

Some characteristics of each of the viewpoints are listed in Table 2-1. The selected framework is very comprehensive. NHSIA will be described from each of these viewpoints.

Table 2-1. Architectural Viewpoints

Viewpoint	Description
Overview	Overarching aspects of architecture context that relate to all views, e.g. key concepts

[3] DoD Architecture Framework, version 2.0, Volume 1: Introduction, Overview and Concepts, Manager's Guide, 28 May 2009.

Viewpoint	Description
Capability	Required high-level operational capabilities described in terms easily understood by decision makers and used to communicate a strategic vision. Includes a NHSIA scorecard and performance reference model.
Business	Business processes and operational scenarios
Systems	New and legacy systems, including software applications and services: their context, components, functions, and interfaces.
Infrastructure	The IT environment including networks, computing facilities, servers, and enterprise services
Information	A conceptual data model (including high-level data classes, associations, attributes) and standards for data exchanges
Project	Strategies and projects planned or required to implement the capabilities defined by the architecture

It is not possible, necessary, or desirable to go to great depth in every viewpoint for all elements of NHSIA. But a level-of-detail sufficient to support portfolio management, pilot program development, and standards development will be defined. The current NHSIA products focus on these human service domains:

- Adoption/foster care
- Child care
- Child protection
- Child support enforcement
- Employability
- Housing and energy assistance
- Financial assistance

2.6 Key Concepts

Key concepts are defined in order to identify high-level characteristics or features of the architecture that have a significant influence on its definition. Key concepts provide a mechanism to discuss and resolve high-level issues necessary to proceed with developing the details of the architecture. They help to clarify the vision and make it more specific.

NHSIA key concepts fall into two categories. The first are concepts that form requirements for the architecture. The second are related to solutions intended to satisfy those requirements.

Key Concepts – Requirements

- Enable, encourage, and reward information sharing and portability across programs, systems, and jurisdictions.
- Protect Personally Identifiable Information (PII) and other sensitive information.
- Develop a consumer-oriented environment (e.g., no wrong door, client controls sharing of their data).
- Provide an integrated environment for caseworkers.
- Use operational data to support performance monitoring, fraud prevention, and research.
- Leverage the Medicaid IT Architecture (MITA) – extend to include human services in general.
- Enable an application/service marketplace.
- Architecture must be useful in evaluating state Advanced Planning Documents to encourage NHSIA-compliant implementations.

Key Concepts – Solutions – Utilize Technology Trends

- Use a Service-Oriented Architecture (SOA) model to encourage service reuse, flexible applications, and incremental deployment.
- Use cloud computing to share costs across states, reduce capital outlay requirements, and provide scalable solutions.
- Enable users to operate in the office or out of the office, connected or not.
- Provide workflow management tools.
- Use electronic forms to streamline data entry and reduce errors.
- Provide automated alerts and notifications.

Key Concepts – Solutions – Utilize Technology for Information Sharing

- Use National Information Exchange Model (NIEM) standards as the basis for information exchange.
- Establish common confidentiality/privacy agreements; use those agreements to drive role-based access.
- Establish virtual records to link together record segments managed in different systems.
- Establish common registries for service providers.
- Establish master person indices (MPI).
- Utilize the electronic health record (EHR) concept and extend it to include human service records.
- Enable paperless operations.

2.7 Guiding Principles

A principle is a fundamental truth or proposition that serves as the foundation for a system of thought or behavior or for a chain of reasoning. Statements of principle are being used to record enduring or high-level rules to guide business process and information technology architectural decisions. They are fundamental guidelines supported and used by the NHSIA community.

Principles are underlying and fundamental elements of sound enterprise architectures. In general, architecture principles are intended to influence the development, maintenance, and use of enterprise architectures. They guide the development of architecture by providing criteria for selecting alternative architectural choices. They are developed from industry best practices and standards.[4]

In order for principles to be useful for architecture planning, they should be [*adapted from reference*[5]]:

- Understandable
- Robust
- Complete
- Consistent
- Stable
- Debatable – at least not state what is already obvious to everyone, or there would not be any reason to articulate it.

NHSIA guiding principles have been grouped into three categories: operations, architecture, and information practices. These are listed below.

Guiding Principles – Operations

- NHSIA will enable secure electronic information sharing among authorized stakeholders via open standards.
- NHSIA will focus on the aspects of stakeholders' major business processes that can be improved via sharing information and IT services.
- The human services community will use NHSIA to implement compatible policies and interoperable systems throughout the United States.
- Business rules will be determined and managed by individual agencies.

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[4] CIO Council, Architecture Principles for the U.S. Government, (CIO Council: Washington, DC, 2007) found at Internet site http://www.cio.gov

[5] Spewak, Steven, Enterprise Architecture Institute, Business Modeling Workshop, material used in workshop at JHU/APL, 21 February - March 2001.

- Each agency will govern and administer information (and access thereto) for which it is the authoritative source.
- Governance and administration of collective information will be controlled by agreements across organizations, agencies, programs, and jurisdictions.
- The human services community will use NHSIA to make information available to support program monitoring and evaluation.
- Data collection for reporting purposes will be a natural by-product of worker activities.

Guiding Principles – Architecture

- NHSIA will be open, modular, and adaptable to improve maintainability and encourage re-use of components.
- NHSIA will accommodate legacy systems.
- NHSIA will be developed incrementally and evolve over time.
- NHSIA will support incremental implementation, allowing frequent deployment of new capabilities.

Guiding Principles – Information Practices

- Privacy: The confidentiality of private, proprietary, and other sensitive information will be preserved.
- Integrity: Information will be protected from improper alteration or improper destruction.
- Quality: Information will be accurate, up-to-date, and relevant for the purposes for which it is provided and used.
- Accountability: Access to data will be controlled and tracked; civil and criminal sanctions will be imposed for improper access, manipulation, or disclosure, as well as for knowledge of such actions by others.
- Visibility: There will be disclosure to the information providers of what data are being collected, how they are collected, who has access to the data, and how the data will be used.

2.8 Architecture Drivers

Architectural drivers are externally imposed mandates, policies, or conditions that strongly influence the development of NHSIA. These include:

- Achieve interoperability across programs and jurisdictions
- Architectural scalability to allow easy and rapid expansion to more jurisdictions and clients
- Reuse processes, infrastructure, and systems by multiple programs and jurisdictions to reduce life cycle costs and share best practices

- Use commercial-off-the-shelf (COTS) software to reduce life cycle costs
- Minimize life cycle cost, achieve a demonstrable return on investment (ROI)
- Information is maintained in multiple, geographically distributed, heterogeneous data structures
- Assure data privacy and confidentiality in compliance with government policies (e.g., HIPAA)
- Leverage federal investments in health care (e.g., as a result of the ACA)

2.9 Barriers and Constraints

Barriers and constraints are the externally imposed mandates, policies, or conditions that limit or impede the development or use of NHSIA. These include:

- Limited funding is available to all levels of government
- Technical limitations on the ability to assure privacy and confidentiality in compliance with regulations
- Existing restrictions on sharing PII, court information, and other sensitive data
- When data is shared with an authorized recipient, it is necessary to assure that the data is not subsequently passed on by that recipient to an unauthorized user. This condition of data persistence is a complex data management problem.
- Time pressures to implement something quickly in order to leverage the opportunity provided by the ACA. If NHSIA is unable to influence or build on the ACA efforts, it is not likely to have sufficient resources to continue.
- Inability to accurately estimate and demonstrate ROI in order to justify investments
- Lack of adequate business models to motivate participation by all stakeholders
- The complexity of human service programs and processes makes system development difficult
- Real variance of needs, rules, and regulations across programs and jurisdictions makes development of systems that are applicable across multiple programs and jurisdictions difficult
- Eligibility and operating rules of some human services programs inhibit automation (e.g., the requirement for face-to-face interviews)
- Federal cost allocation rules in perception and fact inhibit sharing resources across programs
- The primary benefits to investments in process and IT improvement may accrue outside the program making investment
- The large investment in legacy processes and information technology and the huge cost to replace it may prohibit moving to a new architecture

3 Capability Viewpoint Summary

The Capability Viewpoint provides a high-level, yet specific description of what new or improved capabilities would result from the implementation of the NHSIA.

One audience for this viewpoint is the developers of the other NHSIA viewpoints. This viewpoint provides the cornerstone for the development of the architecture. It sets the scope and provides criteria to determine what is inside and what is outside the boundaries of NHSIA. Any business process, system, service, or technology must tie back to some capability in order to be in the NHSIA scope.

A second audience for the Capability Viewpoint is those who are charged with developing strategies and plans for state, local, and private provider architectures and systems. The capabilities provide a basis for evaluating the impact and value of alternative solution architectures implementation approaches.

3.1 Capability Viewpoint Description

The Capability Viewpoint describes the capabilities provided by human services system of systems that implement the NHSIA. As we use the term, **a capability is the ability to achieve a desired objective in the human services domain under specified standards and conditions**. Capabilities are defined independently of specific technology implementation approaches to the extent possible. The Capability Viewpoint defines the new operational capabilities in high-level, user-oriented terms. Capabilities have been grouped into these eight major categories:

- Access to Systems and Data
- Electronic Workflow
- Multi-Program Eligibility Determination
- Integrated Service Management
- Convenient Access for Clients
- Proactive Client Communications
- Automated Monitoring and Reporting
- Information-Based Performance Management

It is not the intent of NHSIA to define a comprehensive set of all capabilities required to provide human services. NHSIA is focused on only those capabilities, which require an interoperable environment where data and services are effectively shared. In the NHSIA Performance Reference Model (PRM), these capabilities are referred to as "technology-enabled capabilities". This reflects the fact that they are all associated with using IT to improve information sharing. In a typical enterprise architecture, capabilities would be defined in more operational terms, rather than

tied so directly to IT. The NHSIA project takes this approach since it is focused on achieving interoperability among information systems.

3.2 Capability Viewpoint Artifacts

The major artifacts currently included in the Capability Viewpoint are summarized in Table 3-1. Each of these major artifacts has several other artifacts associated with it. These other related artifacts are defined and discussed in the Capability Viewpoint Description document.

Table 3-1. Capability Viewpoint Major Artifacts

Artifact	Form & Description
Operational Capabilities List	Form: A list and associated narrative. Currently maintained in an Excel workbook.
	Description: For strategic planners at all levels of government setting the required capabilities for their organization or program. A list of each capability to be provided by the architecture along with a brief narrative description.
Capability Scorecard	Form: A narrative and tabular description. Maintained in an Excel workbook.
	Description: For implementation planners at all levels of government. It provides visibility into where progress is being made in implementing capabilities and where gaps remain. The scorecard uses a simple model defining six levels of achievement that an organization would go through in implementing each capability.
Performance Reference Model	Form: A diagram and associated narrative in a Word document.
	Description: For strategic planners at all levels of government. An organizing framework and associated lists of performance metrics that are to be collected in the to-be architecture, which can be used to evaluate program performance.

4 Business Viewpoint Summary

The Business Viewpoint provides a model of human services business operations. The NHSIA business model is based on the MITA 3.0 (Medicaid Information Technology Architecture) business model.

4.1 Business Viewpoint Description

The NHSIA Business Viewpoint provides a functional, technology-independent model of the human services "business". The Business Viewpoint provides a characterization of business operations that applies across programs and agencies. This viewpoint highlights common processes and opportunities for information sharing and re-use of services and applications.

The NHSIA Business Model, comprised of 10 business areas, was largely developed by adapting and tailoring the MITA 3.0 Business Model to human services. The ten NHSIA business areas are Client Management, Eligibility and Enrollment, Provider Management, Service Management, Performance Management, Contractor Management, Finance Management, Operations Management, Program Management and Business Relationships. About 100 processes comprise the Version D0.2 NHSIA Business Model.

4.2 Business Viewpoint Artifacts

The artifacts currently included in the Business Viewpoint are summarized in Table 4-1.

Table 4-1. Business Viewpoint Artifacts

Artifact	Form & Description
Business Process (BP) Descriptions	Form: Excel spreadsheets
	Description: Version D0.2 provides descriptions for 5 of 10 of the business areas: Client Management, Eligibility and Enrollment, Provider Management, Service Management, and Performance Management. Each business process is defined by a collection of business activities. Each activity is described by the actions performed, inputs and outputs, and other processes triggered.

Artifact	Form & Description
BPs Mapped to Human Service Programs	Form: Excel spreadsheet.
	Description: Each business process is mapped to the human service programs/domains (e.g., child support) to which it applies.
Scenarios and Vignettes	Form: Word document
	Description: Human services operations are characterized in terms of real-world scenarios and vignettes. Scenarios provide the overarching operational context and vignettes describe events and activities. Each vignette is specified by the underlying operational thread, i.e., the business processes and activities invoked. In addition, systems, information, capabilities, infrastructure, and performance evaluation considerations are discussed for each vignette.

An excerpt from the mapping of NHSIA business process to human services programs is shown in Table 4-2. The table includes these programs: Medicaid (MITA), Behavioral Health (SAMHSA), Financial Assistance, Adoption & Foster Care, Child Care, Child Support Enforcement, Child Protection, Home Energy Assistance, and Food/Nutrition.

Table 4-2. Mapping NHSIA Business Processes to Human Services Programs

ID	Process Name	Medicaid (MITA)	BH (SAMHSA)	Financial Assistance	Adoption & Foster Care	Child Care	Child Support Enforcement	Child Protection	Home Energy Assistance	Food / Nutrition
Client Management (CM)										
Client Information Management										
CM1	Establish Shared Client Information	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
CM2	Manage Shared Client Information	MITA (CM2+CM4)	SAMHSA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
CM3	Establish Agency Client Information	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
CM4	Manage Agency Client Information	MITA (CM2+CM4)	SAMHSA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
CM5	Find Client Information	MITA	SAMHSA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
Client Support										
CM6	Manage Client Communications	MITA	SAMHSA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA	NHSIA
CM7	Perform Population and Client Outreach	MITA	SAMHSA	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 4-3 explains the legend used in Table 4-2.

Table 4-3. Legend for Mapping Business Processes Table

Label	Meaning
NHSIA	Applies to program based on NHSIA analysis
MITA	Applies to program based on MITA docs
SAMHSA	Applies to program based on SAMHSA, VA MITA Self-Assessment / BH docs
NA	Current assessment - does not apply
TBD	Not yet determined if applies or not

A representative vignette operational thread and corresponding process list are provided in Figure 4-1 and Figure 4-2, respectively.

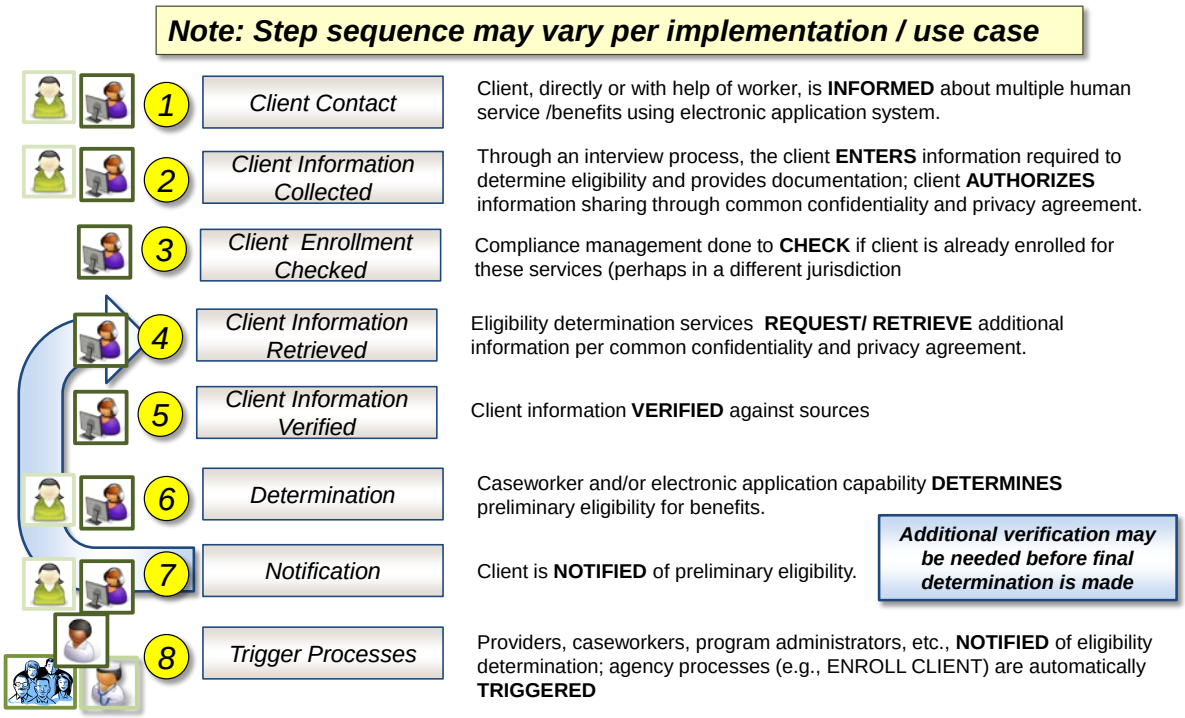

Figure 4-1. Multi-Program Eligibility Determination Vignette Operational Thread

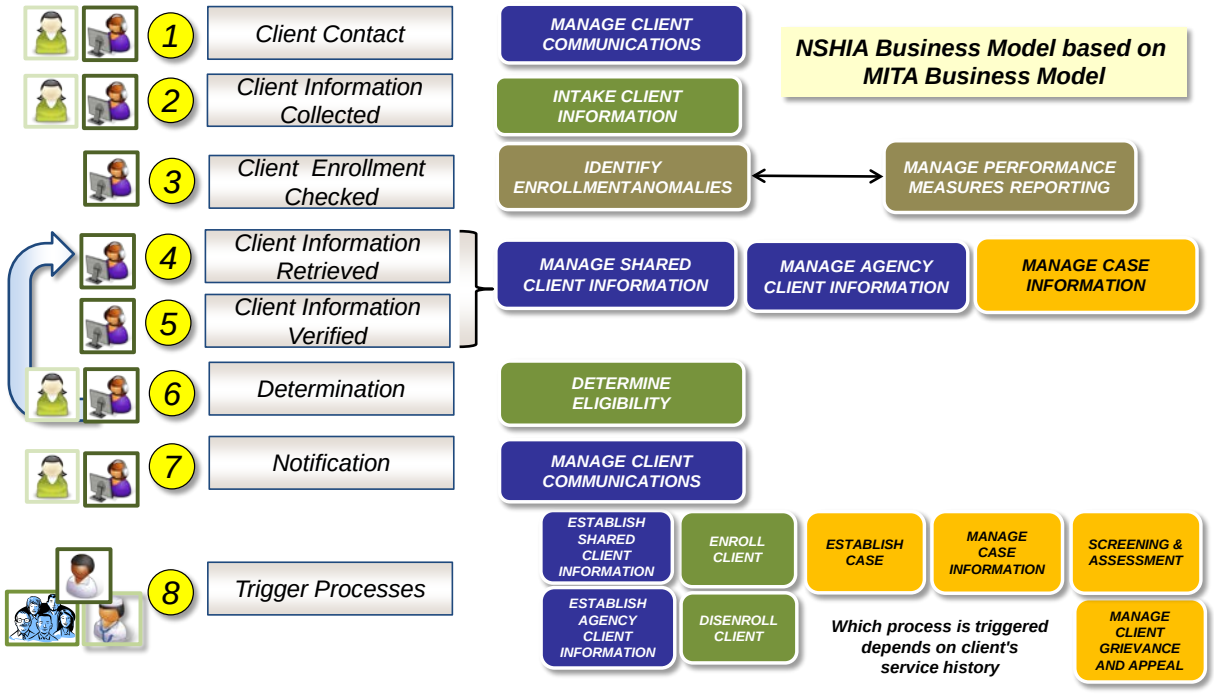

Figure 4-2. Multi-Program Eligibility Determination Vignette Business Processes

5 Systems Viewpoint Summary

5.1 Systems Viewpoint Description

The Systems Viewpoint describes the new and legacy system components included in each of the layers of the to-be architecture. The Systems Viewpoint is organized into a four-layer systems reference model as shown in Figure 5-1.

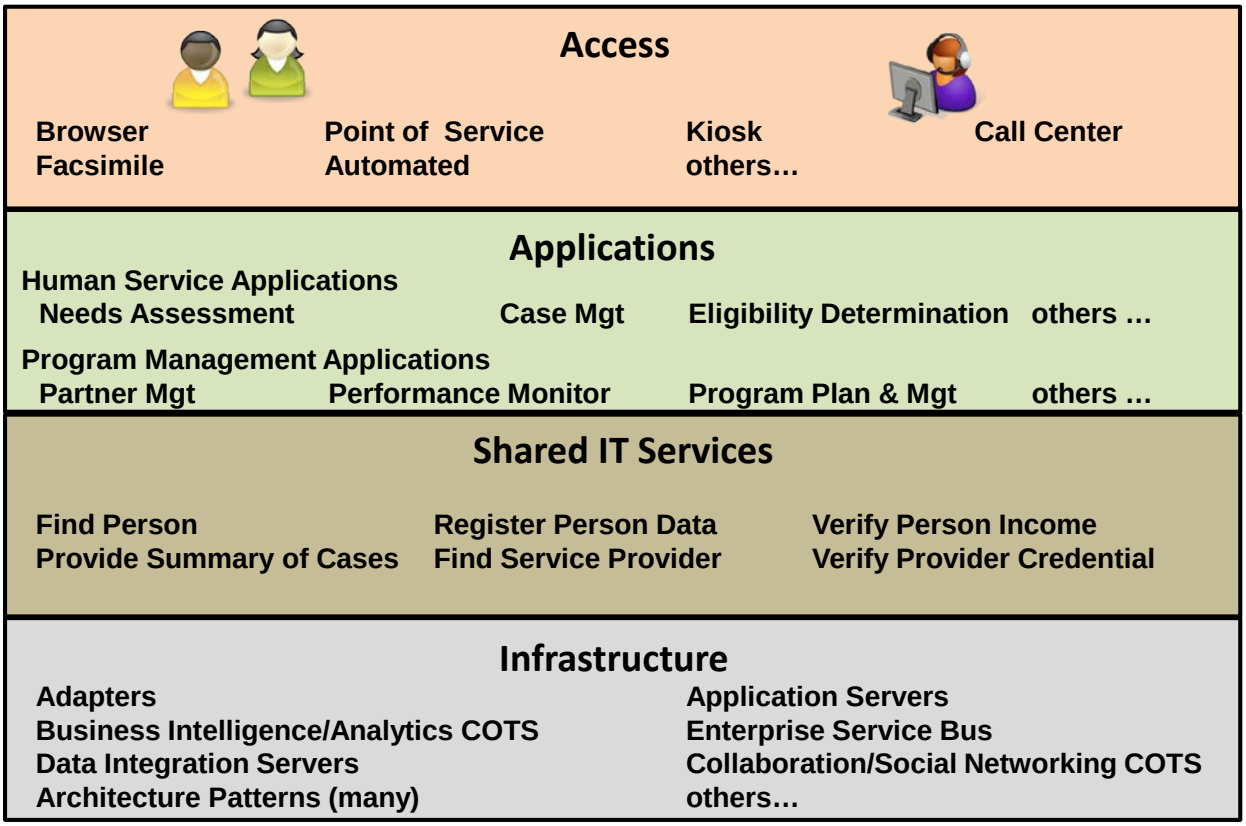

Figure 5-1. NHSIA System Viewpoint Architecture Layers

Access Layer

The access layer includes components for presenting human services information to people, information technology (IT) services for people, and traditional (non-automated) interactions with people. Examples of components in the access layer include kiosks, browsers, call centers, and forms.

Applications Layer

The applications layer includes high-level applications that normally support multiple human services domains, agencies, and programs. In this context an

"application" is application software - a computer program designed for end users to accomplish specific tasks. What constitutes a "domain" depends on how the jurisdiction organizes its services. Examples of components in the applications layer include human service applications that support multiple domains: eligibility determination, case management, and others. This layer also includes program management applications that support multiple programs: partner management, performance monitoring, and others. This layer may include applications unique to a domain, agency, or program (to meet unique requirements or because they are legacy applications). This layer may also include integrated applications (e.g., one application that handles eligibility determination and enrollment) to support multiple activities in one or more domains, agencies or programs. Finally, this layer includes supporting applications such as rules engines, workflow systems, document management systems, and analytics packages. Applications should be interoperable so that users can easily accomplish all their tasks seamlessly.

Shared Services Layer

The shared services layer includes components that deliver functionally-oriented IT services and information (application services and data services) that are unique to the human services domains. Examples of shared services include updating information about a person or verifying credentials for a service provider. The information and information structures shared by multiple applications (e.g., master person index) also appear in this layer. "Wrappers" to enable legacy systems to discover and use shared services are in the shared services layer.

Infrastructure Layer

The infrastructure layer includes IT services, systems, and data not unique to human services domains. This layer includes the tools for applications to discover and use the shared services. The elements in this layer include the enterprise service bus. Basic capabilities include mediation, routing, and data and protocol transformation. The layer includes a service registry and service broker functions. Elements in this layer include the commercial off-the-shelf IT services, hardware, and software that support all the upper layers. Examples of components in the infrastructure layer include adapters, application servers, and data integration servers. The Infrastructure Viewpoint discusses this layer and architecture patterns applicable to NHSIA.

5.2 Systems Viewpoint Artifacts

The artifacts currently planned to be included in the Systems Viewpoint are summarized in Table 5-1.

Table 5-1. Systems Viewpoint Artifacts

Artifact	Form & Description
Systems Reference Model	Form: Illustration and descriptive text
	Description: For system architects. Provide a guide for structuring each jurisdiction's architecture around interoperable and reusable elements rather than stove-piping systems by program or agency.
Access Layer	Form: Text
	Description: For system architects. Describe, at a high level, different elements of the access layer. Identify the stakeholders likely to use each approach.
Applications Layer	Form: Illustrations and text
	Description: For system architects. Identify and describe, at a high level, representative interoperable applications to support human services. Tie to related key concepts in NHSIA. List major functions.
Shared Services Layer	Form: Text and matrix.
	Description: For system architects. Describe, at a high level, representative interoperable shared IT services. Explain how they support the NHSIA business model.
Connections & Relationships	Form: Text and matrices.
	Description: For all readers. Map applications to business processes. Map shared services to business activities and applications. Describe candidate data structures.

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6 Infrastructure Viewpoint Summary

The Infrastructure Viewpoint describes the technical underpinnings of the planned NHSIA architecture.

6.1 Infrastructure Viewpoint Description

The Infrastructure Viewpoint Description includes the components necessary to facilitate interoperability among participants in the health and human services environment ranging from the Federal Government to the individual beneficiary of services. Since the vast majority of human services agencies, organizations and providers will likely already have made significant investments in systems and technology infrastructure, this viewpoint presents an approach that works with the constraints of already established infrastructure environments, but is geared towards leveraging advances in technology with the goal of not only increasing interoperability, but reducing costs and improving process efficiency. The Infrastructure Viewpoint includes descriptions of patterns that can be used by government and private implementers to guide their solution architectures. An example of a pattern is shown in Figure 6-1.

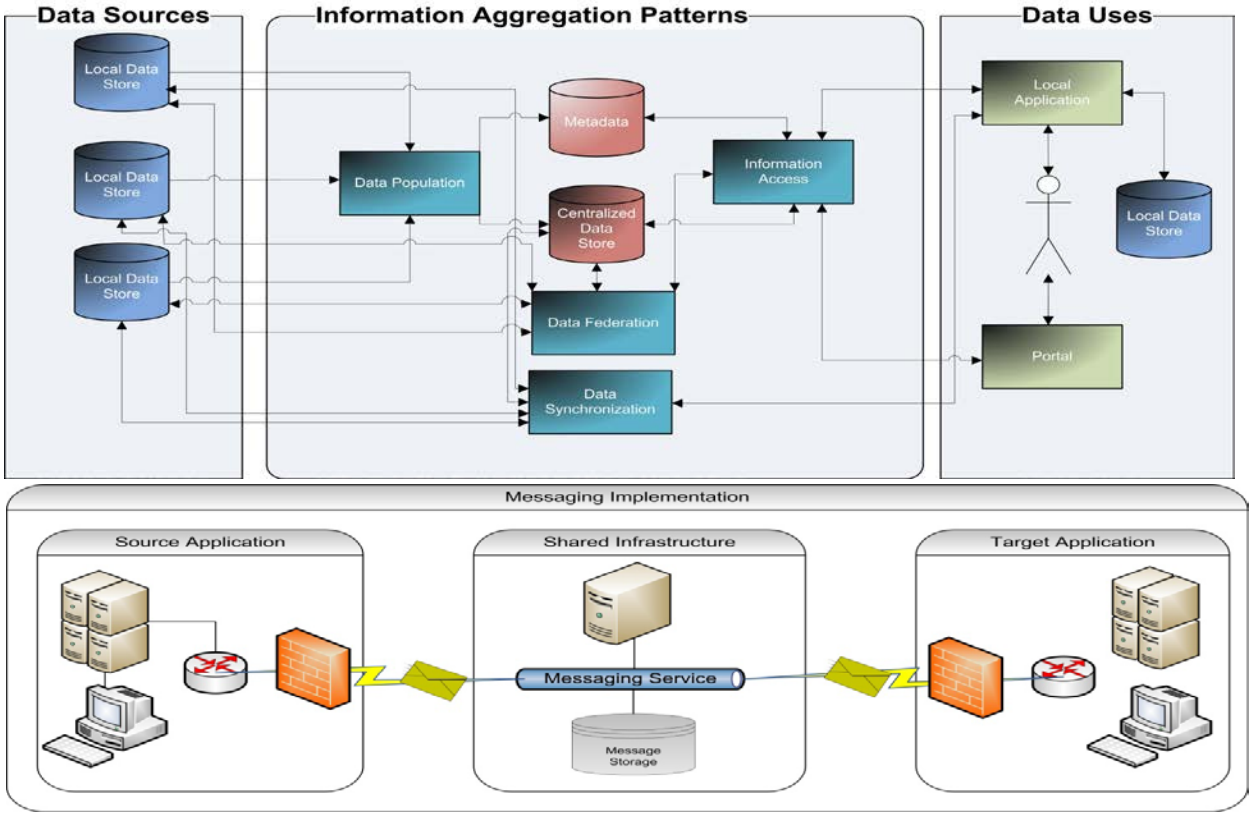

Figure 6-1. Example of an NHSIA Infrastructure Viewpoint Architecture Pattern

6.2 Infrastructure Viewpoint Artifacts

The artifacts currently planned to be included in the Infrastructure Viewpoint are summarized in Table 6-1.

Table 6-1. Infrastructure Viewpoint Artifacts

Artifact	Form: & Description
Key Infrastructure Concepts and Components	Form: Illustrations and descriptive text
	Description: Describes some of the key infrastructure technology trends and their uses and benefits in the NHSIA architecture.
Architecture Patterns	Form: Diagrams and descriptive text
	Description: Focuses on the types of infrastructure implementations needed to achieve interoperability and presents a series of patterns that address common cross-organizational interoperability and integration challenges.
Pattern Use Cases and Implementation Considerations	Form: Diagrams and descriptive text
	Description: Describes the possible uses of the architecture patterns in the NHSIA context and presents factors that may influence implementation decisions.

7 Information Viewpoint Summary

The Information Viewpoint defines a conceptual data model (CDM) which was derived by analyzing the information needs of the business processes defined by the Business Viewpoint.

7.1 Information Viewpoint Description

The Information Viewpoint describes the business information requirements for the NHSIA architecture. The Information Viewpoint leverages existing data standards and ongoing standardization efforts in the area of Health and Human Services. The National Information Exchange Model (NIEM), as defined and governed by the Department of Homeland Security, is the primary standard used in building this architecture viewpoint.

The Information Viewpoint is intended to:

- Identify applicable standards for data definition, message coding, and exchange protocols.
- Define a conceptual data model (CDM) to support the Business Viewpoint.
- Identify information exchanges required among human service processes.
- Identify requirements for the definition of National Information Exchange Model (NIEM) Information Exchange Package Documentation (IEPD) to support the identified exchanges.

The Information Viewpoint products can facilitate interoperability among Human Services systems and processes in several ways:

- Alignment with the "Information Input and Output" terms defined in the Business Viewpoint Description document provides a common vocabulary for discussion of shared information.
- The NHSIA CDM identifies classes, attributes, and relationships between classes at a level of detail that can guide the development of standards, while leaving some flexibility to respond to specific stakeholder needs during the standards development process.
- Development of specific NIEM Information Exchanges, including XML message schemas for the identified Information Exchanges, will support actual implementation of interoperable interfaces that can be leveraged by current and future stakeholders.

The Information Viewpoint provides a vocabulary, requirements, and context to support the development of the Human Services Domain of the National Information Exchange Model (NIEM). NIEM is designed to develop, disseminate, and support enterprise-wide information exchange standards which enable federal,

state, local, and tribal jurisdictions to effectively share critical information required by their operations.

NIEM includes:

- A standardized data model for terms used in information exchanges between federal, state, local, and tribal government units,
- A process for defining and sharing the context, structure, and elements of messages exchanged between two stakeholders, and
- A process for collaborative extension of the model's vocabulary.

Figure 7-1 illustrates the standard NIEM development process and highlights the areas where NHSIA products support the development of Information Exchange Package Document (IEPD) artifacts.

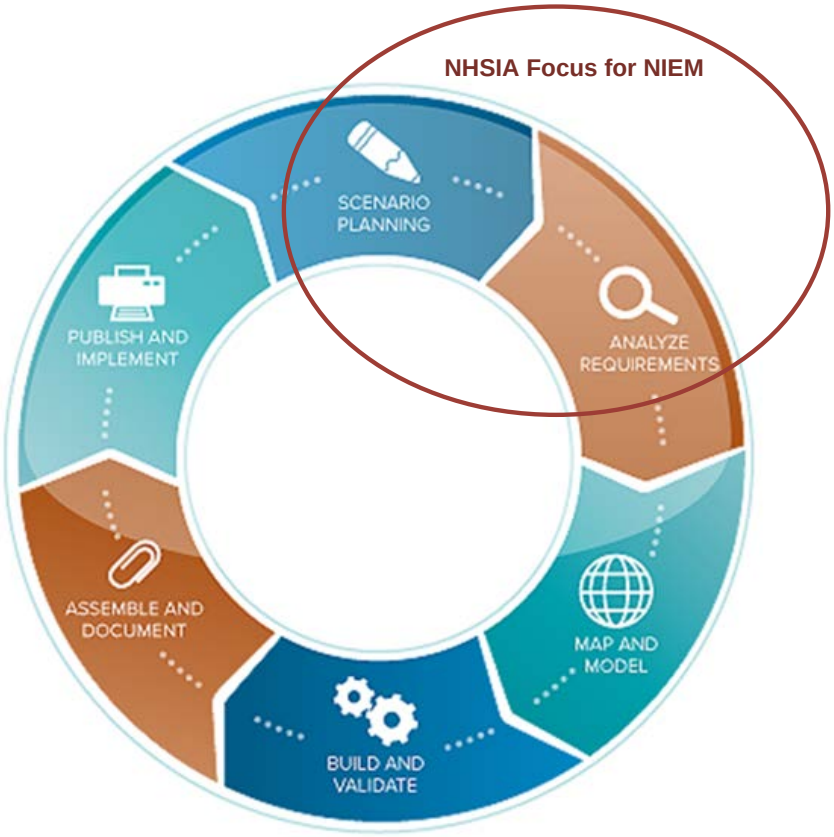

Figure 7-1: NHSIA Support to Development of NIEM IEPDs

7.2 Information Viewpoint Artifacts

The artifacts currently planned to be included in the Information Viewpoint are summarized in Table 7-1.

Table 7-1. Information Viewpoint Artifacts

Artifact	Form & Description
List of Relevant Standards	Form: Spreadsheet of standards with detailed descriptions.
	Description: A spreadsheet of existing information standards in the areas of data, coding, and exchange protocols relevant to health and human services. Includes oversight authority, definitions, and references.
Conceptual Data Model	Form: A data model generated in Enterprise Architect (EA), delivered in native EA format and as a portable document format (pdf) diagram.
	Description: A diagram identifying classes, attributes, and associations between classes. This model forms the basis for the model aspects for Information Exchanges (for IEPD Requirements Artifacts) and for Data Structures.
Data Dictionary	Form: A spreadsheet.
	Description: Definitions of data items identified in the CDM. Includes a mapping to the Information terms defined in the Business Viewpoint.
List of Information Exchanges	Form: Spreadsheet migrating to a modeling tool.
	Description: List and description of information exchanges between stakeholders, associated with business processes and activities from the Business Viewpoint.
IEPD Requirements Artifacts	Form: A data model generated in Enterprise Architect (EA), delivered in native EA format and as a pdf diagram, accompanied by a spreadsheet for the mapping.
	Description: Data Models derived from the NHSIA CDM focused on specific families of information exchanges. The spreadsheets map the CDM data elements to NIEM elements and identify potential NIEM gaps. The current NHSIA release addresses the "Eligibility and Enrollment" Information Exchanges.

Figure 7-2 is the Eligibility Aspect of the CDM for the IEPD Requirements Artifacts. This is also the format used for the overarching NHSIA CDM.

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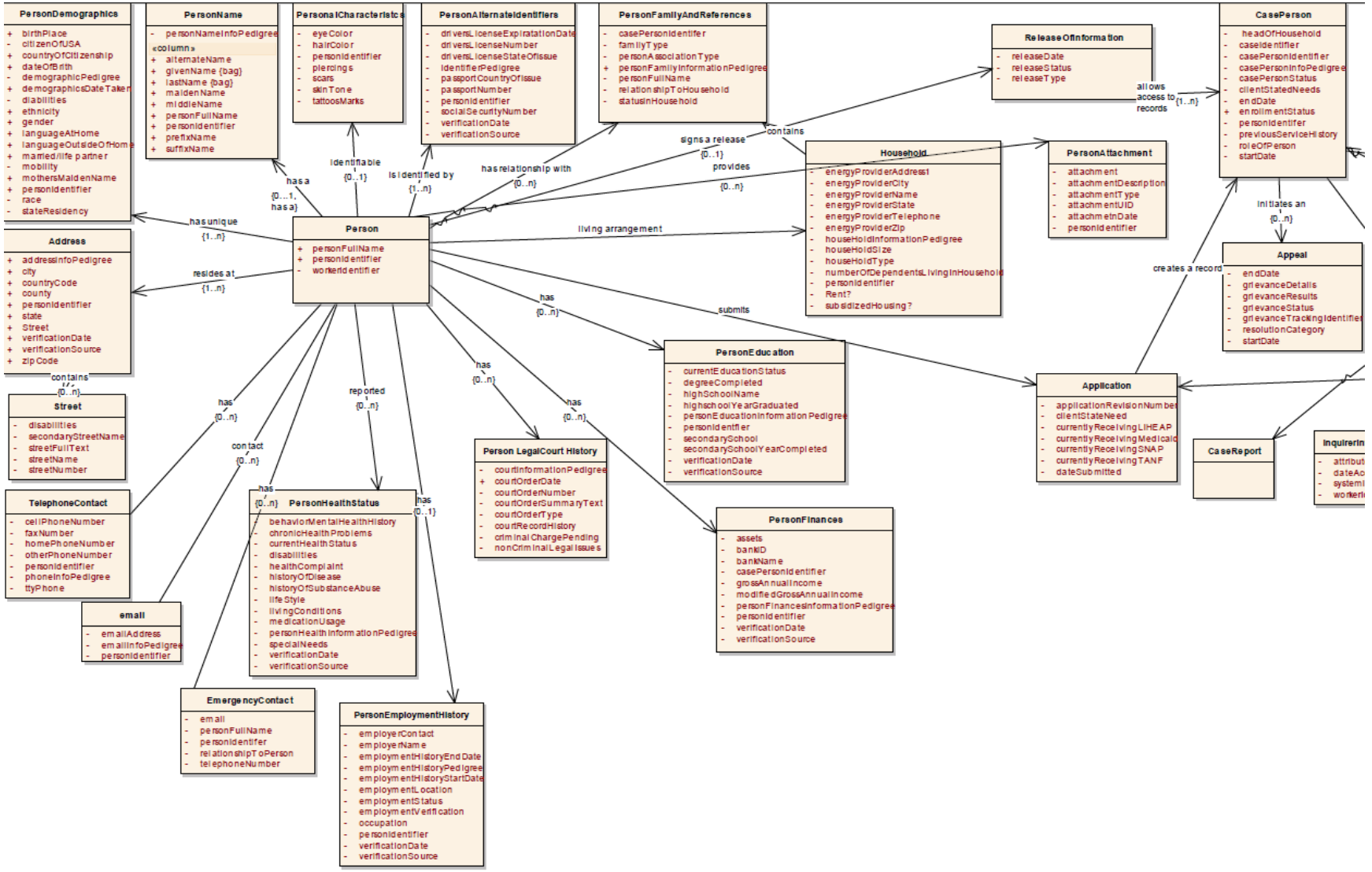

Figure 7-2: Eligibility Aspect of the NHSIA Conceptual Data Model

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The complete CDM contains ~ 50 classes and several hundred attributes. These are further detailed in the Data Dictionary, which is partially illustrated in Table 7-2. UML nomenclature standards are being applied and the attributes names appear in camel case.

Table 7-2. Extract from NHSIA Data Dictionary

UML Class	UML Attribute	Primary UML Association	Description/Definition
Access Authorization		Person	Whether or not an individual or system has the necessary permission to create, read, update, and/or delete information
Access Authorization	accessAuthorizationLevel		Level of access permissions for an individual or system to create, read, update, and/or delete information
Access Authorization	accessGroup;		Group association for an individual or system who has permission to create, read, update, and/or delete information
Address		Person Contact Information	
Address	addressInfoPedigree		Source of address
Address	city		City associated with a person or agency, part of an address.
Address	countryCode		Country part of address
Address	county		County location associated with address
Address	personIdentifier		Unique person identifier
Address	state		State or providence in USA associated with address
Address	Street	Address	Street is associated with address and is its own class. Address inherits street
Address	verificationDate		Date the address was verified
Address	verificationSource		Authoritative source for verification of address
Address	zipCode		Zip code associated with address

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8 Project Viewpoint Summary

The Project Viewpoint describes the projects planned or required to implement the capabilities defined by the architecture. It outlines how the transition from the as-is state to the desired to-be state will be made.

8.1 Project Viewpoint Description

The NHSIA Project Viewpoint is defined in a document entitled "NHSIA Project Viewpoint Description" and one other associated artifact.

The Project Viewpoint proposes an approach that a jurisdiction may consider to implement the capabilities defined by the NHSIA architecture. It outlines how the transition from the as-is human services information systems architecture to the desired to-be architecture might be made. The primary audience is the members of the human services community at the state or county level of government who are responsible for developing strategic plans, projects, and budgets to effect the transition.

In the context of NHSIA implementation, we use the term "jurisdiction" to mean the region or geo-political unit that is responsible for the management and/or administration of human services. A "jurisdiction" may be a state, one or more counties, or one or more municipalities - depending on how the management and administration of human services are organized. The agencies, staff members, and other stakeholders in a jurisdiction will collaborate to implement NHSIA.

8.2 Project Viewpoint Artifacts

The artifacts currently included in the Project Viewpoint are summarized in Table 8-1.

Table 8-1. Project Viewpoint Artifacts

Artifact	Form & Description
Project Viewpoint Description: Implementation Approach	Form: A narrative document including text and figures.
	Description: An approach for the transition from the as-is situation to the NHSIA to-be architecture. To be used primarily by the members of the human services community at the state and local levels of government who are responsible for developing strategic plans, programs, and budgets to effect the transition.
"NHSIA Core" Concepts	Form: A narrative document including text and figures.
	Description: Definition of NHSIA core capabilities, related concepts, and implementation building on those concepts.

9 Accessibility Appendix

This section contains accessible versions of figures and tables in this document. Table and figure numbers that appear here correspond to versions that appear earlier in this document.

People:	Organizations	Systems for:
Assistor Auditor Case worker Client Community partner Legal staff Program/agency staff Researcher Service contractor Service provider The Public	Community-based agency Court Educational institution Financial institution Government agency Health institution Insurance company Legislative, regulatory body National association Other private company Research institution	Adoption/foster care Child care Child protection Child support Disability Domestic violence Education Employability Financial assistance Food/nutrition Health Housing & energy assistance Parenting/family planning Public health Substance abuse & mental health

Figure 2-2 NHSIA Context and Scope (1 of 3)

Technologies & Standards:	Access points:	Structures:
Architecture patterns Best practice Business intelligence Business rules and rules engine Cloud computing Customer relationship management Data standard (e.g., HL7, NIEM) Decision support Design pattern Fixed & mobile communications Internet and Web Networks Security Service-oriented Architecture (SOA) Workflow XML	At home At work In call centers In clinical settings In field/mobile systems In office-based service-related systems In schools	Agency Person Record Case Person Record Case Record Confidentiality and Privacy Authorization Electronic Case File Case Record Electronic Health Record (EHR) Health Information Exchange (HIE) Master Person Index (MPI) Medicaid Information Technology Architecture (MITA)-derived structures Personal Health Record (PHR) Service Provider Registry Shared Person Record

Figure 2-3 NHSIA Context and Scope (2 of 3)

Information about:	Actions:
Account, payment	Apply for
Association	Approve
Benefit	Archive
Business (provider, contractor, etc.)	Authorize
Case	Bill
Credential	Collaborate
Document	Delete
Facility	Determine/screen
Finances	Develop
Group	Educate
Job	Freeze
Legal action	Identify and select
Metrics	Initiate
Organization	Interview
Outcome	Manage
Person	Monitor/assess/detect
Placement	Notify/communicate
Population	Pay
Program	Plan
Resource capacity	Record
Rule, policy, regulation, law	Refer
Service	Register
Status	Report
System	Request
Workflow	Research/analyze
	Respond
	Retrieve
	Review
	Schedule/coordinate
	Share
	Trigger
	Verify

Figure 2-4 NHSIA Context and Scope (3 of 3)

Level	Category
Federal Government	Provide system management (e.g., guidelines and criteria, standards development, program monitoring, compliance)
Regional Coalition - State Government	Provide program management Provide services not related to care (e.g., payment processing, reporting)
Regional Coalition – Local and Tribal Government	• Provide program administration • Pay for service At community level regional coalitions, local government and private organizations: • Provide services (holistic, not programmatic) • Assist clients in navigating the system • Collect data at point of care/service
	Notes: Some jurisdictions manage some programs at the local level. Some jurisdictions provide selected services at the state level.

Figure 2-5 Levels and Categories of Stakeholders and Users

Level	Scope	Detail	Impact	Audience
Community Architecture	Multiple Organizations	Very Low	Community Outcomes	Community Stakeholders
Enterprise Architecture	Agency/ Organization	Low	Strategic Outcomes	Enterprise Stakeholders
Segment Architecture	Line of Business	Medium	Business Outcomes	Business Owners
Solution Architecture	Function/ Process	High	Operational Outcomes	Users & Developers

Figure 2-6 Architecture Levels and Attributes

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