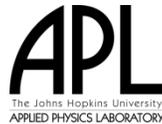


*Prepared for the:*  
Administration for Children and Families (ACF)

**National Human Services Interoperability Architecture**  
**“NHSIA Core” Concepts**  
**DRAFT Version D0.3**  
**September 2012**

*Prepared by:*  
The Johns Hopkins University  
Applied Physics Laboratory (JHU/APL)



## **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.

This document is disseminated in the interest of information exchange. The Johns Hopkins University Applied Physics Laboratory (JHU/APL) assumes no liability for its contents or use thereof. This report does not constitute a standard, specification, or regulation. JHU/APL does not endorse products or manufacturers. Trade and manufacturer's names appear in this report only because they are considered essential to the object of this document.

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/initiatives-priorities/interoperability>. When ACF completes the migration to their new website the URL is expected to be <http://www.acf.hhs.gov/initiatives-priorities/interoperability>.

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

Valerie B. Barnes  
The Johns Hopkins University Applied Physics Laboratory  
11100 Johns Hopkins Road  
Laurel, MD 20723  
Phone: 717-352-0131  
E-Mail: [Valerie.Barnes@jhuapl.edu](mailto:Valerie.Barnes@jhuapl.edu)

### Revision History

<b>Version</b>	<b>Date</b>	<b>Description of Change</b>	<b>Reference</b>	<b>Edited Location</b>	<b>Executor</b>
D0.2	2012-03	Original version published.			VBB
D0.3	2012-09	Revised to incorporate feedback from ACF. Focus on jurisdiction activities.	Primarily content changes. Also made 508-compliant.	Throughout	VBB

This page intentionally blank

## Table of Contents

1	Introduction and Background .....	1
1.1	NHSIA Background.....	1
1.2	Summary of the NHSIA Implementation Approach .....	1
2	The “NHSIA Core” Concept .....	5
3	NHSIA Core IT Services .....	15
Appendix A.	DRAFT Lists of Elements that Support Core Capabilities.....	21
Appendix B.	Process for Identifying and Specifying NHSIA Core IT Services .....	31
B.1	Drivers and Objectives.....	34
B.2	Business Capabilities Analysis (“Business-Oriented Approach”).....	37
B.3	System Capabilities Analysis (“Technical/Systems-Oriented Approach”) .....	39
B.4	Consolidation and Classification .....	41
B.5	IT Service Analysis.....	42
Appendix C.	Factors To Identify High-Priority Business Problems.....	45

**List of Figures**

Figure 1. NHSIA Core Capabilities Support All Business Areas..... 7

Figure 2. Realize the Value of the Core Capabilities by Implementing *End-User Business Capabilities* ..... 7

Figure 3. "NHSIA Core" Elements..... 8

Figure 4. Notional IT Environment for a County that Adopts NHSIA ..... 10

Figure 5. IT Environments at Different Levels of Government May Support NHSIA ..... 10

Figure 6. A Catalog Is One Way to Make Information about Hubs Available ..... 11

Figure 7. Notional NHSIA Core Infrastructure ..... 13

Figure 8. Reference Model: Performance Information Repositories..... 14

Figure 9. NHSIA Process to Identify Core IT Services..... 15

Figure 10. Example Pilot Deployment of NHSIA ..... 18

Figure 11. Notional Caseworker Portal Implementation ..... 19

Figure 12. Map of Process Step Outputs to Tables and Spreadsheets ..... 21

Figure 13. Approach to Identify and Specify Core NHSIA IT Services ..... 31

Figure 14. Different Groups Participate in the Analysis Activities ..... 32

Figure 15. Iterative Process to Identify NHSIA IT Services ..... 34

Figure 16. FEA Business Area - Services for Citizens..... 38

**List of Tables**

Table 1. Different IT Environments Host Different Elements ..... 11

Table 2. DRAFT Core IT Services ..... 23

Table 3. DRAFT Information Type Categories for Entities ..... 27

Table 4. DRAFT Core Interfaces..... 28

Table 5. DRAFT Core Repositories..... 29

Table 6. DRAFT High-Priority Business Problems ..... 35

# 1 Introduction and Background

## 1.1 NHSIA Background

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 comprehensive eligibility determination and information sharing across programs and agencies, improved delivery of services, prevention of fraud, and better outcomes for children and families. It consists of business, information, and technology models to guide programs and states in improving human service administration and delivery through improved interoperability of business processes and information technology (IT).

Currently, systems supporting ACF programs are often “siloes”, 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. Siloes 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 and components, inability to exchange information, susceptibility to duplicate and fraudulent

***NHSIA Challenge – Develop a national architecture to enable information exchange and shared IT services among currently siloes federal, state, local and private human service information systems.***

payments, and unnecessarily complicated and expensive operations. The desired state is to have an environment characterized by interoperability. Interoperable systems share information and IT services to efficiently deliver integrated human services to the client community. Interoperability can be achieved via the design and implementation of an overall NHSI Architecture, which defines the principles, standards, IT services, security, and interfaces to be followed by the component elements within the total system of 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 expected ultimate **impact** of using NHSIA is improved effectiveness and efficiency in providing human services.

## 1.2 Summary of the NHSIA Implementation Approach

Each state has its own approach for organizing, managing, administering, delivering, and supporting human services. The National Human Services Interoperability Architecture applies to any state model. The architecture addresses information systems that provide capabilities to

support the business activities associated with the management, administration, and/or delivery of human services. NHSIA focuses on enabling information exchange and sharing IT services among information systems, whether those systems are managed and/or operated by state, local/tribal, or private organizations.

The NHSIA Project Viewpoint Description outlines an approach to transition from the current situation to the NHSIA to-be architecture. 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.

The implementation approach includes these elements:

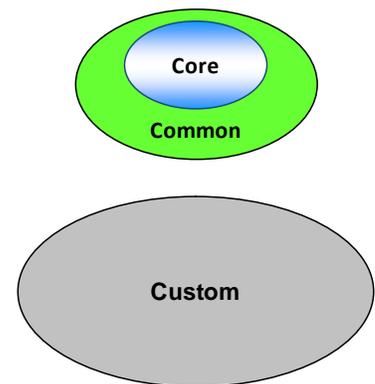
- State diversity and commonality
- ➔ • NHSIA core
- NHSIA system of systems
- Roadmap
- ➔ • Jurisdiction's steps

This document focuses on the “NHSIA core” concepts and how a jurisdiction's implementation builds on those concepts.

The implementation approach is to leverage the development of reusable IT components (e.g., IT services, information exchanges, and information repositories). The IT services may be built once and invoked by many applications, or built as a model for others to use in their own implementation. New information exchanges should use standards, primarily based on the National Information Exchange Model (NIEM) vocabulary. The information repositories may be virtual or actual.<sup>1</sup>

NHSIA classifies IT services as common, core, or custom.

- **Common** IT services support cross-jurisdiction information sharing (e.g., local-local, local-state, state-state, state-federal) and/or cross-program or agency information-sharing (e.g., child support with temporary assistance to needy families, child welfare agency with income support agency). The concept is that the human services community will agree on naming conventions, functions, and NIEM-based interfaces for the common services. Eventually, those who manage and operate IT environments for human services will implement the common services to support their human services programs. In this category, an IT service with the



---

<sup>1</sup> See the NHSIA Infrastructure Viewpoint Description for a discussion of architecture concepts and patterns that may apply.

same name in two different IT environments would perform the same functions, use the same input parameters, and return the same information.

- **Core** IT services are a foundational subset of the common IT services that enable a basic level of interoperability. These are discussed in more detail in this “NHSIA Core” Concepts document.
- **Custom** IT services are the other services that jurisdictions will implement to support their own human services operations. Uniformity of purpose and interfaces across programs and jurisdictions is not necessary for custom IT services.

The reader is advised that some material appears in both of the Project Viewpoint artifacts. This lets each document stand alone.

This page intentionally blank

## 2 The “NHSIA Core” Concept

NHSIA is likely to be implemented via an evolutionary approach. The as-is systems comprising NHSIA have been developed over a period of a couple decades or more. It is not feasible to replace them or even modify them all in a few years. Given that it will take some years to accomplish the transition, it is not possible to foresee all the changes in laws, regulations, the economy, and technology that will impact the to-be state beyond a few years out. Therefore, the approach that NHSIA is taking is to architect a core set of essential capabilities that everyone needs. **The core capabilities enable critical information sharing and create an environment that allows new capabilities to evolve more easily.**<sup>2</sup> Defining a core provides a clear target for initial implementation. Decision-makers should consider the core capabilities when funding and prioritizing projects and when ordering the sequence of implementation activities. The list of core elements provides a yardstick to measure progress in implementing NHSIA.

Stated simply, the **core NHSIA capabilities**:

- Provide a foundation for interoperability (among programs, agencies/organizations, and jurisdictions). Interoperable systems share information and IT services to efficiently deliver integrated human services to the client community. Interoperability can be achieved via the design and implementation of systems compatible with NHSIA, which defines the principles, standards, IT services, security, and interfaces to be followed by the component elements within the total system of systems.
- Provide foundational capabilities or information.
  - Find and get basic and/or summary information about key entities (person, case, provider, and program) to improve information sharing and enable improved delivery of human services
  - Verify information against authoritative sources to support eligibility and other program-related rules
  - Collect, aggregate, and analyze key operational performance information across programs and agencies/organizations to improve effectiveness and efficiency

As one example of interoperability, the foundation should provide user identity management to allow information system users to access the tools and information they need across multiple systems via a single set of credentials. This is sometimes called “single sign-on”. Another foundational element is the Master Person Index (MPI) which enables matching records about people.

Several key entities are involved in human services operations. The core capability requirement is to be able to locate and read basic and/or summary information about the key entities. NHSIA defines these terms for key entities:

---

<sup>2</sup> The Internet and World Wide Web are two common, extremely successful examples of this type of approach. Both have underlying architectures that permit expansion into new features and capabilities never envisioned when the architectures were first defined.

- Person = Someone who is interested in or already receiving human services. When the person starts to receive services, he/she is also called a "client". Several persons may be considered a client if they receive services as a group (e.g., a household).
- Case = A set of information related to a particular human service for a particular client. A case is normally associated with a human services program. The term "case person" associates a person with a case.
- Provider = An agency, company, or individual that provides human services.
- Program = A funded activity to deliver a set of one or more human services; usually established by law and managed by an agency in accordance with specified regulations.

Applicants for human services provide information about themselves. That information may be used to look up additional information from authoritative sources (e.g., use driver license number to retrieve demographic information). Rules for programs require some level of information quality. So, the core capability requirement is to be able to verify the applicant-provided information against an independent, third-party authoritative source or retrieve the information directly from an authoritative source. Similarly, human services providers supply information about themselves. The core capability requirement is to be able to verify that information or retrieve information about the provider to support program rules. Human services programs also define rules for eligibility and other aspects of program supervision, administration, and operations. To enable automation for these business functions, the rules themselves must be available for use in automated processes. The rules should be stored in an electronic repository so that they can be extracted and managed. This requirement also supports fraud detection.

Operational performance information is collected and analyzed to improve effectiveness and efficiency. The core requirement is to enable and facilitate the collection, aggregation, and analysis of performance information. Resultant outputs and outcomes could be shared across programs and jurisdictions. This capability will enable in-depth understanding of processes and programs at all levels, allow exploration of improved evidence-based practices, and support fraud detection.

Figure 1 illustrates that the NHSIA core capabilities support all the business areas involved in human services. Initial work on NHSIA addressed the green business areas in some detail; yellow areas were defined at a high level.<sup>3</sup>

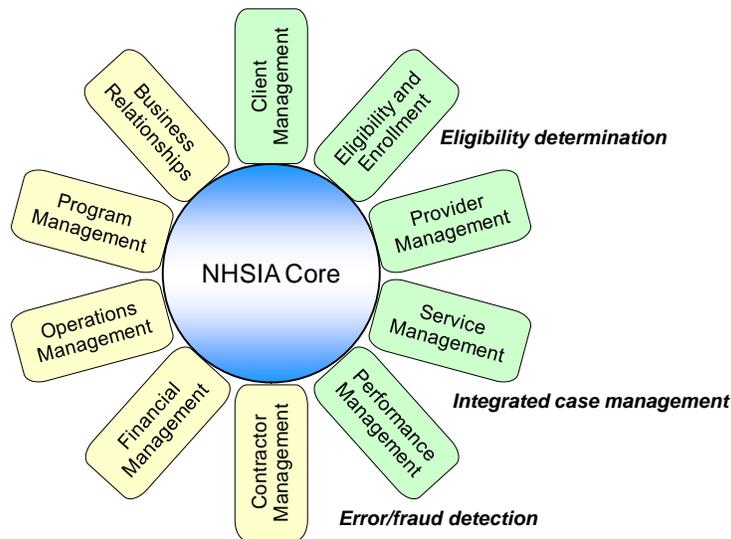
---

<sup>3</sup> See the NHSIA Business Viewpoint Description and attachments for more about business areas.



**Figure 1. NHSIA Core Capabilities Support All Business Areas**

The core elements provide functionality upon which end-user capabilities can be built. To realize value of the core capabilities, an agency/organization should implement the core capabilities and implement or adapt one or more high-priority end-user business capabilities building on the core elements. The implementation would likely invoke core, other common, and custom IT services. Figure 2 overlays Figure 1 with a few candidate end-user capabilities.<sup>4</sup>



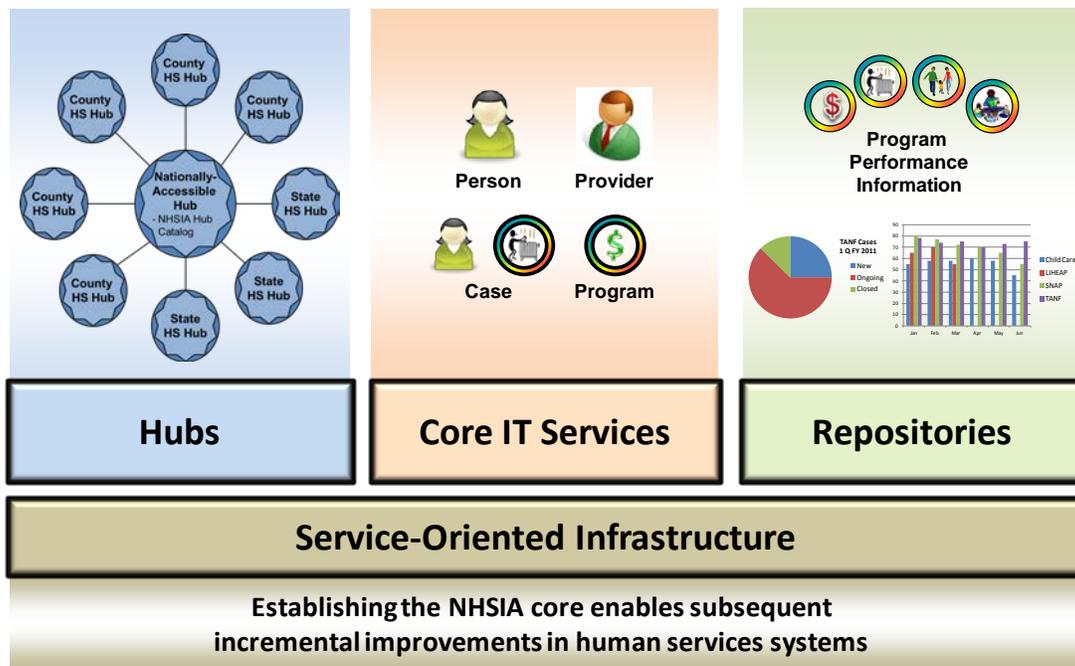
**Figure 2. Realize the Value of the Core Capabilities by Implementing *End-User Business Capabilities***

<sup>4</sup> See the NHSIA Business Viewpoint Description and attachments for more about business areas, business processes, and business activities and their relationships to capabilities. See the NHSIA Capability Viewpoint Description and attachments for more about NHSIA capabilities.

**Implementing NHSIA core concepts means that these **core information system elements** will be available:**

- A service-oriented architecture infrastructure in each IT environment that supports human services to provide the foundation for IT service discovery and re-use
- A set of hubs to share IT services. Information sharing may use NIEM-based standards. The initial shared IT services and information sets are those required to support the core capabilities.
- For authorized users, single sign-on and attribute-based access control to streamline the user's experience and abide by confidentiality agreements
- A set of repositories to facilitate selected data aggregation and analysis

Figure 3 illustrates those core "NHSIA Core" elements. By establishing a shared, service-oriented infrastructure (shown in the long brown box at the bottom), jurisdictions will lay the foundation for improving IT systems that support human services. Part of that foundation includes establishing agreements and environments that provide security and access control. Moving up the diagram, core IT services provide the enabling capabilities to find and share information and to support functional and supporting applications for multiple programs. Those core services and related information sets are shared through hubs (shown on the left) hosted in a service-oriented architecture environment. Repositories (on the right) provide a common environment for information from multiple programs to facilitate fraud detection, performance monitoring, and performance management. In the end, this interoperable architecture should provide a way forward for improved programs and services to clients.



**Figure 3. "NHSIA Core" Elements**

Service-oriented architecture (SOA) is a methodology for systems development and integration where functionality is grouped around business processes and packaged as interoperable services<sup>5</sup>. SOA also describes an IT infrastructure that allows different applications to exchange data with one another as they participate in business processes. An SOA IT environment provides the ability to request services from local and distributed components and manage the results.

A hub is a place within the service-oriented IT environment that is used to host services, applications, and information to be shared externally. The hub may also contain other elements that are only shared internally.

Single sign-on (SSO) addresses the cumbersome situation of logging on multiple times to access different resources. In the NHSIA environment, users should not be required to maintain separate sets of logon credentials to access their local and shared resources. Human services workers will require access to shared applications and resources. Human services clients will require access to their own information and information about programs. Data integrity and confidentiality must be ensured. Sharing information about the user's roles, rights, and privileges in a secure manner enables single sign-on and attribute-based access control.<sup>6</sup>

Human services workers and clients require access to various sets of information. Jurisdictions will implement repositories that authorized users and user systems can access. As part of implementing the NHSIA core capabilities, jurisdictions will implement a Performance Information Repository (PIR) to collect operational information from the jurisdiction's human services activities so the information can be used to assess performance across, potentially, multiple agencies, organizations, and programs.

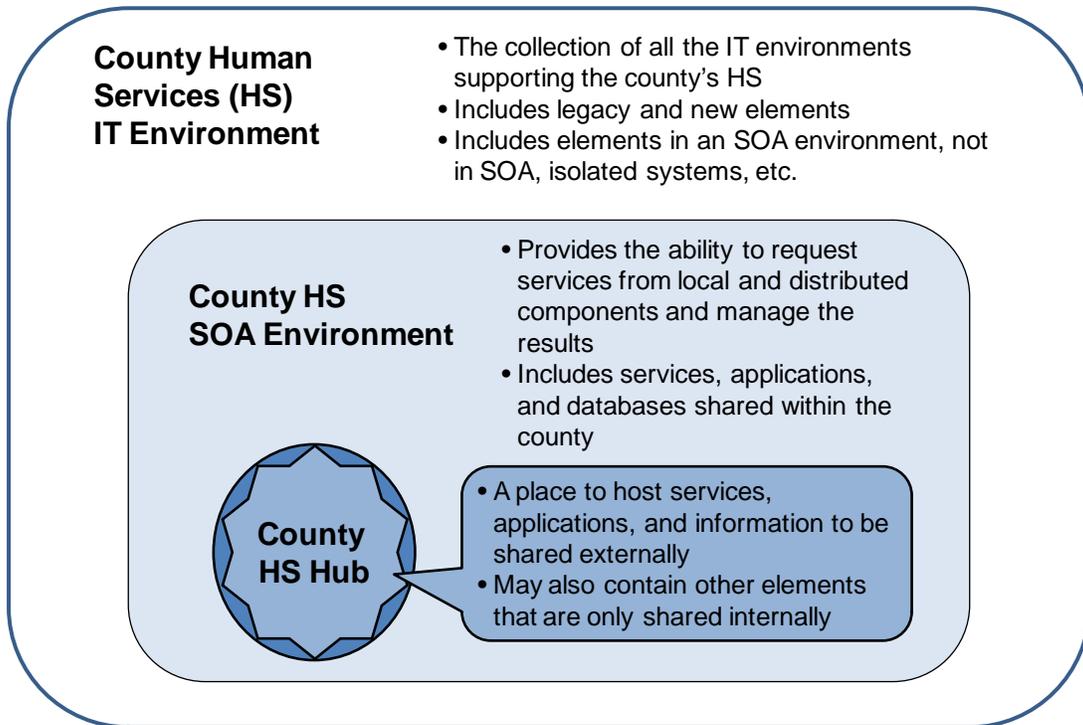
Figure 4 illustrates a notional IT environment for a county that adopts NHSIA. There may be several IT environments in a large county.

- The large white box represents the collection of all the IT environments that are involved with supporting human services in the county. It includes all aspects of all IT environments, both legacy elements and those deployed to support NHSIA concepts. It includes the service-oriented environment as well as others that are not service-oriented.
- The middle light blue box is the service-oriented IT environment. It is a subset of the county HS IT environment. The SOA IT environment provides the ability to request services from local and distributed components and manage the results. It includes IT services, applications, and databases that are shared within the county.
- The blue circle contains the hub. It is a subset of the HS SOA environment. The hub is used to host services, applications, and information to be shared externally. The hub may also contain other elements that are only shared internally.

---

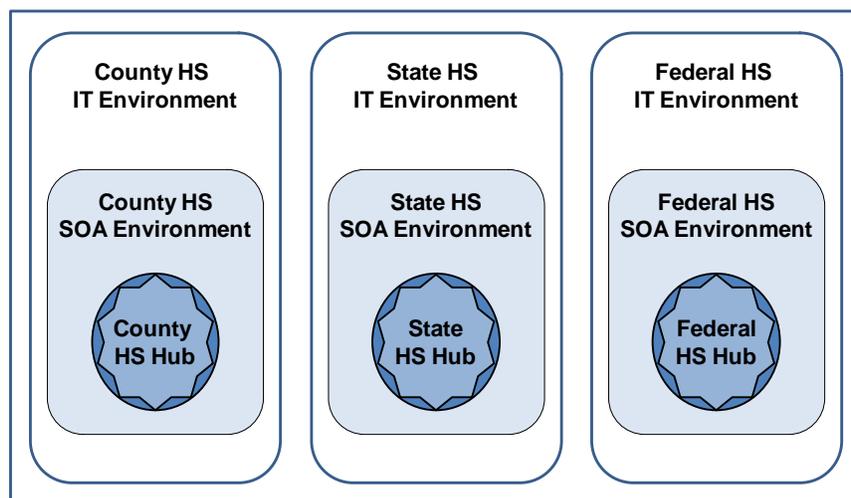
<sup>5</sup> Thomas Erl, *Service-oriented Architecture: Concepts, Technology, and Design*, Upper Saddle River: Prentice Hall PTR, 2005.

<sup>6</sup> See the NHSIA Security White Paper for more about single sign-on and access control.



**Figure 4. Notional IT Environment for a County that Adopts NHSIA**

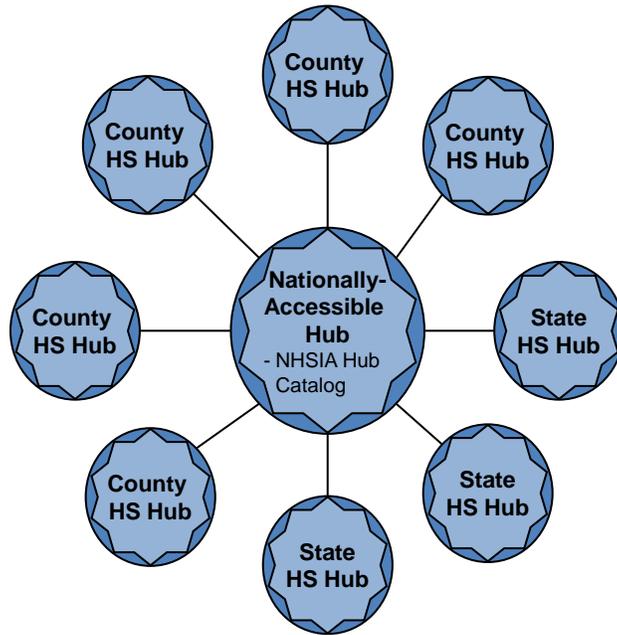
Elements to provide the NHSIA capabilities will be implemented in IT environments at different levels of government. Figure 5 depicts one reference model for deployment. In this model, each county has its own IT environment and human services are state-supervised and county-administered.



**Figure 5. IT Environments at Different Levels of Government May Support NHSIA**

To make shared IT services easily accessible across different organizations, programs, and jurisdictions, one NHSIA core concept is that a hub is aware of the existence of other NHSIA

hubs. Figure 6 illustrates one way that information about the hubs could be shared — via a catalog hosted in a nationally-accessible hub. Other models are possible.



**Figure 6. A Catalog Is One Way to Make Information about Hubs Available**

Different levels of government may implement elements to support NHSIA. Table 1 shows notional NHSIA adoption across the county, state, and federal levels. As shown, the hubs provide shared IT services, applications, and information. The last row lists likely IT services to support the NHSIA core capabilities. The federal column may apply to outward-facing operations, namely those operations of Federal Human Services agencies that involve interacting with clients, local and state jurisdictions, and providers.

**Table 1. Different IT Environments Host Different Elements**

	<b>County</b>	<b>State</b>	<b>Federal</b>
Human Services IT Environment	<ul style="list-style-type: none"> <li>• County SOA elements</li> <li>• County legacy systems</li> </ul>	<ul style="list-style-type: none"> <li>• State SOA elements</li> <li>• State legacy systems</li> </ul>	<ul style="list-style-type: none"> <li>• Federal SOA elements</li> <li>• Federal legacy systems</li> </ul>
SOA Environment (a subset of the IT environment)	<ul style="list-style-type: none"> <li>• County custom IT services</li> <li>• County applications and databases that are shared within the county</li> </ul>	<ul style="list-style-type: none"> <li>• State custom IT services</li> <li>• State applications and databases that are shared within the state</li> </ul>	<ul style="list-style-type: none"> <li>• Federal custom IT services</li> <li>• Federal applications and databases that are shared within the federal government</li> </ul>
Hub (a subset of the SOA environment for)	<ul style="list-style-type: none"> <li>• County core IT services</li> <li>• County common IT services</li> </ul>	<ul style="list-style-type: none"> <li>• State core IT services</li> <li>• State common IT services</li> </ul>	<ul style="list-style-type: none"> <li>• Federal core IT services</li> <li>• Federal common IT services</li> </ul>

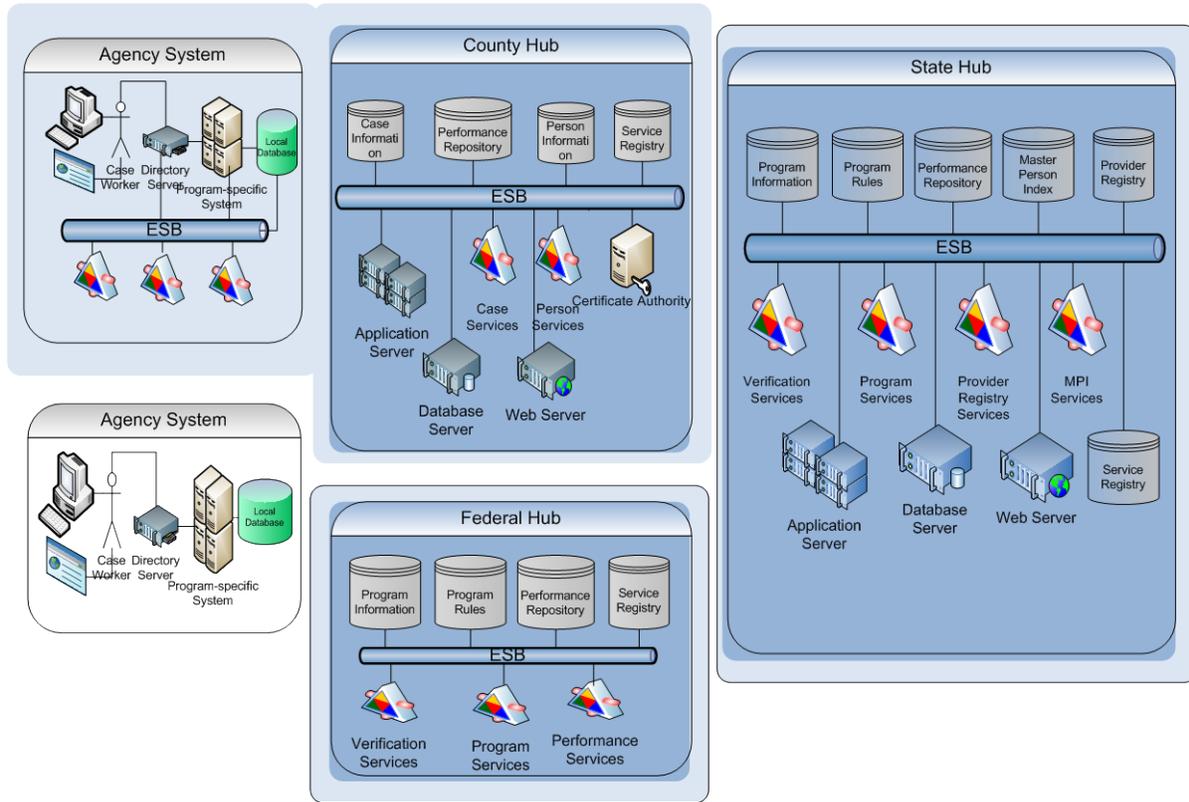
	<b>County</b>	<b>State</b>	<b>Federal</b>
sharing with external partners)	<ul style="list-style-type: none"> <li>• County performance info repository</li> <li>• County applications &amp; databases</li> <li>• County IT service registry</li> </ul>	<ul style="list-style-type: none"> <li>• State performance info repository</li> <li>• State applications &amp; databases</li> <li>• State program rules</li> <li>• State IT service registry</li> </ul>	<ul style="list-style-type: none"> <li>• Federal performance info repository</li> <li>• Federal applications &amp; databases</li> <li>• Federal program rules</li> <li>• Federal IT service registry</li> <li>• Nationally-accessible NHSIA Hub Catalog<sup>7</sup></li> </ul>
Likely core IT Services (hosted in the Hub)	<ul style="list-style-type: none"> <li>• Person</li> <li>• Case</li> <li>• Summary of cases</li> </ul>	<ul style="list-style-type: none"> <li>• Master Person Index (MPI)</li> <li>• State program</li> <li>• Provider registry</li> <li>• Provider</li> <li>• Verification (DMV address, employment, vital records)</li> </ul>	<ul style="list-style-type: none"> <li>• Federal program</li> <li>• Verification (citizenship, residency, status, income, race, SSN, SSA death master file, parent location)</li> </ul>

Jurisdictions may choose to put elements in different IT environments than where they are shown in Table 1. Elements other than those listed may also reside in the hub.

Figure 7 presents a simplified, notional illustration of a few segments of the IT infrastructure environments that would support NHSIA: one county, one state hub, and a federal hub. The figure focuses on a few key elements to support the core capabilities. The light blue shading depicts SOA environments at each level. Darker blue shading depicts the hubs in each of those SOA environments. These hubs contain the IT infrastructure needed to support the deployment of shared IT services and the centralized storage of associated data. In addition, Figure 7 illustrates two county agency-level IT infrastructures that would make use of core services and capabilities. The top left agency has a fully-developed SOA infrastructure of its own. In this case, the agency is considered part of the county SOA environment and may develop and deploy shared web services to expose its own information or capabilities to NHSIA partners. The intent is that all organizations that expose web services will register them in a service registry in their associated hub. The bottom left agency is not considered part of the county SOA environment, but may still modify its internal applications to access NHSIA IT services in any hub.

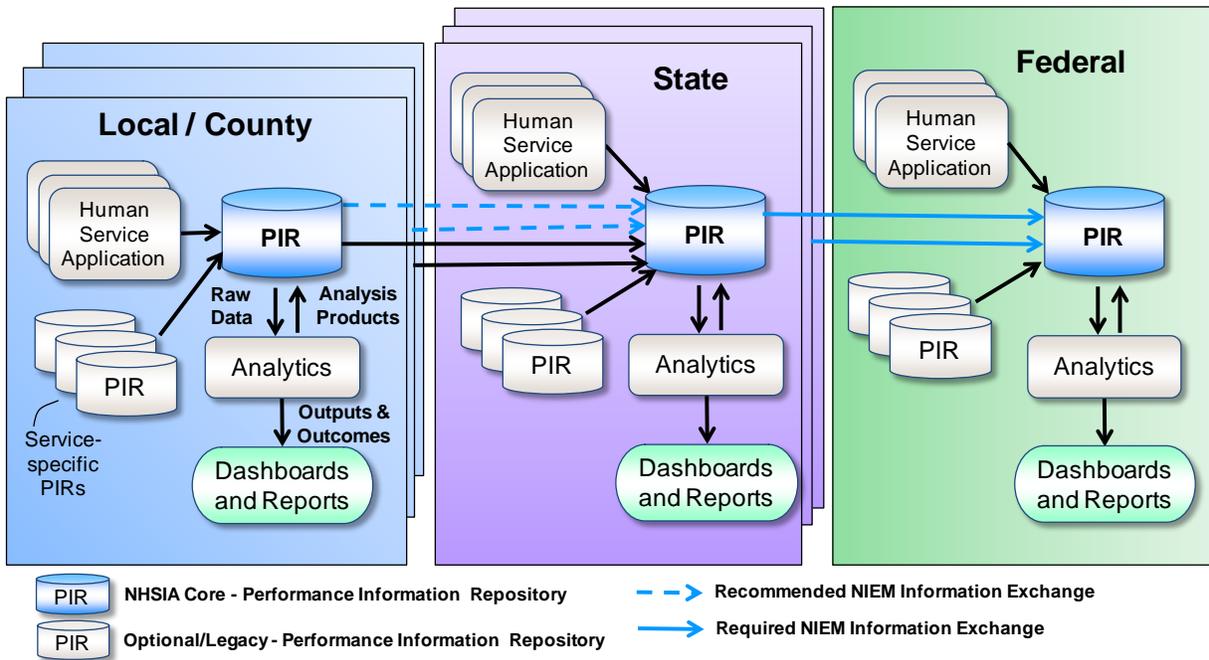
---

<sup>7</sup> This hub catalog may be hosted by a federal agency, or by some other entity. This simply illustrates one option.



**Figure 7. Notional NHSIA Core Infrastructure**

Figure 8 illustrates a reference model focused on performance information repositories (PIRs). The figure shows a repository that supports the core requirements at each level of government. IT services at each level would replicate performance information into an integrated PIR (shown as blue canisters in the figure). The systems would use standard interfaces, primarily NIEM-based, to exchange information.



**Figure 8. Reference Model: Performance Information Repositories**

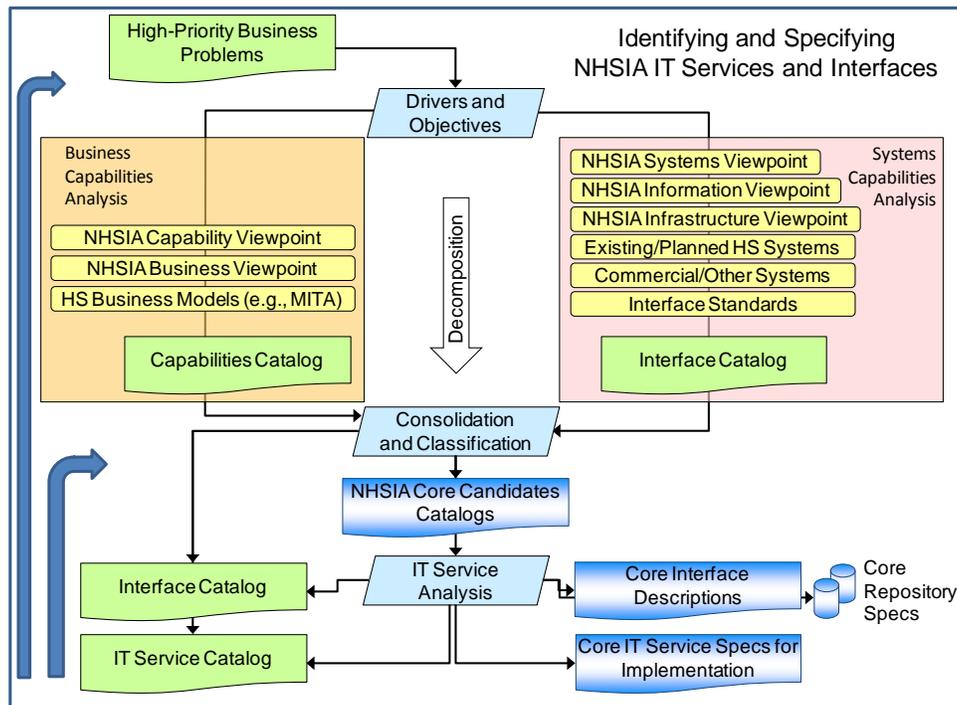
The gray PIR canisters represent service-specific PIRs. These may or may not exist in a given jurisdiction or for a given program. Analytics tools process the raw data and generate products including outputs and outcomes. Analytics are enhanced by the integration of performance information across human services programs and agencies/organizations. The connections between the local/county-level integrated PIRs and the state-level integrated PIR represent sharing whatever information the state needs to perform its analysis. Similarly, the connections between the state-level integrated PIRs and the federal-level integrated PIR represent sharing whatever information the federal government needs to perform its analysis. Integrating the PIRs at the state and federal levels should reduce duplication of effort and data reporting, and also enable more meaningful analysis. A PIR may be implemented as a "virtual" structure that is physically several different databases.

### 3 NHSIA Core IT Services

As described earlier, implementing NHSIA core concepts means that a set of hubs that share IT services will be available in those jurisdictions that implement NHSIA. Information sharing may use NIEM-based standards. The initial shared IT services and information sets are those required to support the core capabilities.

The NHSIA Architecture Team developed a draft list of specific IT services to support the core capabilities. The team followed a tailored version of the Global Reference Architecture (GRA) methodology for identifying those IT services. The GRA is “an abstract framework for understanding significant components and the relationships between them within a Service-Oriented Architecture. It lays out common concepts and definitions as the foundation for the development of consistent SOA implementations within the justice and public safety communities.”<sup>8</sup> NHSIA has adopted many of the GRA concepts and definitions, tailoring them as needed for the human services community.

Figure 9 illustrates the tailored approach to identify and specify the IT services and related interfaces and repositories to provide the NHSIA core capabilities. The process also captures information (shown as green catalogs) about other IT (custom and common) services and interfaces to support human services activities.



**Figure 9. NHSIA Process to Identify Core IT Services**

<sup>8</sup> U.S. Department of Justice’s Global Reference Architecture (GRA) Framework, Global Infrastructure/Standards Working Group (GISWG), Version 1.9, April 2011. Available online at <http://it.ojp.gov/globaljra>.

Appendix B explains the approach used to identify the IT services and related interfaces to support the core capabilities.

The core capabilities require IT services to

- Find and get basic and/or summary information about key entities (person, case, provider, and program)
- Verify information against authoritative sources
- Support a set of repositories to facilitate selected data aggregation and analysis

These requirements suggest **core IT services** in these categories:

- Deployed in local and/or state IT environments, depending on how human services are administered and managed:
  - Master Person Index (MPI). To locate records about persons in human services systems.
  - Person. To share basic information about a person.
  - Verification of person information. To verify information about the person from local and/or state authoritative sources.
  - Case. To share summary information about cases related to persons who are receiving or have received human services.
  - Summary of cases. To share a summary of cases (potentially, gathered from different organizations and associated with different programs) related to a person.
  - Program information. To share local-level or state-level information about human services programs, including reporting local-level performance information to the state level or state-level performance information to the federal government.
  - Provider registry. To locate records about human service providers.
  - Provider. To share basic information about human service providers.
  - Verification of provider information. To verify information about the provider from local- or state-level authoritative sources.
- Deployed at the federal level
  - Verification of person information. To verify information about a person or human services provider from national- or federal-level authoritative sources.
  - Verification of provider information. To verify information about the provider from national- or federal-level authoritative sources.
  - Program information. To share federal-level information about human services programs.

The core IT services should utilize standard interfaces. ACF sponsors the NIEM Human Services Domain and is supporting NIEM-based standards development. NIEM standards are preferred for defining interface content unless an alternative standard exists and is widely accepted.

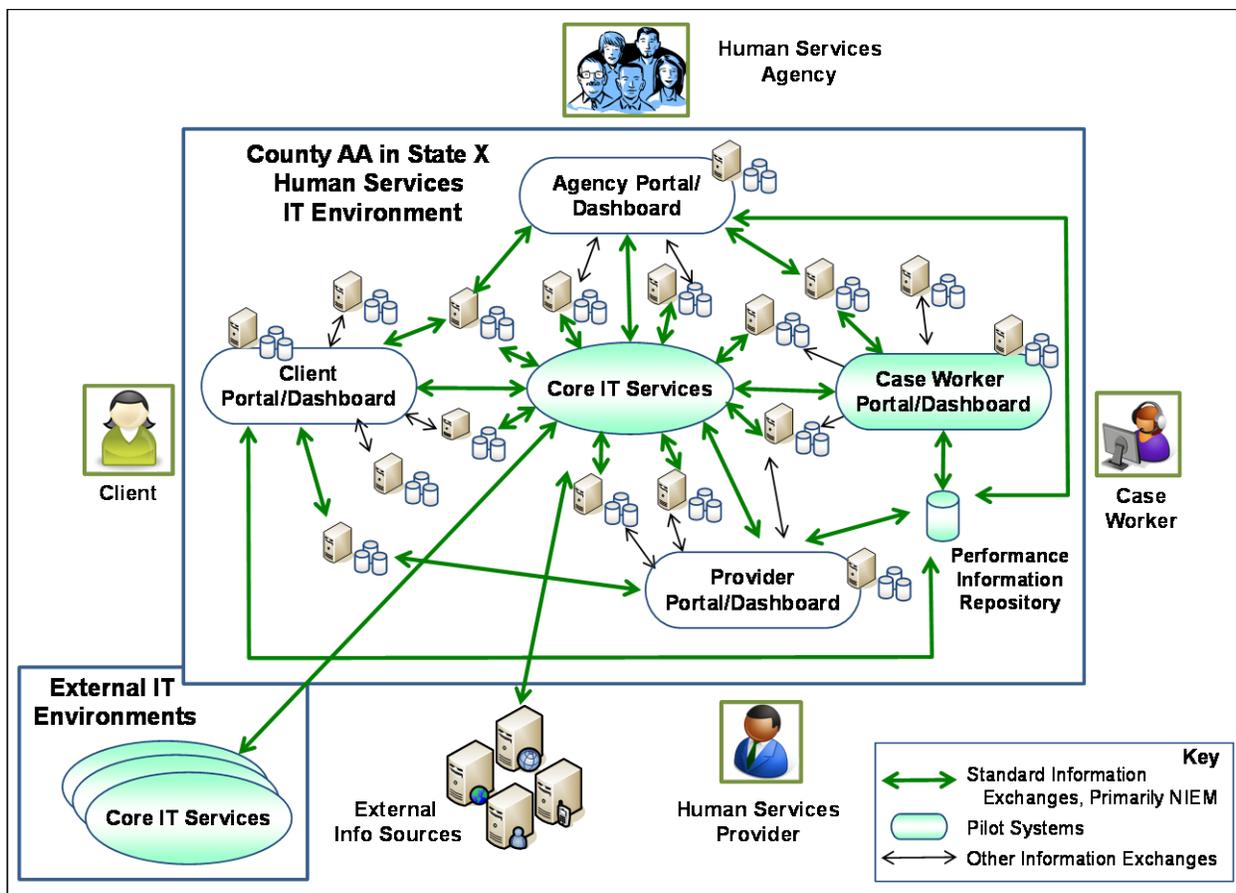
NHSIA encourages the re-use of IT services. Jurisdictions should share designs and implementations. A core IT service may be hosted in a hub and accessed from other IT environments in other jurisdictions. Another form of re-use would be to adapt a service developed in one jurisdiction for use in a different jurisdiction's IT environment.

See Appendix A for the current working list of IT services and related interfaces that support the NHSIA core capabilities. It is anticipated that a NHSIA governance process will be defined to allow working groups to vet and modify this initial list and continue to evolve it over time.

Some jurisdictions may choose to prototype or elements to validate the essential concepts of NHSIA. If lessons learned are shared, those projects could inform a nationwide implementation. The projects might include implementing all or some IT services, repositories, and interfaces to support the NHSIA core capabilities. A prototype or pilot project could also include implementing one or more end-user business capabilities. Enabling someone to use a single sign-up process for multiple human services is one example. A portal/dashboard that gives access to multiple functions is another example/model for providing end-user business capabilities. The prototype and/or pilot projects may build one or more portals/dashboards that will use core IT services to provide useful capabilities to end users:

- Client
- Case worker
- Provider
- Human services program manager

One example for the elements in a pilot implementation is illustrated in Figure 10. The figure shows a pilot deployment of the caseworker portal/dashboard. In practice, a county may choose to implement only a portion of the capabilities shown or may implement end-user capability that uses NHSIA core capabilities without using the dashboard/portal approach. This example configuration represents a county that has its own IT environment and in which state-supervised human services are administered at the county level.



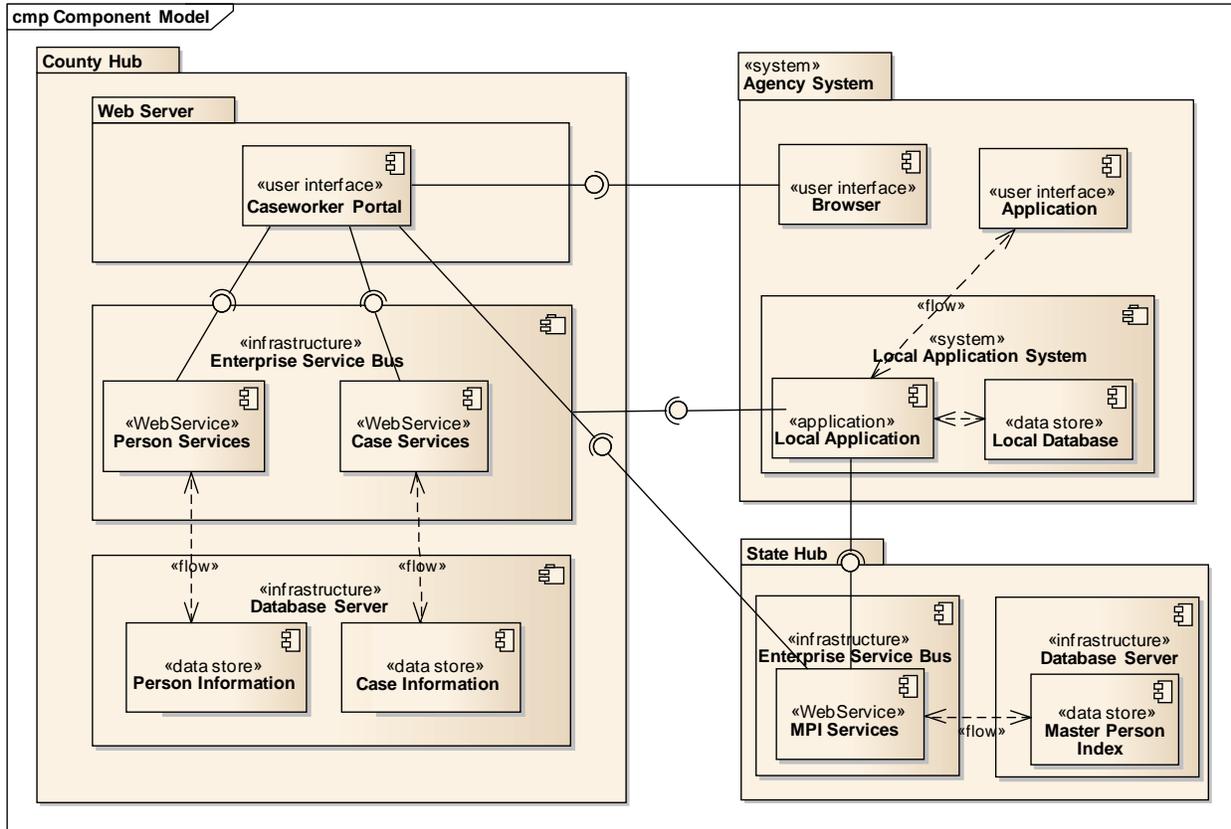
**Figure 10. Example Pilot Deployment of NHSIA**

Figure 11 presents a reference model for the elements that may be deployed to host a caseworker portal in a county. In this diagram, the caseworker portal runs on an application server deployed in the county’s NHSIA hub infrastructure. The portal accesses a number of web services that provide information about existing clients (persons) or cases. The hub infrastructure also provides the data storage mechanism necessary to hold any aggregated or shared information.

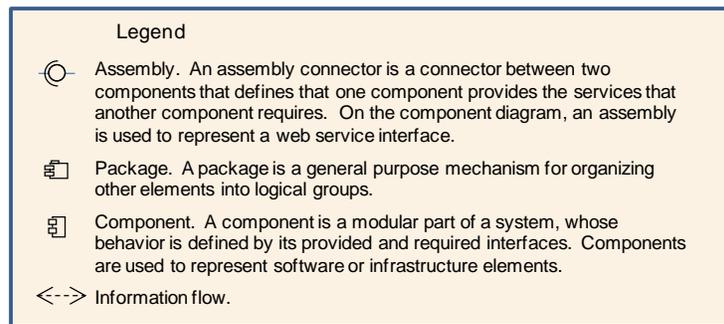
Figure 11 illustrates different ways in which a local agency system can interact with the county’s NHSIA hub. First, the caseworker portal can be accessed by a user via a web browser over a network connection to the county hub. Second, a local application in the user’s environment could be modified to call the person or case web services available in the county hub.

Figure 11 illustrates the interaction between a local application system and the Master Person Index (MPI) services (deployed in a state hub). For example, when a new client is recorded in the local system, the local application could call a web service, in the state hub, to create a new MPI entry or match the client to an existing entry.

In addition, the caseworker portal could call the MPI web services in the state hub to query MPI information or to match persons to MPI entries. The actual integration and use of the MPI will depend on the nature of the participating organizations.



**Figure 11. Notional Caseworker Portal Implementation**



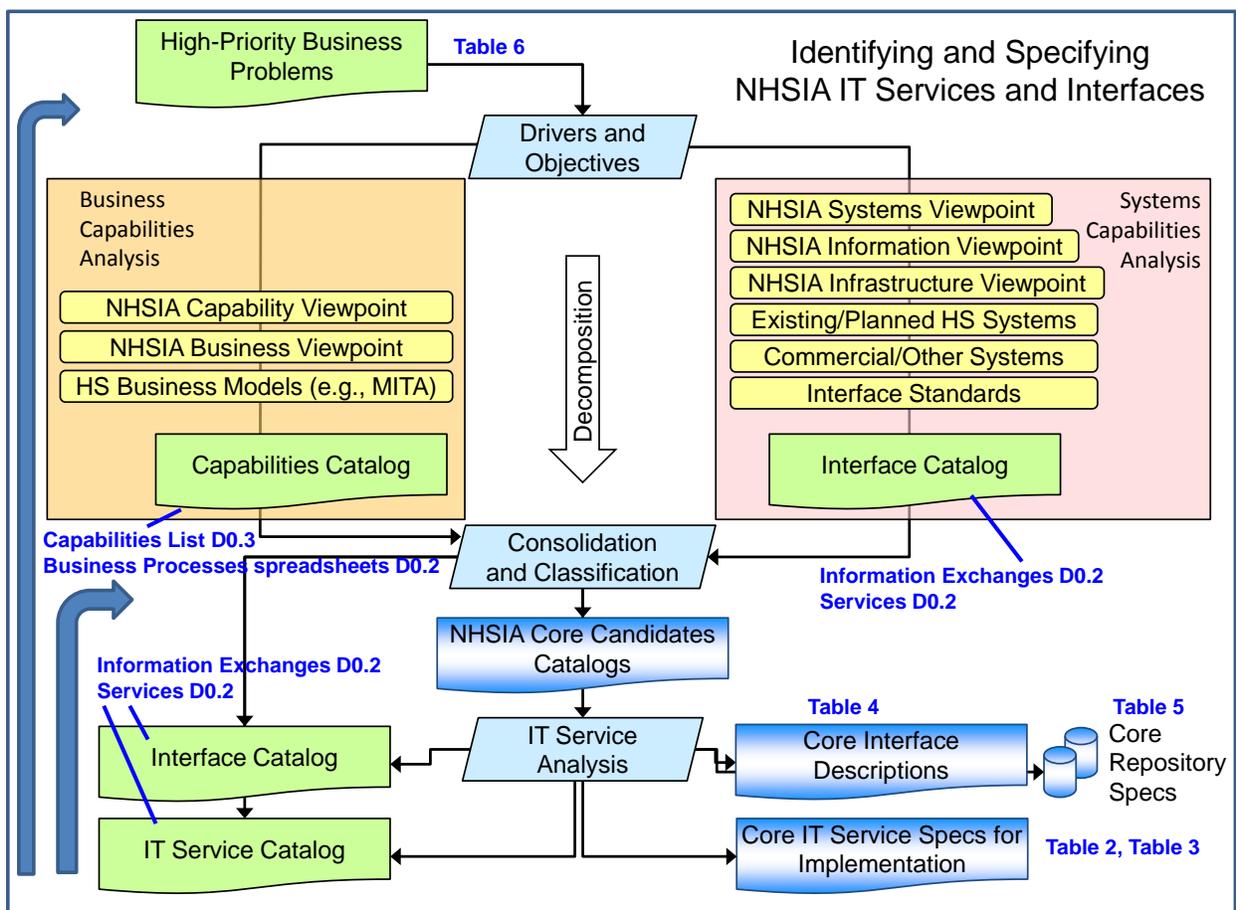
As part of the prototype and pilot activities, we encourage participants to share lessons learned. If a pilot is successful, the design and implementation may be re-usable by others. We encourage states to form working groups with each other to facilitate sharing lesson learned. The NHSIA Architecture Team may use the lessons learned and model designs/implementations to update the architecture documentation.

This page intentionally blank

## Appendix A. DRAFT Lists of Elements that Support Core Capabilities

The NHSIA Architecture Team drafted lists of IT services, interfaces, and repositories that support the core capabilities. The team followed the process outlined in Appendix B. The team recommends that Jurisdiction NHSIA Teams that are planning to align with NHSIA should start with these draft lists of core elements.

Figure 12 maps the outputs of the process to tables in this appendix and to the separate spreadsheets.



**Figure 12. Map of Process Step Outputs to Tables and Spreadsheets**

Table 6 lists the high-priority business problems that NHSIA IT information-sharing services should address. The NHSIA Architecture Team drafted the list and invites comments.

Following the process outlined in Appendix B, next the NHSIA Architecture Team analyzed business capabilities and system capabilities. The NHSIA Capability Viewpoint and Business Viewpoints provided the primary inputs to the business capabilities analysis. The NHSIA

Systems, Information, and Infrastructure Viewpoints provided the primary inputs to the Systems Capabilities Analysis. Next the team consolidated and classified the Capabilities Catalog and Interface Catalog analysis results and updated the catalogs. Finally, the team analyzed the candidate services and updated the catalogs to reflect the results of the service analysis. This appendix extracts the core elements from the catalogs to show the draft recommendations for core IT services, information exchanges, and repositories. A paragraph at the end of each section in Appendix B explains where the results of each step in the process were captured.

Table 2 provides the draft list of core IT services. Table 3 provides the draft list of information types associated with the services that exchange information.

**Service Designators** follow this naming convention: CS-<category>-<identifier>, where

CS = Core Service and <category> is one of the following:

- MPI = Master Person Index
- PERS = Person-related information, including services that verify information about a person
- SUMCASES = Information that summarizes the cases related to a client
- CASE = Case-related information
- PROVREG = Provider Registry
- PROVIDER = Provider-related, including services that verify information about a provider
- PROG = Program-related information

and <identifier> is an alphanumeric string. Note: in this draft iteration, a single identifier may refer to a family of IT services rather than an individual IT service.

**Interface Designators** follow a similar naming convention: CI-<category>-<identifier>, where CI = Core Interface and the categories are the same as those listed above for services.

The <identifier> is also an alphanumeric string. Note: in this draft iteration, a single identifier may refer to a family of interfaces rather than an individual interface.

In Table 2 the **Service Name. Description** column includes a draft name and description for the proposed core IT service. Note: in this draft iteration, a single name may refer to a family of IT services rather than an individual IT service.

Note that the draft list of core IT services addresses the NHSIA D0.1 business areas. The initial NHSIA efforts did not include any details about several business areas (Business Relationships, Program Management, Operations Management, Financial Management, and Contractor Management). Thus, Table 2 does not identify any core IT services related to those business areas. The NHSIA Architecture Team recommends that Jurisdiction NHSIA Teams review all their business areas and nominate additional candidates for NHSIA core IT services.

Note that the draft list of core IT services does not identify any services to share eligibility or other rules. The NHSIA Architecture Team continues to explore ideas about how rules could be extracted from online repositories to enable automated processing for eligibility and other processes.

Table 2 designates only one fairly generic interface for each service. In reality, many interfaces may apply to some services.

**Table 2. DRAFT Core IT Services**

<b>Service Designator</b>	<b>Service Name. Description</b>	<b>Interface Designator</b>
<b>CS-MPI-001</b>	<b>Find Person.</b> Locate candidate (potential) information in one or more indices or identity sources about the person based on search criteria input. Return one (or more) set(s) of basic demographic and contact information about candidate matching person(s).	CI-MPI-001
<b>CS-MPI-002</b>	<b>Identify Available Person Records.</b> Identify human services information available about the person. Based on the MPI entry parameter input, return a list of pointers to available records about the person.	CI-MPI-001
<b>CS-MPI-003</b>	<b>Match Person.</b> Using matching algorithm(s), identify the best match in the MPI about the person based on search criteria input. Return best possible match that exceeds the specified minimum matching level. (This service would likely be used by an automated process.) Based on the best match MPI entry, return basic demographic data, contact data, and a list of pointers to available records about the person.	CI-MPI-001
<b>CS-MPI-004</b>	<b>Create Person Index Entry.</b> Create an entry in the MPI for a person.	CI-MPI-001
<b>CS-MPI-005</b>	<b>Register Person Data.</b> Update an existing MPI entry to add one or more pointers to additional information. Specify metadata fields necessary to access the information.	CI-MPI-001
<b>CS-MPI-006</b>	<b>Update Person Identifying Information.</b> Update an existing MPI entry to modify or add to the information that identifies the person (e.g., name or address).	CI-MPI-001

Service Designator	Service Name. Description	Interface Designator
CS-PERS-001	<b>Provide Person &lt;person information type&gt;.</b> Supply <person information type> about a specific person. This is a higher-level service that may invoke lower-level services based on the information to be supplied.	CI-PERS-001 (for <person information type = education> data)
CS-PERS-101	<b>Provide Person In a Case &lt;case person information type&gt;.</b> Supply <case person information type> about a specific person associated with a specific human services case.	CI-PERS-101
CS-PERS-201	<b>Verify Person Citizenship Status.</b>	CI-PERS-201
CS-PERS-202	<b>Verify Person Residency Status.</b>	CI-PERS-202
CS-PERS-203	<b>Verify Person Income.</b>	CI-PERS-203
CS-PERS-204	<b>Verify Person Native American Status.</b>	CI-PERS-204
CS-PERS-205	<b>Verify Person Social Security Number.</b>	CI-PERS-205
CS-PERS-251	<b>Verify Person &lt;information type&gt;.</b> Compare <information type> about a specific person from one source versus another. Use fuzzy match for text data. Raise flag if the comparison falls outside the specified tolerance.	CI-PERS-251
CS-SUMCASES-001	<b>Provide Summary of Cases.</b> Supply a summary of cases associated with a specific person. May invoke Provide Individual Case Summary repeatedly to satisfy this service.	CI-SUMCASES-001
CS-CASE-001	<b>Provide Individual Case Summary.</b> Supply a summary of a specific case associated with a specific person.	CI-CASE-001
CS-PROVREG-001	<b>Find Service Provider.</b> Locate candidate (potential) information in one or more provider registries about one or more providers based on search criteria input. Return one (or more) set(s) of basic information about candidate matching provider(s).	CI-PROVREG-001

Service Designator	Service Name. Description	Interface Designator
CS-PROVREG-002	<b>Identify Available Service Provider Records.</b> Identify information available about the provider. Based on the provider registry entry parameter input, return a list of pointers to available records about the provider.	CI-PROVREG-001
CS-PROVREG-003	<b>Match Service Provider.</b> Using matching algorithm(s), identify the best match from available registry based on search criteria input. Return best possible match that exceeds the specified minimum matching level. (This service would likely be used by an automated process.) Based on the best match entry, return basic information and a list of pointers to available records about the service provider.	CI-PROVREG-001
CS-PROVREG - 004	<b>Create Provider Registry Entry.</b> Create an entry in the provider registry for a human services provider.	CI-PROVREG - 001
CS-PROVREG - 005	<b>Register Provider Data.</b> Update an existing provider registry entry to add one or more pointers to additional information. Specify metadata fields necessary to access the information.	CI-PROVREG - 001
CS-PROVREG - 006	<b>Update Provider Information.</b> Update an existing provider registry entry to modify or add to the information about the provider (e.g., facility or affiliation).	CI-PROVREG - 001
CS-PROVIDER-001	<b>Provide Service Provider &lt; provider information type&gt;.</b> Supply <provider information type> about a specific human services provider.	CI-PROVIDER-001
CS-PROVIDER-201	<b>Verify Provider &lt;credential type&gt;.</b> Confirm that a specific provider has the <credential type> claimed, with the claimed status, in the specified jurisdiction.	CI-PROVIDER-201
CS-PROVIDER-202	<b>Verify Provider &lt;provider information type&gt;.</b> Compare <information type> about a specific provider from one source versus another. Use fuzzy match for text data. Raise flag if the comparison falls outside the specified tolerance.	CI-PROVIDER-202

<b>Service Designator</b>	<b>Service Name. Description</b>	<b>Interface Designator</b>
<b>CS-PROG-001</b>	<b>Find Program.</b> Locate candidate (potential) information in one or more indices or identity sources about a program based on search criteria input. Return one (or more) set(s) of basic information about candidate matching program (s).	CI-PROG-001
<b>CS-PROG-002</b>	<b>Identify Available Program Records.</b> Identify information available about the program. Based on the program identity parameter input, return a list of pointers to available records about the program.	CI-PROG-001
<b>CS-PROG-003</b>	<b>Match Program.</b> Using matching algorithm(s), identify the best match from available sources based on search criteria input. Return best possible match that exceeds the specified minimum matching level. (This service would likely be used by an automated process.) Based on the best match entry, return basic information and a list of pointers to available records about the program.	CI-PROG-001
<b>CS-PROG-101</b>	<b>Provide Program &lt;program information type&gt;.</b> Supply <program information type> about a specific program.	CI-PROG-101
<b>CS-PROG-151</b>	<b>Provide Program &lt;program report type&gt;.</b> Supply <program report type> for a specific program.	CI-PROG-151

Table 3 provides the draft list of information type categories for each major entity about which the services will exchange information. Each category may contain multiple information types. For example, the Person Finances information type category may include several types of financial information, e.g., current earned income, unemployment income, bank account data, etc.

**Table 3. DRAFT Information Type Categories for Entities**

<b>Entity</b>	<b>Information Type Category</b>
<b>Person</b>	Contact
<b>Person</b>	Demographics
<b>Person</b>	Education
<b>Person</b>	Employment
<b>Person</b>	Family and references
<b>Person</b>	Finances
<b>Person</b>	Health
<b>Person</b>	Legal/court
<b>Person</b>	Name
<b>Person</b>	Other identifiers
<b>Person in a Case</b>	All persons associated with case
<b>Person in a Case</b>	Start/end dates
<b>Provider Credential Type</b>	Professional credential (e.g., social worker, day care)
<b>Provider</b>	Affiliations
<b>Provider</b>	Contact
<b>Provider</b>	Performance
<b>Program</b>	Description
<b>Program</b>	Contact
<b>Program Report</b>	Jurisdiction summary
<b>Program Report</b>	Jurisdiction details
<b>Program Report</b>	Nationwide summary

Table 4 provides a draft list of NIEM-based interfaces associated with the core IT services. The interfaces would be described in NIEM Information Exchange Package Documentation (IEPD). Multiple interfaces may be grouped into one IEPD. This list identifies fairly generic interfaces to handle information type categories. NHSIA NIEM working groups would identify specific interfaces associated with detailed information types.

**Table 4. DRAFT Core Interfaces**

<b>Interface Designator</b>	<b>Interface Name. Description</b>
<b>CI-MPI-001</b>	Master person selection. This interface provides one or more entries from the Master Person Index. The interface may include multiple entries that match the specified criteria, if there is more than one potential match. The interface includes basic demographic data, contact data, and a list of pointers to available records about each person that potentially matches the criteria. The interface also provides a level of confidence about each match. The interface may also be used to submit the information required to establish a new entry in an MPI or to update an existing entry with revised identifying or pointer information.
<b>CI-PERS-001</b>	<person information type = education> information about a person. This interface provides <person information type = education> information about a specific person.
<b>CI-PERS-101</b>	<case person information type> information about a person. This interface provides <case person information type> information about a specific person within a case.
<b>CI-PERS-201</b>	Person citizenship status. This interface provides citizenship status for a specific person.
<b>CI-PERS-202</b>	Person residency status. This interface provides residency status for a specific person.
<b>CI-PERS-203</b>	Person income. This interface provides income information for a specific person.
<b>CI-PERS-204</b>	Person Native American status. This interface provides whether a specific person is a Native American.
<b>CI-PERS-205</b>	Person social security number. This interface provides the social security number for a specific person.
<b>CI-PERS-251</b>	Person <information type> verification. This interface provides data to verify <information type> about a specific person.
<b>CI-SUMCASES-001</b>	Summary of cases associated with a person. This interface provides <case person information type> information about a specific person within a case.
<b>CI-CASE-001</b>	Summary of individual case. This interface provides a summary of a specific case for a specific person.

<b>Interface Designator</b>	<b>Interface Name. Description</b>
<b>CI-PROVREG-001</b>	Human service provider selection. This interface provides one or more entries from the Provider Registry. The interface may include multiple entries that match the specified criteria if there is more than one potential match. The interface includes basic demographic data, contact data, and a list of pointers to available records about each service provider that potentially matches the criteria. The interface also provides a level of confidence about each match. The interface may also be used to submit the information required to establish a new entry in a Provider Registry or to update an existing entry with revised identifying or pointer information.
<b>CI-PROVIDER-001</b>	<provider information type> information about a human services provider. This interface provides <provider information type> information about a specific provider.
<b>CI-PROVIDER-201</b>	Provider <credential type>. This interface provides <credential type> information for a specific provider.
<b>CI-PROVIDER-202</b>	Provider <information type> verification. This interface provides data to verify <information type> about a specific provider.
<b>CI-PROG-001</b>	Human services program selection. This interface provides one or more entries about programs. The interface may include multiple entries that match the specified criteria if there is more than one potential match. The interface includes basic descriptive information, contact data, and a list of pointers to available records about each program that potentially matches the criteria. The interface also provides a level of confidence about each match.
<b>CI-PROG-101</b>	<program information type> information about a human services program. This interface provides <program information type> information about a specific program.
<b>CI-PROG-151</b>	Program <program report type>. This interface provides < program report type> for a specific program.

Table 5 provides a draft list of core repositories. These are motivated by the core IT services.

**Table 5. DRAFT Core Repositories**

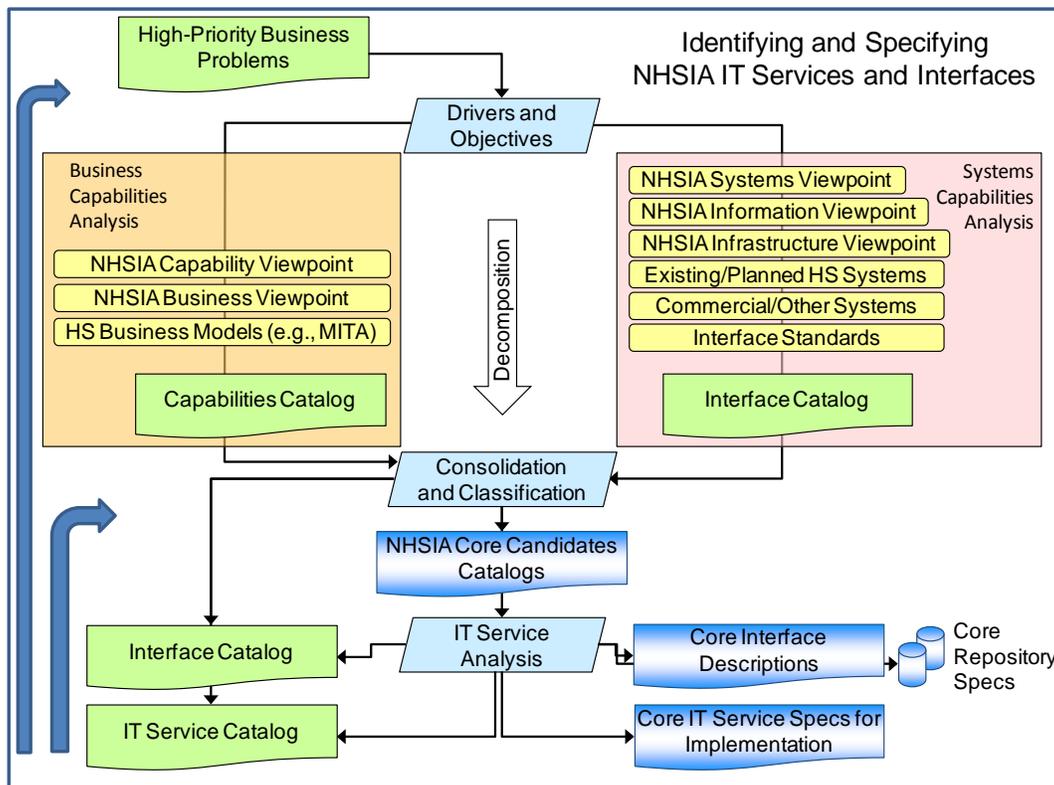
<b>Repository Name</b>	<b>Description/Purpose</b>
<b>Jurisdiction X IT Service Registry</b>	Information needed to invoke each of jurisdiction X’s IT services that are registered for use by systems outside the originating system.
<b>Federal IT Service Registry</b>	Information needed to invoke each of the IT services that are registered by a federal agency for use by systems outside the originating system.

<b>Repository Name</b>	<b>Description/Purpose</b>
<b>Jurisdiction X Human Services Program Rules Repository</b>	Rules defined by jurisdiction X related to human services programs. Includes rules related to determining eligibility, enrollment/disenrollment, verifying identity, and other activities.
<b>Federal Human Services Rules Repository</b>	Rules defined by a federal agency related to human services programs. Includes rules related to determining eligibility, enrollment/disenrollment, verifying identity, and other activities.
<b>Jurisdiction X Performance Information Repository</b>	Operational information from the jurisdiction's human services activities; used to assess performance. Includes information from multiple agencies, organizations, and programs. At the state level, some information may be aggregated across counties and municipalities.
<b>HHS Performance Information Repository</b>	Operational information from human services activities; used to assess performance. Includes information from multiple programs. Some information may also be aggregated across each state.
<b>Jurisdiction X Master Person Index</b>	A structure of identifying information about persons. The Master Person Index (MPI) is used to link to information about the person in different source systems.
<b>Jurisdiction X Provider Registry</b>	A structure of identifying information about human services providers. The registry is used to link to information about the service provider in different source systems.
<b>NHSIA Hub Catalog</b>	Information about each hub that shares IT services in support of NHSIA concepts.

## Appendix B. Process for Identifying and Specifying NHSIA Core IT Services

This process is based on the methodology described in the GRA Guidelines for Identifying and Designing Services<sup>9</sup>. NHSIA adapted the methodology to focus on identifying and specifying NHSIA core IT services. This process description focuses on identifying elements to support the NHSIA core capabilities because the NHSIA project seeks feedback on the draft working lists of those elements (see Appendix A). However, **the goal is that each NHSIA team that follows this process will emerge with final prioritized lists of IT services, interfaces, and repositories that are classified as common, core, and custom.** At the end of this systematic process the team should be reasonably confident that the lists will steer their system upgrade/development projects in a direction consistent with their goals and with NHSIA.

Figure 13 illustrates the approach to identify and specify core NHSIA IT services and related interfaces and repositories. The process also captures information (shown as green catalogs) about other services and interfaces to support NHSIA.

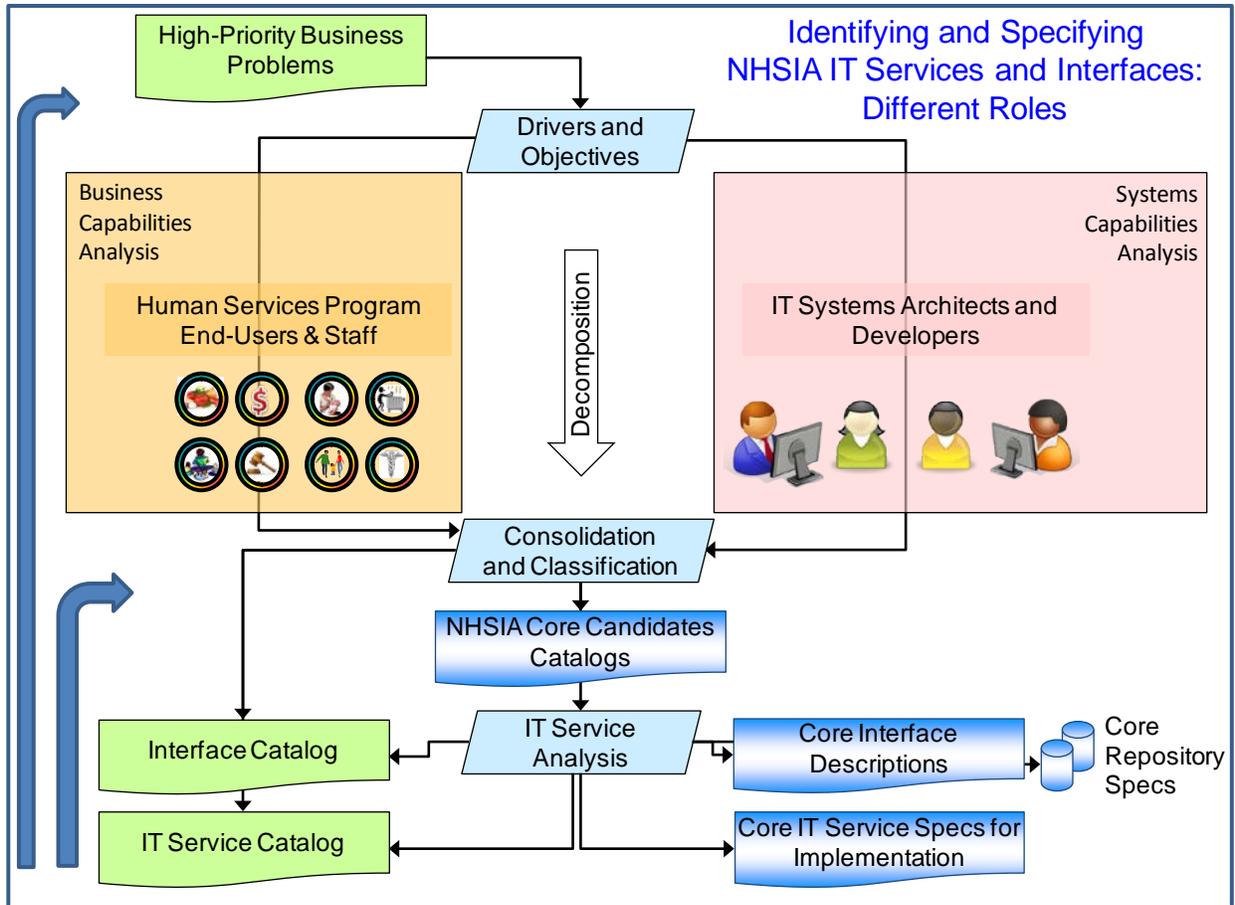


**Figure 13. Approach to Identify and Specify Core NHSIA IT Services**

<sup>9</sup> U.S. Department of Justice’s Global Reference Architecture (GRA) Guidelines for Identifying and Designing Services, Global Infrastructure/Standards Working Group (GISWG), Version 1.1, May 2011. Available online at <http://it.ojp.gov/globaljra>.

Throughout this write-up, the text often focuses on IT services. The reader should understand there is an implicit reference in each case to the interfaces and repositories that would support the IT services.

Different groups will participate in the process. Figure 14 shows that human service program end-users and staff are likely to be key players in the business capabilities analysis stages. Information technology (IT) systems architects and developers are likely to be key players in the systems capabilities analysis stages. IT services provide access to the business capabilities and to the technical capabilities of the IT systems interfaces/applications.



**Figure 14. Different Groups Participate in the Analysis Activities**

The human services and IT staff members should collaborate for the subsequent Consolidation and Classification and IT Service Analysis activities.

NHSIA core candidates are based on business drivers. A complete business or system capabilities analysis is not required in any of the iterations.

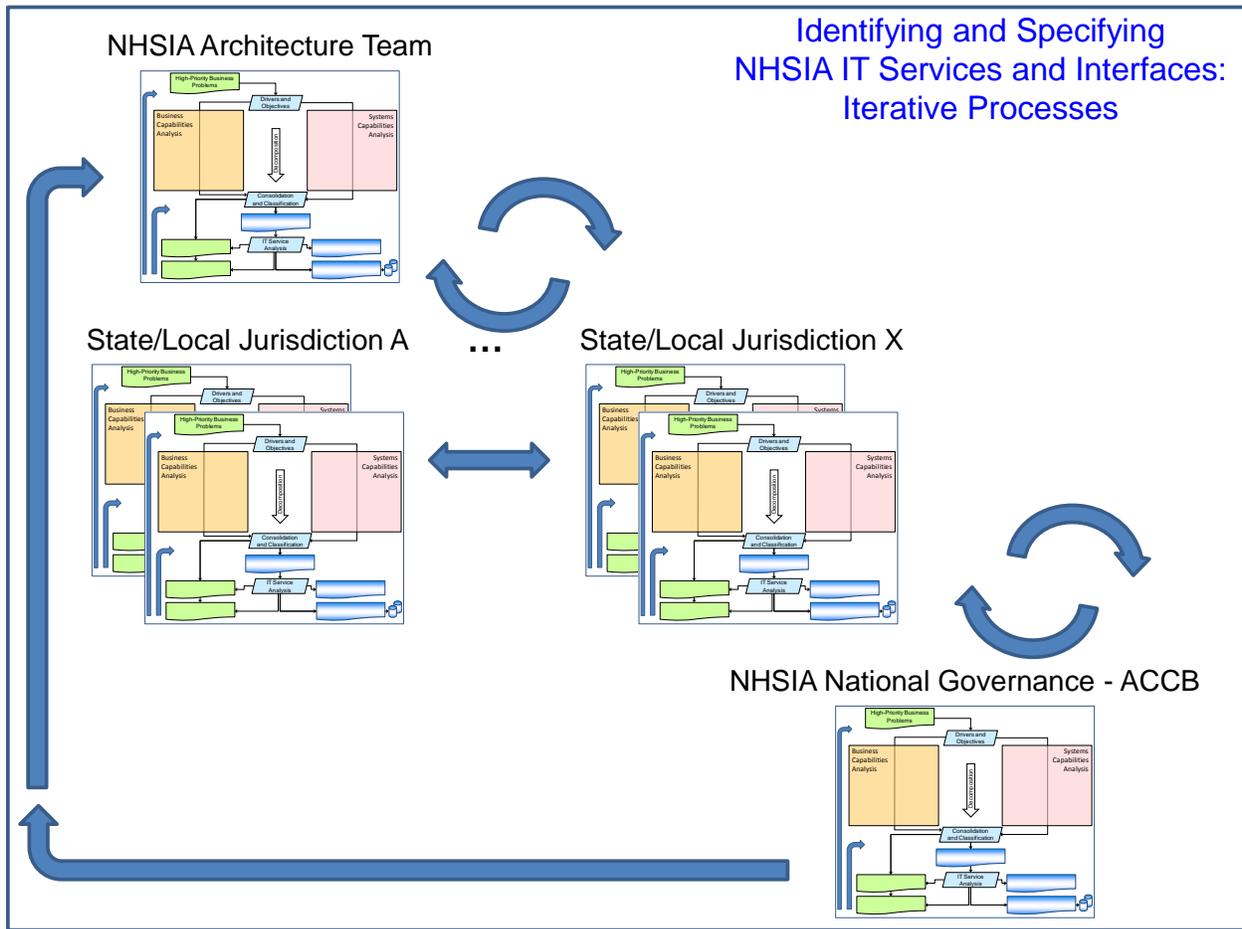
After candidate core IT services are identified, the IT service analysis process begins. The teams work together to identify IT services that are narrow enough in scope, clearly named, and well understood. This is likely to involve decomposing the original candidate services. Core IT services, along with related information exchanges and repositories, are eventually specified for

implementation. Other services not deemed core may be resubmitted later for further analysis or may re-orient the drivers and objectives stage in the identification process.

In this appendix, following the GRA conventions, we use the term "capability" in different contexts. In NHSIA, the Capability Viewpoint defines the term "capability" as: "the ability to achieve a desired objective in the human services domain under specified standards and conditions". The GRA's business capabilities analysis step looks at "business capabilities". For NHSIA, these include capability statements from the Capability Viewpoint and business activities from the Business Viewpoint. The GRA's systems capabilities analysis step looks at "technical capabilities". For NHSIA, these include system and application descriptions and functional capabilities. The analyses of business and technical capabilities may be performed separately. However, the analyses must be reconciled and integrated in the consolidation and classification step.

This entire process is iterative, as denoted by the thick blue arrows in Figure 14 that point to an earlier stage in the process. Each iteration should start with existing drafts from previous iterations. For example, jurisdiction teams should start with the drafts provided by the NHSIA Architecture Team.

Iterations also occur within the NHSIA Architecture Team, the jurisdictions, and using the outputs of those efforts within the larger NHSIA national governance process to agree on the core elements of NHSIA. The NHSIA Architecture Team will update the current drafts captured in Appendix A based on feedback from the iterations from other teams' efforts. See Figure 15.



**Figure 15. Iterative Process to Identify NHSIA IT Services**

Sections B.1 through B.5 describe the activities illustrated in Figure 13.

## B.1 Drivers and Objectives

The first stage in the IT service identification methodology is for the NHSIA team to determine business drivers and associated objectives within the larger scheme of business goals. Drivers and objectives define the strategic bounds within which to conduct the service identification process. The process starts with the high-priority business problem list that emerged from the prioritization effort during the Assess Current Situation phase undertaken by the Jurisdiction NHSIA Team.

So, as a preliminary step, rather than jumping immediately to generating a list of the IT services to be implemented, the team should begin by identifying an overarching set of business problems that NHSIA could address across the human services community. There may also be funding or scheduling opportunities that would influence the selection of business problems. The set of overarching business problems helps to set the drivers and objectives to steer the identification of core IT services. Factors for high-priority business problems may include those identified in Appendix C, based on the GRA model.

The NHSIA Architecture Team identified the high-level business problems shown in Table 6.

**Table 6. DRAFT High-Priority Business Problems**

<b>Problem Name</b>	<b>Description</b>
<b>Common Person Information</b>	Information about people is scattered across multiple systems. Some information (e.g., name, date of birth, address) is held in multiple systems. Keeping the information up-to-date is problematic. For instance, if the person moves, records in all systems that hold address data must be updated. Sometimes workers start a new record for a person because they can't find the old one. Being aware of and linking different records about a person is difficult. People have limited ability to update information about themselves.
<b>Summary of Services for a Client</b>	Workers have limited visibility into the spectrum of services a client has requested and/or is receiving. This limits their ability to coordinate services effectively. It also limits the ability to detect fraud.
<b>Individual Case Summary</b>	A worker from one agency has limited visibility into the general information about the cases he/she is not directly involved in (e.g., case status, start/end dates, case members, caseworker). This limits her/his ability to deliver or manage services to improve the quality of life for the client.
<b>Basic Provider Information</b>	Basic information about human services providers (e.g., name, location, services provided) is scattered across multiple systems and programs. The public and workers have trouble finding accurate information. Providers have limited ability to update information about themselves.
<b>Basic Program Information</b>	Basic information about human services programs is often available on Web sites or in paper brochures. Much of the information is not accessible to automated processes via standard interfaces. Thus, people must read and interpret the information to use it in automated processes.
<b>Common eligibility and enrollment</b>	Members of the public who need services sometimes must visit different offices and submit the same information repeatedly. In some instances, case workers spend many hours verifying the information provided by the applicant. What one case worker verifies is not always shared with other case workers. Note: federal agencies have instituted a temporary waiver on cost allocation requirements to help states implement common eligibility and enrollment systems in support of the ACA.
<b>Fraud detection</b>	Agencies and caseworkers have limited ability to detect fraud. For example, sometimes people are able to receive the same service from multiple jurisdictions because there is no electronic way to check for evidence of service across jurisdictions.

The determination of drivers and objectives establishes bounds within which to identify and prioritize services. For example, although it is possible to apply a service identification methodology to the entire enterprise, practical application suggests that boundaries be

established based on business drivers. Drivers could be defined from a number of perspectives. The list below shows some examples of typical drivers that could be used independently or in combination to frame the service identification process. (Performance evaluation measures could also be implemented to determine whether those drivers and subsequent objectives are being met by the deployment of services.)

- Legislation (e.g., Affordable Care Act)
- Regulations
- Executive Order (e.g., information sharing initiatives)
- Technology [changes]
- Social [changes]
- Community interaction

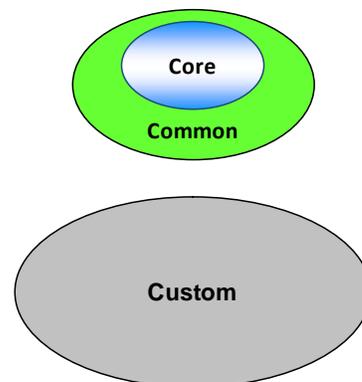
The NHSIA Architecture Team identified these objectives associated with business drivers:

- Interoperability of IT elements and associated business processes
- Improved care provided to clients by holistically addressing their needs
- 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 through sharing and reuse of software services, data, and other IT resources
- Reduced errors and 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 the ability to leverage advances made in those areas

(The list is the same as the list of NHSIA objectives from the Project Viewpoint Description.)

In addition to establishing drivers and objectives, the team should confirm and, if necessary, refine the NHSIA criteria/definitions for common, core, and custom IT services.

- **Common** IT services support cross-jurisdiction information sharing (e.g., local-local, local-state, state-state, state-federal) and/or cross-program or agency information-sharing (e.g., child support with temporary assistance to needy families, child welfare agency with income support agency). The concept is that the human services community will agree on naming conventions, functions, and NIEM-based



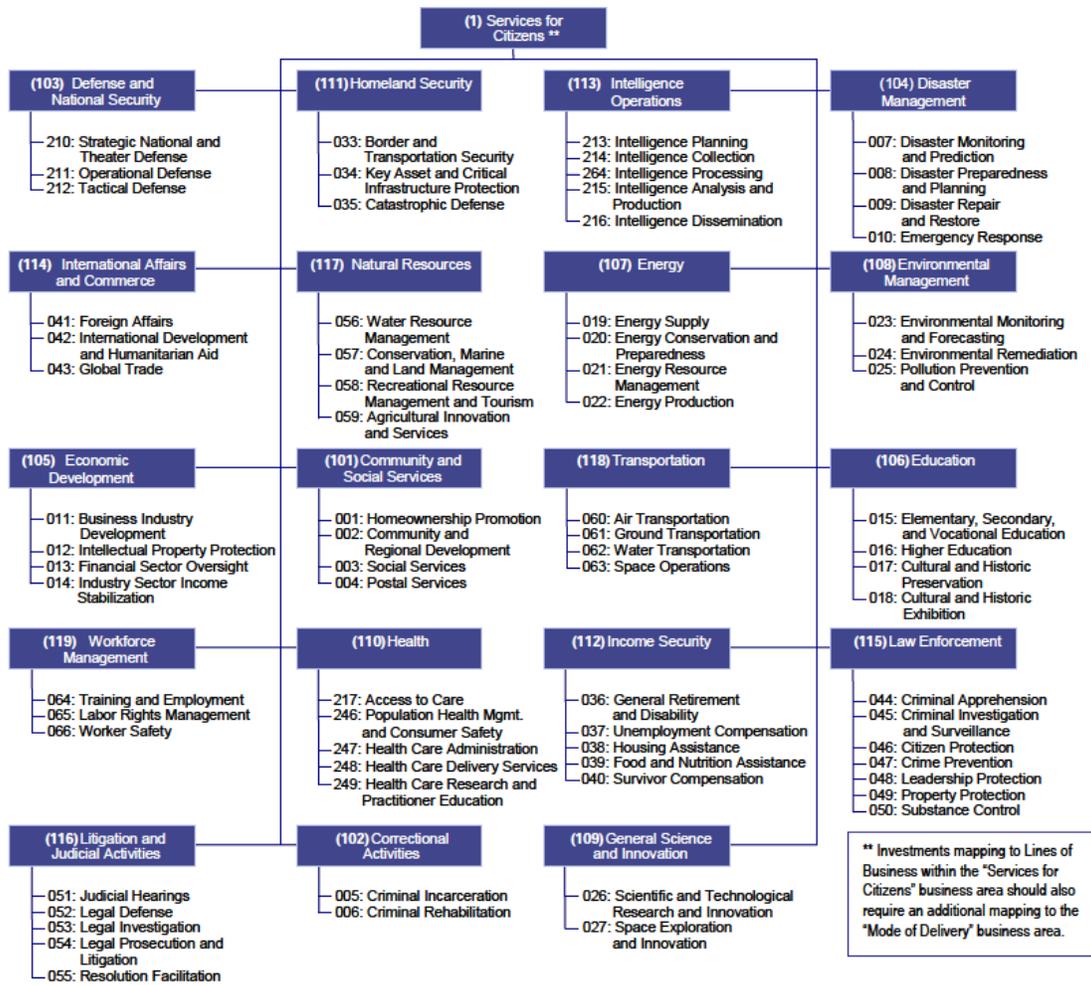
interfaces for the common services. Eventually, those who manage and operate IT environments for human services will implement the common services to support their human services programs. In this category, an IT service with the same name in two different IT environments would perform the same functions, use the same input parameters, and return the same information.

- **Core** IT services are a foundational subset of the common IT services that enable a basic level of interoperability. These are discussed in more detail in this "NHSIA Core" Concepts document.
- **Custom** IT services are the other services that jurisdictions will implement to support their own human services operations. Uniformity of purpose and interfaces across programs and jurisdictions is not necessary for custom IT services.

The NHSIA Architecture Team used the definitions of the **core NHSIA capabilities** and related **core information system elements** as the basis for business drivers.

## **B.2 Business Capabilities Analysis ("Business-Oriented Approach")**

The human services program-related members of the NHSIA team, and their human services program end-users and staff colleagues complete this analysis stage. The outcome of this stage is a list of desired common capabilities. The GRA recommends starting with the Federal Enterprise Architecture (FEA) Business Reference Model "Services for Citizens" business area that contains related lines of business (LOBs) and business sub-functions. Figure 16, extracted from the FEA Consolidated Reference Model, shows the LOBs for Services for Citizens.



From Federal Enterprise Architecture Consolidated Reference Model, Version 2.3,  
[http://www.whitehouse.gov/sites/default/files/omb/assets/fea\\_docs/FEA\\_CRM\\_v23\\_Final\\_Oct\\_2007\\_Revised.pdf](http://www.whitehouse.gov/sites/default/files/omb/assets/fea_docs/FEA_CRM_v23_Final_Oct_2007_Revised.pdf)

**Figure 16. FEA Business Area - Services for Citizens**

This serves as a broad starting point; see the FEA Consolidated Reference Model for additional details. For NHSIA, more specific inputs can be found in the NHSIA Capability Viewpoint, Business NHSIA Business Viewpoint, federal human services programs’ business models, and jurisdictions’ business models. As an example, the MITA business model might be considered in this step. The intent is to refine these models to identify capabilities that are sufficiently flexible to decompose the jurisdiction’s information sharing into business sub-functions across human services. The team should iterate on this process to define functions and sub-functions.

In the initial analysis, identify each business function. In subsequent decomposition, refine the analysis and specify greater detail as sub-functions. In the end, the analysis should reflect low-level business capabilities that address the objectives/business drivers from the prior stage. Business process modeling techniques can be applied to identify business processes components surrounding those capabilities which may help to identify additional capabilities. Access to the capabilities is provided through IT services. For simplicity at this stage, assume that each business capability is provided by a single IT service candidate.

NHSIA tailored the GRA guidance and recommends these business considerations to assist in defining the catalog of service candidates:

- Are there capabilities which can in the future be utilized by other human services agencies or organizations?
- Are there business requirements to share information with other human services agencies or organizations in the near future?
- Does the model incorporate strategic planning initiatives?
- Does the model accurately reflect business policies and procedures?

The result of the business capabilities analysis is a catalog of business capabilities. This may be in the form of a spreadsheet, database, or artifact from a modeling tool. Make a preliminary assessment as to which capabilities are foundational, basic, or advanced.

The NHSIA Architecture Team analyzed the NHSIA D0.1 Capability and Business Viewpoints and captured the results of this analysis in the D0.2 versions of the Capabilities List and Business Process spreadsheets. The D0.2 version of the Capabilities List includes a new column, labeled "Classification".<sup>10</sup> Each capability is classified as foundational, basic, or advanced.

Foundational capabilities relate to the NHSIA core. The D0.2 versions of the Business Process spreadsheets include a new column, labeled "Classification". The business activities related to providing core capabilities are classified as core. The combination of these D0.2 files comprises the Capabilities Catalog shown in Figure 13 at the end of the Business Capabilities Analysis step.

### **B.3 System Capabilities Analysis ("Technical/Systems-Oriented Approach")**

The IT members of the NHSIA team, working with their system development colleagues lead this activity. This stage starts with identifying specific systems. Then identify applications, interfaces, and their functions or capabilities. In NHSIA's terminology, it is the application layer that provides end-user capabilities; applications could provide or consume IT services. The outcome of this stage is a list of common technical capabilities that might be implemented as IT services. The list should indicate which already exist.

The scope of this analysis should include existing systems, planned enhancements, commercial packages in use or under consideration, planned new systems, and other systems that might be models for human services support. Review these documents: NHSIA Systems Viewpoint, NHSIA Information Viewpoint, NHSIA Infrastructure Viewpoint, existing/planned human services systems documentation, commercial/other systems documentation, and interface standards (e.g., NIEM IEPDs). During the document review and discussions, focus on

---

<sup>10</sup> Note that the D0.1 efforts did not include any details about several business areas (Business Relationships, Program Management, Operations Management, Financial Management, and Contractor Management). Thus, this exercise did not result in identifying capabilities related to those business areas. The NHSIA Architecture Team recommends that Jurisdiction NHSIA Teams review all their business areas and consider which business activities should be nominated as additional candidates for NHSIA core capabilities.

identifying the systems' ability to provide capabilities to address the objectives/business drivers from the "Drivers and Objectives" stage of this process.

The analysis effort should decompose the applications' capabilities and interfaces in sufficient detail to select those that are the best candidates for service enablement. The selection criteria for service enablement listed below were adapted from the GRA guidelines.

- Has high importance for the agency's mission and maintains highly critical information
- Plays or will play a major role in the agency's information sharing
- Is stable and there are no existing plans for replacement
- Has a large number of high-priority enhancements pending
- Can satisfy high demand to build new interface(s)
- Provides current interfaces that are not maintainable
- Provides interfaces or will need to provide interfaces that require higher transaction rates

One caveat: the team should not create a list for service enablement that they know they cannot support; i.e., the team should acknowledge the reality of resource (staff and funds) availability when identifying candidates for service enablement.

Finally, select from the candidates for service enablement those that should be classified as core. The set includes the services that match these **criteria for core IT services**:

- Functionality supports the **core NHSIA capabilities**. Bullets below paraphrase; see the link for full text.
  - Provide a foundation for interoperability
  - Provide foundational capabilities or information
- The service supports **core information system elements**. Bullets below paraphrase; see the link for full text.
  - Service-oriented architecture infrastructure
  - Hubs to share IT services and information sets; start with those that support the core NHSIA capabilities
  - Single sign-on and attribute-based access
  - Repositories to facilitate selected data aggregation and analysis

A service that meets those criteria is likely to be needed by multiple applications and/or be invoked very frequently. Such a service may provide a model for other services. An interface that meets those criteria is likely to be used often, is used by or may satisfy a need to interface with other applications and/or human services agencies (currently or in the future), and/or already exists as a widely-accepted standard.

The more an application's capability and interface are used, the more likely they are candidates for a core capability/interface. Again, access to the capabilities will be provided through IT services. For simplicity at this stage, assume that each technical capability is provided by a single IT service or service candidate.

The result of the system capabilities analysis stage is a catalog of technical capabilities and interfaces. This may be in the form of a spreadsheet, database, or artifact from a modeling tool. Make a preliminary assessment as to which capabilities are custom, common, and core.

The NHSIA Architecture Team analyzed the NHSIA D0.1 Systems, Information, and Infrastructure Viewpoints, updated the information to reflect evolving concepts, and captured the results of this analysis in the D0.2 versions of the Services Matrix and Information Exchanges spreadsheets. The D0.2 version of the Services Matrix includes two new columns and several new service rows. The new "Classification" column contains the word "Core" for those IT services rows proposed as core elements. The "Federal" column contains the letter "F" for those IT services rows proposed as core elements to be provided at the federal level. The first column contains a service designator. The Information Exchanges spreadsheet includes new rows to reflect additional information exchanges classified as core, primarily to support the core IT services. The team recommends that Jurisdiction NHSIA Teams review existing interfaces associated with standard reporting processes and consider nominating them as additional candidates for NHSIA core interfaces. The new worksheet named InterfaceCatalog(Sys) in the Services Matrix identifies a partial list of candidates related to existing interfaces. The combination of the D0.2 files (Services Matrix and Information Exchanges) comprises the Interface Catalog shown in Figure 13 at the end of the Systems Capabilities Analysis step.

## **B.4 Consolidation and Classification**

The program and technical parts of the NHSIA team come together to consolidate their catalogs and complete this stage. During consolidation, the team merges the business and technical capabilities catalogs, revealing overlaps and high-priority candidates for core IT services.

IT services that appear only in the business-oriented core capabilities catalog might include those that are not currently implemented technically or are not good candidates for near-term service enablement. IT services identified only in the technical capabilities and interface catalog might be those that are not currently required or of high importance to the organization. The team should understand why a capability appears on only one list so that deciding which to include as a core services recommendations is well-grounded.

The results of this stage are as-complete-as-possible lists of IT services and interfaces. Those that are high-priority and meet the criteria for core selection are classified as such. These comprise the core candidates catalog. The other IT services and information exchanges are classified as common or custom, depending on whether they should be the same across IT environments or not. Each catalog (Information Exchange, IT Services, and Core Candidates) may be in the form of a spreadsheet, database, or artifacts from a modeling tool.

## B.5 IT Service Analysis

The service analysis stage involves reviewing and discussing the catalogs that emerged from the “Consolidation and Classification” stage. The NHSIA team performs various kinds of analyses to finalize the catalogs and identify (and eventually specify) core IT services, interfaces, and repositories. In this step, the team works to identify IT services that are narrow enough in scope, clearly named, and well understood. This is likely to involve decomposing the original candidate services. The team should make a fairly quick pass through the list of candidate IT services and interfaces to complete the analysis. Recall that the goal of this process is to emerge with final prioritized lists of IT services, interfaces, and repositories that are classified as common, core, and custom. At the end of this systematic process the team should be reasonably confident that the lists will steer their system upgrade/development projects in a direction consistent with their goals and with NHSIA.

During each step in this stage the team should evaluate the IT services to determine if one or more shared repositories might facilitate information-sharing. If so, the team should capture ideas about the repository(ies) (e.g., users, contents, concepts of operations, and/or responsibilities). Throughout this section, when the process refers to “IT service”, analyzing the related interface(s) and repository(ies) is also implied.

The NHSIA Architecture Team’s outputs of this stage, the final one in the process, are shown in Appendix A for the core elements.

### B.5.1 Interaction Analysis

To this point most of the emphasis has been on static views of the business and technology environments. As suggested in earlier sections we assumed that each “capability” that emerged from the Business Capabilities and System Capabilities analyses was related to exactly one service. In this step, the team considers interactions among the capabilities and the people who need those capabilities. The team should abstract and encapsulate the people, processes, procedures, and technology associated with a business capability. Then the team should decompose those capabilities, if necessary, to identify supporting IT services. Business process modeling is useful to identify the interactions among stakeholders and the information sharing needed to support those interactions. The team may prepare a set of business model diagrams using Business Process Modeling Notation (BPMN).

### B.5.2 Granularity Analysis

This step affords the opportunity to re-organize/re-define the IT services based on looking for affinities among them. The team should make a fairly quick pass through the list of candidate IT services and interfaces to look for opportunities to logically combine or split them. Directly from the GRA guidelines:

“Clustering, refactoring, and decomposition of the candidate services are the three main approaches used during this step of the process. Clustering requires changing the standard interactions of a service with another service. Decomposing services allows splitting services into more basic, “granular” services. Refactoring involves decomposing services

and then grouping them based on relationships. The clustering, refactoring, and decomposing process is based on affinity factors that influence grouping or separating services. Some of the affinity factors to be considered are:

- Affinity of critical or common private data
- Affinity of the interactions
- Density of interactions
- Time constraints of the interactions
- Transactions or referential integrity of update activity
- Natural separation of activities
- Designer determination/choice

Occasionally, new factors affecting service granularity are identified during the process of service specification and documentation. In this case, going back to the previous step of the identification process might lead to more efficient service identification. Thus, the service identification process is an iterative process in which additional iterations might be viable even after deploying an initial set of services.”<sup>11</sup>

The outputs from this step may be revised catalogs of candidate services and interfaces.

### **B.5.3 Prioritization**

In this step the NHSIA team sorts the catalog of services in priority order for implementation. To determine priority, the team needs to agree on criteria so that the prioritization can be accomplished systematically. The services catalog can simply be sorted into common, core, and custom priority bins, rather than ordering the entries in absolute priority order.

Systematic prioritization should follow these steps:

- Revisit the characterizations and criteria for common and core categories. Other services are automatically “custom”.
- Assign values/weights to the factors/criteria
- Calibrate the prioritization weights as needed
- Draft the service prioritization
- Assign and record the service prioritization

---

<sup>11</sup> U.S. Department of Justice’s Global Reference Architecture (GRA) Guidelines for Identifying and Designing Services, Global Infrastructure/Standards Working Group (GISWG), Version 1.1, May 2011. Available online at <http://it.ojp.gov/globaljra>.

- Sort the catalog according to priorities
- Resolve conflicts or discrepancies

The NHSIA Architecture Team used the [criteria for core IT services](#).

## B.5.4 Interdependency Analysis

This analysis focuses on interdependencies across the IT services. Some may be composites (use other services) or may depend on an enabling service. The team should identify dependencies and use that information to establish a logical implementation sequence. Iterating on the dependency analysis should help to refine the priorities for IT services.

## B.5.5 Validation

Finally, the team should review the catalogs and confirm that the process has generated a valid list of services, interfaces, and repositories ordered according to all the appropriate priorities and drivers for implementation sequence. The team should consider both business values and technical architecture availability.

## B.5.6 Output of IT Service Analysis Stage

The results from this stage include:

- **Interface Catalog** (updated from Consolidation and Classification stage). Each entry includes at least a designator, name, and classification (common, core, custom).
- **IT Service Catalog** (updated from Consolidation and Classification stage). Each entry includes at least a designator, name, and classification (common, core, custom).
- **Core Interface Descriptions**. This may be a version of the Interface Catalog filtered to show only the core elements. In addition to the standard information provided in the Interface Catalog, each core entry also includes at least a description and whether the interface should include a repository (and whatever additional details emerged from the analysis activities). Additional information will be required to fully specify the interface.
- **Core IT Service Specifications**. This may be a version of the IT Services Catalog filtered to show only the core elements. In addition to the standard information provided in the IT Services Catalog, each core entry includes a description and a reference to the associated interface designator. Additional information will be required to fully specify the service.
- **Core Repository Specifications**. This may be a version of the Core Interface Description, filtered to show the interfaces that have been identified as candidates for repositories. Additional information will be required to fully specify the repository.

Appendix A shows the draft outputs generated by the NHSIA Architecture Team.

## Appendix C. Factors To Identify High-Priority Business Problems

This appendix recommends factors to be used in identifying an overarching set of business problems across the human services community. The set of business problems can later be used to set drivers and objectives for the core IT services identification process. The factors are based on the GRA model<sup>12</sup>.

- **Growth Potential:** The problem involves business process and information flows that could expand or be the foundation for other capabilities in future cycles.
- **Composable IT Services:** The problem will likely lead to the identification of IT services that can be composed in novel ways to solve new business problems.
- **National Scope:** The problem is recognized as significant nationally and will lead to identification of IT services that will likely have more national commonality.
- **Consolidated Capabilities:** The problem involves information systems that are typically provisioned at the national, regional, or state level rather than locally.
- **Known Requirements:** The problem is well-known with a well-understood underlying set of business practices and requirements.
- **Simplicity:** The problem involves relatively simple (and not bleeding-edge) technology.
- **Cost-Effective for Implementers:** The problem does not require IT services that will involve exorbitant implementation costs.
- **Willingness and Tradition of Sharing:** The problem involves human services partners who have traditionally worked well together and shared information and/or are willing to share.
- **Multijurisdictional or multidisciplinary:** The problem crosses jurisdictional, level of government, or agency boundaries.
- **Criticality to Decision Making:** The problem is one of providing key information to decision-makers for the purpose of making better decisions in critical (e.g., life-and-death) situations.
- **Time Sensitivity:** The problem is one of ensuring responsiveness on the order of seconds or minutes versus days or weeks.
- **Accuracy and Currency of Data:** The problem is one of improving the accuracy or currency of information available to practitioners.
- **Clear Semantics:** The problem involves the exchange of information that has clear structure and meaning, and the structure and meaning are already well-understood (e.g., there is an existing information standard, NIEM IEPD, or at least NIEM vocabulary).

---

<sup>12</sup> U.S. Department of Justice Global Services Task Team 2009-2010 Priorities Definition Workshop Summary Report, October 27-18, 2009. Available online at <http://it.ojp.gov/globaljra>.

- Potential to Support Assessment/Measurement. The problem is amenable to the computation of performance measures that reflect the effectiveness and efficiency of the human services delivery system.
- Number of Consumers. The problem will lead to the identification of IT services that will have a high potential for reuse.
- Potential for Implementation and Adoption. The problem is one likely to be solved in a large number of jurisdictions once reference service specifications are available.
- Legal Requirements. The problem is required to be solved by law or policy.