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1 EXECUTIVE SUMMARY

1.1 Purpose

Develop a roadmap for a statewide Enterprise/electronic Master Patient/Person Index (eMPI) to reduce enrollment data duplication. It is expected that the eMPI, as a centralized identity management service for the State of Oklahoma, will eventually support broader system-to-system interoperability for other Oklahoma State e-Human Services and e-Health initiatives in the future. Most importantly, the eMPI will provide the cornerstone for electronic records of client personal and health information in the State of Oklahoma. The main purpose for a central eMPI is to consolidate client records from across agencies creating unique and non-duplicated client records. An eMPI has an essential role to play, facilitating trusted data exchange while protecting the privacy of client information. An eMPI provides a real-time way to locate, identify, match and cleanse information about a person from many sources to create a comprehensive view for authorized Human Service and health service providers. It is proven to reduce duplicate records within and across systems to improve client/patient administration and care. A Master Person Data Management (MPDM) system of which eMPI is the key component will allow fully automated data exchange and service reusability for all services exchanged between Oklahoma Department of Human Services (OKDHS) and Oklahoma Health Care Authority (OHCA) and other initiatives. Member identification and authentication will also enhance program integrity and reduce the number of times our public customer has to repeat this process.

1.1.1 Goals/Objectives

The major goals/objectives to be achieved with the implementation of the TO-BE system are summarized in Table 1.

<table>
<thead>
<tr>
<th>Goal/Objective</th>
<th>Desired Outcome</th>
<th>Measurement</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardization</td>
<td>Enterprise wide standards</td>
<td>Adopted by Inter/Intra Agencies and Programs</td>
<td>Improved efficiency</td>
</tr>
<tr>
<td>Reusability</td>
<td>Shared &amp; reused data</td>
<td>Adopted as a model by other states</td>
<td>Reduction of development time</td>
</tr>
<tr>
<td>Less Duplication</td>
<td>Less data redundancy</td>
<td>Adopted by Inter/Intra Agencies and Programs</td>
<td>Improved data integrity and reduced errors</td>
</tr>
<tr>
<td>Governance</td>
<td>Policies and procedures</td>
<td>Adopted by Inter/Intra Agencies and Programs</td>
<td>Conformance to standards</td>
</tr>
<tr>
<td>Cost</td>
<td>Reduced operating expenses</td>
<td>Less operating and maintenance costs</td>
<td>Consolidated maintenance shared operating costs</td>
</tr>
<tr>
<td>Shared Services</td>
<td>Interoperability</td>
<td>Adopted by Inter/Intra Agencies and Programs</td>
<td>Improved agility, response times</td>
</tr>
</tbody>
</table>
1.1.2 Project Outcomes

An eMPI provides the maximum potential for mutual benefit and “reusability” by health and human services organizations in Oklahoma, enabled through the Project Outcomes listed in Table 2.

<table>
<thead>
<tr>
<th>Index</th>
<th>Project Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1</td>
<td>Development of a roadmap for statewide eMPI to reduce enrollment data duplication. Member identification and authentication will also enhance program integrity and reduce the number of times our public customer has to repeat this process.</td>
</tr>
<tr>
<td>O2</td>
<td>To incorporate with eligibility determinations, and identify opportunities for workflow improvement through the introduction of eMPI capabilities, such as new web services or business processes that can apply heuristics (via automated rules engines).</td>
</tr>
<tr>
<td>O3</td>
<td>Performance improvements can be realized through the development of an eMPI in concert with business processes, enabled by SOA, which can automatically perform eligibility validation and cross-referencing. Through the eMPI Analysis, the development of business processes and the validation of web services to support these processes this can transform administrative activities to reduce redundancy of effort and streamline workflows to improve efficiency.</td>
</tr>
<tr>
<td>O4</td>
<td>Achieve a standardized enterprise wide eMPI using a national data exchange standard NIEM</td>
</tr>
<tr>
<td>O5</td>
<td>Leverage governance for the eMPI components and data elements. Proper governance will ensure data quality, adequate data transparency and data sharing.</td>
</tr>
</tbody>
</table>

1.2 Assumptions and Constraints

General assumptions considered for Interoperability are:

- The partnership is committed to the development of a roadmap for integration of Service Oriented Architecture (SOA)/Enterprise Service Bus (ESB) to allow fully automated data exchange and service reusability for all services exchanged between OKDHS and OHCA and other initiatives.
- The partnership is committed to the development of a model for the use of the National Information Exchange Model (NIEM) to enable a consistent exchange of data.
- The partnership is committed to focusing on programs that addressed those interactions between OKDHS, OHCA and OSDH, which is scoped as medical and Medicaid. This should further focus our current scope of eligibility and enrollment.
- The partnership is committed to building consensus on interoperability needs and solutions through an acceptable methodology and embraces a change management process overseen through a partnership governance model.
- The partnership will respect individual lines of business authority and capability to allow and prevent access to business data in accordance to all appropriate Federal and State requirements, Federal and State standards, Industry standards.
- The partnership will include Federal partners to assist with resolving identified federally mandated issues that may be identified as opportunities for improvement to a more efficient interoperability experience.
The partnership and its federal partners will explore as part of its methodology working towards interoperability, existing and future best practices, and IT solutions that provide more efficient interoperability.

The partnership sees the opportunity to adopt an eMPI solution that will assist with a more efficient approach to identifying and sharing information regarding an individual, as well as avoiding potential duplications or errors.

General constraints considered for Interoperability are:

**Constraint:**

- Federal funding streams earmarked to certain programs with attached restrictions and regulations create artificial silos and barriers to achieving interoperability across various human service organizations and programs. This barrier makes it difficult for certain organizations to “break out” of their current silos; although the Memorandum of Understanding (MOU) and Service Level Agreements (SLA) between organizations attempt to solve some of these issues, this barrier is ever present. As implementation of the National Human Services Interoperability Architecture (NHSIA) Business Viewpoint strives for interoperability through a functional point of view so must go the Federal funding streams and associated restrictions and regulations if true interoperability is to be achieved.

- Oklahoma has recently passed House Bill 1304: Information Technology Consolidation and Coordination Act, along with other House Bills for consolidation on both the Business Operations and Technical side of government. Some of the language of this Act is summarized below:
  - No state agency shall expend or encumber any funds for the purchase, lease, lease-purchase, lease with option to purchase, rental or other procurement of any information technology assets without the prior written approval of the Chief Information Officer (CIO).
  - No state agency shall initiate or implement an information technology planned project without the prior written approval of the CIO.

**Schedule Constraints** – Currently separate agencies, divisions and programs have different schedules for upgrading systems and infrastructure based on immediate needs, Federal rules and available funding. Agencies are in different stages of the process.

**Data Constraints** – Focusing on Eligibility and eMPI, initially on data exchange between agencies/programs.

- Currently OKDHS, OHCA, and OSDH each use their own intake for services and Master Person Index (MPI) process. This is a business data constraint because we collect different information in different ways for
different purposes but need to share that information between when we have common customers.

- OKDHS, OHCA and OSDH have requirements to have interagency data sharing agreements. This is a constraint because it takes on a lengthy path through business, legal and executive reviews and approvals.
- OKDHS, OHCA, OSDH and our Federal partners have similar or same data but different data definitions. The data length for attributes being exchanged is different.

**Hardware Constraints** – Any required hardware must fit with SOA and Enterprise Architecture, and acquisition of any additional hardware is dependent on funding or financial constraint.

- Oklahoma Office of Management and Enterprise Services-Information Services Division (OMES-ISD) Hardware and Software Operating Standards will be followed:
  - The architecture will follow all established OMES security and infrastructure standards, as well as industry best practices.
  - The architecture will conform to State of Oklahoma financial and economic best practices, allowing for a maximum return on investment in serving the citizens of Oklahoma.
  - The architecture will present a scalable infrastructure accommodating future growth and adhering to established governance polices.
  - The architecture will align with OKDHS business requirements and policies for delivering quality service and utility.

**Software Constraints** – Any required developed or Commercial Off the Shelf (COTS) software must fit within the approved SOA and Enterprise Architecture, and acquisition of any additional software is dependent on funding or financial constraint. Our organizations do not use any common IT solution to share business data or processes, and each uses different custom software, programming languages and coding styles.

**Organizational Constraints:**

- Resource acquisition and allocation may be a factor in implementing the Interoperability Plan. Policies and procedures may be too specific to share or reuse for purposes other than eligibility.
- Each organizational unit uses their own data center and resources to manage and support the hardware and software that support the organizations business data and processes. In addition by having varying types of hardware and software requires different types of resources and skills sets to maintain them.
- Business process changes that may be required to implement the interoperability plan will likely meet with some resistance from affected staff in each organization.
Funding streams often dictate specific guidelines, policies, systems, etc., and we may not be able to influence change with the respective federal agencies. In the interim, we must be compliant with Federal funding terms and conditions.

- Some agencies may have some systems that are considered proprietary by a vendor.
- Some policies and practices are based in State and Federal law which govern accessibility to data.

### Security Constraints:

- Compliance with Internal Revenue Service (IRS) Standards
- Compliance with Health Insurance Portability and Accountability Act (HIPAA)/Health Information Technology for Economic and Clinical Health (HITECH) Act Standards.
- Compliance with Family Educational Rights & Privacy Act
- Compliance with Social Security Accounts Standards
- Compliance with Information Security Standards
- Compliance with Federal and State Mandates for Accessibility
- Compliance with Program Requirements for Confidentiality
- Compliance with Federal and State Mandates, as well as IT Standards for the creation, storage, reading and transfer of data

### Political Constraints

- Local, state or federal mandates may impose constraints.

#### 1.2.1 Benefit to Other States

This Interoperability Plan may be used by other states to implement Enterprise Interoperability measures. Other States can benefit from lessons learned avoiding any difficulties we may encounter.

#### 1.3 Breadth

The focus of this interoperability effort will include: state and federal programs that require eligibility determination: SNAP, TANF, LIHEAP, Aid to the Aged, Blind and Disabled, and the child care subsidy. Other human services programs that will benefit from a new configuration of IT services include Child Welfare, Child Support Services, Aging Services Division (Medicaid funded long term care waiver) and Developmental Disabilities Services (Medicaid funded community based waivers). Other state agencies that are participating in the consortium include OHCA, Oklahoma Department of Mental Health and Substance Abuse Services and Oklahoma State Department of Health’s program; Women, Infants and Children (WIC). Other business segments involved in planning include the Department of Public Safety and the State Department of Education.
1.4 Human Services Program and Initiatives

OKDHS is undertaking a multi-year, multi-program, agency-wide effort to update its technology, streamline and improve its business practices, consolidate its information systems, and provide a secure, compliant Web portal for OKDHS employees, clients and providers to conduct daily business...anytime, anywhere. OKDHS is pursuing a new Enterprise Software solution that is flexible and supports interoperability to allow internal and external stakeholder’s access to the Enterprise System and data, regardless of technology. OKDHS is seeking an Enterprise Software solution that will increase client use of self-service tools. The project will lead to a fully-functional, automated system that meets federal certification, compliance and mandates for child support, child welfare, and adult and family services and the associated titles and certifications needed for certification.

1.5 Information Technology Initiatives

OKDHS is working with state governance and leadership to procure the software, installation and configuration for an enterprise Human Services Application (HSA) to support the core business functions and processes of OKDHS, as described for the enterprise system. Also, the OHCA is seeking to implement the technical aspects of the Affordable Care Act (ACA) for Oklahoma. Many aspects of the OHCA plan are consistent with the approach envisioned by the model. OHCA and OKDHS are working together on both of their initiatives to assure no duplication in funding or resources for similar projects using the Medicaid Information Technology Architecture (MITA) and NHSIA principles of re-usability. The proposed system will:

- Modernize existing system functionality to provide recipients a “golden standard” of customer care (i.e. a consistent look and feel across stakeholders and seamless customer service with consistent metrics to measure and continuously approve the customer experience).
- Significantly enhance the ability for providers to have prompt access to member eligibility and enrollment information to ensure that eligible individuals receive the health care benefits to which they are entitled and that providers are reimbursed promptly and efficiently.

An individual seeking health coverage in 2014 will be able to access information and assistance, and apply for health coverage, through multiple channels. All of these channels will connect with a standardized, web-based system to evaluate the individual’s eligibility for coverage through one of four programs:

- Qualified health plans through the Exchange (with or without Guidance for Exchange and Medicaid Information Technology (IT) Systems 4 Version 2.0 May, 2011/Centers for Medicare & Medicaid Services advance premium tax credits and cost-sharing reductions)
- Medicaid
- Children’s Health Insurance Program (CHIP)
MITA ensures the availability of high-quality health care coverage to families and individuals who are achieved through a collaborative partnership between and within federal agencies and states responsible for implementation of the exchanges and the ACA’s Medicaid and CHIP provisions.

MITA envisions a streamlined, secure, and interactive customer experience that will maximize automation and real-time adjudication while protecting privacy and personally identifiable information. Individuals will answer a defined and limited set of questions to begin the process, supported by navigation tools and windows that open to provide or seek additional information based on individual preferences or answers. The application will allow an individual to accept or decline screening for financial assistance, and tailor the rest of the eligibility and enrollment process accordingly. The required verifications that will be necessary to validate the accuracy of information supplied by applicants will be managed in a standardized fashion, supported by a common, federally managed data services hub that will supply information regarding citizenship, immigration status, and federal tax information. Tools for calculation of advance premium tax credits will also be provided. Business rules will be supplied that will allow for resolution of most discrepancies through automation, including explanations of discrepancies for the consumer, opportunities to correct information or explain discrepancies, and hierarchies to deal with conflicts based on source of information and extent and impact of conflicts on eligibility. Individuals will attest to the accuracy of the information they supply. The goal of MITA is to serve a high proportion of individuals seeking health coverage and financial support through this automated process.

1.6 Health Intersection

In October 2007 OHCA received a $6.3 million dollar Transformation Grant through CMS to develop a web based online application and eligibility determination system to improve the ease and efficiency of Medicaid enrollment. Originally known as No Wrong Door, the process allows potential members to apply for SoonerCare electronically.

OHCA and their partner, Hewlett Packard Enterprise Services (HPES), began developing SoonerCare Online Enrollment (OE) to reach those potentially qualified for coverage and improve the efficiency of SoonerCare. The OE process creates a single-point-of-entry intake that results in the applicant’s real-time eligibility determination. The project resulted in implementation of the state’s first electronic enrollment system for Oklahoma Medicaid members to enroll in SoonerCare.

Oklahoma elected to not participate in the creation of a State Based Exchange; however, OHCA will coordinate with the Federal Exchange by conducting its own intake process and determining eligibility. Additional Interoperability between NHSIA and MITA Programs for Oklahoma can be reviewed in Appendix A of the SOA Roadmap. Oklahoma plans to support a future exchange interoperability concept.
OSDH seeks a comprehensive solution for an Interoperable Public Health Information System (IPHIS), to prepare for participating with health information exchange activities and to improve the quality of data available to support decisions about improving the health of Oklahomans. After the completion of internal OSDH interoperability projects described in the IPHIS project, OSDH will continue collaboration and planning for data interchange and interoperability with key systems at OKDHS and OHCA as well as other State of Oklahoma entities.

The Interoperability grant helps establish a roadmap for building a health intersection between OHCA’s established programs, OKDHS and potentially other agency member identification and authentication services, through governance.

Application Starts through the Oklahoma Health Care Authority, see Figure 1.

![Figure 1: Application through State Medicaid/CHIP Agency](image)

Application Starts through the Federally Facilitated Marketplace (FFM), see Figure 2.
1.7 End Result

Best practices will be taken into consideration to achieve maximum efficiency with interoperability. End result will be a statewide interoperable system that:

- Allow agencies to maintain control of their data
- Reduce agency and overall State costs
- Provide a good foundation for the statewide interoperability campaign

1.8 Background/Overview

An eMPI is a system which coordinates client identification across multiple systems by:

- Collecting and storing IDs and person-identifying demographic information from source systems (track new persons, track changes to existing persons)
- Assigning unique IDs for internal eMPI data management within a MPDM system
- Matching person-identifying demographic information and creating links between IDs from source systems:
  - Automatically and/or with manual intervention
Based on probabilistic algorithms ranging from very simple to very complex
- Merging existing duplicates and detecting new duplicates
- Creating a unified view of a client across multiple sources to enable effective information exchange among various participants
- Providing capability to search for individuals given IDs and/or demographic information
- Integrating with source systems to provide demographic information to save typing (and therefore typos) and avoid creation of new duplicates (through system integration)
- Optionally, pushing changes in demographic information to source systems (through system-to-system integration)
- Providing historical client demographic information

1.8.1 Exploration Questions (and Answers)

This plan in conjunction with the plans covered under this grant will seek to explore and answer the following questions in Table 3:

Table 3: Exploration Questions and Answers

<table>
<thead>
<tr>
<th>Index</th>
<th>Questions/Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>What resources will be needed to integrate OKDHS human services programs into MITA Maturity Model (MITA Framework Version 3.0)/ NHSIA compliant architecture?</td>
</tr>
<tr>
<td>A1</td>
<td>Interoperability will be run as a project under the Oklahoma Partnership direction and will require a project schedule, staffing plan, and adherence to the Project Management methodology and the symphony of methodologies deployed as best practices in the lifecycle development of the technology solution. This is captured in a tool called Symphony – Eclipse. Resources should include Data Architect, Data Modeler, Database Administrators, Security Architects, Business Analyst, Business Architects, experienced XML Developer, Business Liaison, Program Manager, Stakeholder participation, executive level participation for data governance, and resources from NIEM/NHSIA.</td>
</tr>
<tr>
<td>Q2</td>
<td>What technical and business architecture will be needed at OKDHS to integrate MITA? What is the security architecture that protects the interests of all State agencies?</td>
</tr>
<tr>
<td>A2</td>
<td>The Interoperability Business Architecture required will include AS-IS and TO-BE Business Node Connection Models, Conceptual Diagrams, detailed Business Process Management Notation (BPMN) mapping for the AS-IS and TO-BE for each of the identified processes for the scope of Interoperability. SOA and ESB architectures will be needed. Identity management and access control is needed including strong authentication. Network and infrastructure security also make up the security architecture. The Global Federated Identity and Privilege Management (GFIPM) could be used for federated identity and privilege management to allow users from one federation partner to seamlessly access resources from another partner in a secure and trustworthy manner.</td>
</tr>
<tr>
<td>Q3</td>
<td>What is needed among the health and human services agencies to develop and share eMPI?</td>
</tr>
</tbody>
</table>
| A3    | The TO-BE Interoperability Architecture will require a mitigation of the current Federal and State Business requirements driving the current business decisions, a building of
consensus of ID information to be applied, consensus on a new eMPI framework, consensus on matching criteria logic, consensus on a historical data migration plan and the assistance of the Federal partners to position the local partners through mandates to remove any potential barriers for building this consensus. Once consensus is achieved, MOUs and SLAs should be approved.

Q4 What initiatives of the MOSAIC human services eligibility and case management system can be shared with OHCA initiatives under the ACA?

A4 For interoperability, the work that has been completed for MOSAIC; alignment of business requirements, models created, data harvested and resolved and IT solutions offer an opportunity to have a solid foundation to move forward with the roadmap presented here. The provided roadmap is intended to build upon this work and provide an Oklahoma solution.

Q5 What efficiencies can be gained by using SOA?

A5 The SOA will give us a more agile environment and can transform the IT landscape by increasing efficiencies and decreasing costs. Efficiency = output/input*100

1) Efficiency operates within the context of other performance measures like effectiveness, return on investment etc.

Efficiency must be measured relative to a standard – the ideal point before efficiency becomes a negative measure.

Q6 How can governance be used to achieve the wide range of performance expectations?

A6 Interoperability provides an opportunity for developing a strong partnership between the NHSIA partners and MITA partners through the utilization of a strong governance model, the governance will align performance expectations with their Strategic Plan. The recommended governance process will be the owner of strategic alignment of measures for the partnership.

Q7 How can Oklahoma improve overall State IT operating and cost efficiencies?

A7 Interoperability provides an opportunity to realize cost savings through IT by focusing resources for developing and implementing software and hardware not from an individual program and service point of view, but rather from a shared functional point of view that crosses boundaries of silos with something that meets at least 80% of the common needs to complete the function. Hence, cost savings and operational costs from an IT and business perspective are realized through efficient business processing time, data sharing, and development of IT solutions to support the process.

Q8 How can applying NIEM Standards to our data can help facilitate a more efficient, timely and accurate exchange?

A8 An interoperability solution utilizing a NIEM Standard for our data collection will assist with developing consensus on standardized data elements to assist with the data exchanges that are required to support the overall process of serving the common customer/clients needs in a seamless approach, while reducing the required time needed for the common customer/client to access the delivery system’s programs and services.

1.8.2 Options Impact and Goals

1.8.2.1 Improve service delivery for customers/clients

The implementation of an eMPI system across state agencies will benefit the client in several ways. First by reducing the amount of documentation families must submit to
apply for multiple benefits. Second, by reducing the time spent by families applying or retaining eligibility, or improving the quality of services a family receives. Finally, the client is better served because the information needed to deliver more effective services is readily available to the entities that provide them.

1.8.2.2 Reduce errors and improve program integrity

A critical challenge to realize an enterprise solution for the Eligibility Use Case is a common and accurate way of identifying clients, which is consistent across agencies. Oklahoma does not currently have a statewide eMPI; the addition of an eMPI will aid all agencies data steward functions when attempting to align persons across systems. For example, currently, multiple identifiers exist for eligibility determination for the Insure Oklahoma (IO) members, including a member ID (an OKDHS identifier) and an IO case ID (an Insure Oklahoma identifier). In the current workflow where manual reference checks are performed, the opportunity for errors increases. Through the development of a statewide eMPI, errors can be reduced and accuracy of eligibility determinations increased. Information reported to or available in one program can be shared with other programs in support of program integrity efforts.

1.8.2.3 Improve administrative efficiency

Through the integration of an eMPI with the source systems demographic information can be pre-filled, save typing (and therefore typos) and avoid creation of new duplicates, streamline workflow.

1.8.3 Options Considered

Build a state-mandated enterprise wide eMPI that would create a single record (that is identifiable by a unique identifier) for a person by using an agreed upon matching criteria across the agencies.

There are two cases that would need to be handled by the eMPI system, 1). If the participating agency has an internal eMPI, and 2). if the participating agency does not yet have an eMPI that is internal to the agency:

Case 1: If the participating agency has an internal eMPI, the agency has the option to use their existing eMPI system for an internal eMPI within the agency and they will have to integrate with an enterprise wide eMPI to get the unique person number across the agencies. The steps to create an enterprise wide eMPI would be:

1. **Define the workflow** of the enterprise wide eMPI system (back end, front end workflow, etc.).
2. **Define the architecture** of the eMPI system: An MDM Architecture for the backend and an Application Architecture for the front-end along with Infrastructure and Security.
• MDM Architecture – Suggests using a multi-domain MDM architecture. The MDM could include the following:
  o Master/Central MDM – Client Demographics Information
  o Eligibility MDM – Income Information, Resource Information, Other Eligibility information
  o More MDMs as the need arises

• Application Architecture – The front-end could include the following:
  o Single Sign-on (SSO)
  o Identity Management and Directory Services (This component does not fall under eMPI but eMPI would integrate with it)
  o Workflow
  o Other Web Applications
  o Web services, catalogues
  o Client facing Portals
  o Other applications integrating portals with backends
  o Updates to/from other systems

• Infrastructure Architecture
  o Servers (for database, ESB, web application etc )

• Security Architecture
  o Firewalls, gateways, certificates, security standards for access management

3. **Define the integration** with Identity Management and Directory Services. OHCA is working on Identity Management and Directory Services (IMDS) for the providers. If the scope of this effort is extended to include other agencies, all the partner agencies may integrate with OHCA’s IMDS. The other option would be to build or buy an IMDS.

4. **Define the requirements** of the enterprise wide eMPI System. The requirements would include all the collective requirements from different agencies. Business rules/requirements are given in Appendix A – Harvested eMPI Criteria. The hardware/application requirements and resources need to be determined.

5. **Define Data Management Services** – Data Management Services would include backend services, databases.

6. **Define the operations** needed by the eMPI system e.g. Initial load of eMPI data, incremental load, identify, match, merge/deduplication (cleanup), update master indexes/data or updates to systems, reports. The operations would be based on eMPI requirements and the SOA/data exchange frameworks. There are some procedures to follow for building the eMPI system, as shown in Table 4:

<table>
<thead>
<tr>
<th>Steps</th>
<th>Descriptions</th>
</tr>
</thead>
</table>
| **Analyze** | **Analysis** includes taking data extractions from contributing systems to eMPI, and coming up with rules that standardize the data. The data coming in is rarely clean. So they need to be filtered and standardized for matching. The standards that will be used for interoperability are:  
  - NHSIA  
  - NIEM |
Steps | Descriptions
--- | ---
**Match** | The matching process consists of coming up with fields to be used for matching, giving weights and thresholds to different attributes, matching the records and coming up with one single record.

**Load** | Loading would involve the bulk load, data validation (nullable option, length, code lookup etc), performance validation and incremental load.

**Connect** | Connect includes deployment of real-time Application Protocol Interfaces (APIs) (Quality Manager, Reports, Access Manager etc) for eMPI functions and notifications. Feed of information constantly to keep the eMPI up-to-date.

- Define the governance of the eMPI components and data and services. (Data and services are also components but since they are at a detail level they are listed separately).
- Suggest any products if they satisfy the requirements.

**Case 2:**
If the participating agency does not yet have an eMPI that is internal to the agency, it is recommended the agencies directly integrate with and use the enterprise wide eMPI. Exceptions would occur where the agency chooses to build an internal eMPI (that they’ve already started to work on or for other reasons) before integrating with the enterprise wide eMPI.

There were four products that were reviewed during the process of analysis of eMPI. All of these products are widely used and could be a likely candidate for eMPI implementation. They will require configuration to fit into NHSIA/NIEM framework. Final decision will be made based upon various components offered by the products and the configuration capabilities of the products to fit into NIEM/NHSIA framework. Each vendor describes their product below in Table 5:

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initiate (IBM)</strong></td>
<td>IBM Initiate eMPI is a flexible tool that helps resolve patient and provider identity across disparate systems. It provides a very high level of patient matching accuracy to eliminate duplicate patient records that often plague the creation of an enterprise patient record, or electronic health record (EHR).</td>
</tr>
<tr>
<td><strong>NextGate</strong></td>
<td>The eMPI delivers a sophisticated mechanism to compare and correlate various patient records within a healthcare environment. The eMPI is comprised of the MatchMetrix Server, management GUIs, APIs, and a database. The application can be deployed on any Java runtime platform, utilize popular databases, and integrate with any middleware or service bus environment.</td>
</tr>
<tr>
<td><strong>MultiVue (VisionWare)</strong></td>
<td>VisionWare’s MultiVue Patient is an eMPI solution that makes sense of the inconsistency of data identifiers across disparate systems, whether those are patients, providers or other data types and creates the single, consolidated and trustworthy index of the entity we refer to as the ‘Golden Record’. This master registry or index is leveraged by applications across the enterprise requiring a single version of the truth.</td>
</tr>
<tr>
<td>Product Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>WebMethods OneData(SoftwareAG)</td>
<td>OneData gives you “one version of truth.” Redundancies and errors are eliminated. Only reliable, accurate and approved enterprise information flows through your processes, systems and applications.</td>
</tr>
</tbody>
</table>

Virginia’s MDM approach uses IBM’s Initiate Master Data Service to implement MPI services. Maryland’s CRISP (Chesapeake Regional Information System for our Patients), also uses IBM’s Initiate product for a federated MPI. OHCA currently uses Initiate for their internal eMPI.

### 1.9 Approach

OKDHS hopes to embrace eMPI as a business-IT strategy. The development of a roadmap for implementing eMPI to provide better alignment between business and IT is an effort to improve interoperability. The approach used in this roadmap is to identify the current state of eMPI and identify the future state or TO-BE model and analyze the gaps between the two. This work helps redesign the Eligibility and Enrollment system currently in place by leveraging previous IT investments and the existing collaborative environment between OKDHS and OHCA and other initiatives. The roadmap will focus on the eMPI and eligibility requirements. This roadmap includes the data these systems will share in inter-agency collaboration by using the NIEM for a consistent and repeatable exchange of data between systems and agencies through the integration of information via an enterprise data warehouse and web services.

### 2 AS-IS SYSTEM

#### 2.1 Oklahoma Department of Human Services

The OKDHS Enterprise assigns individual identifier numbers to all of its clients to assist with tracking services to individuals through the system and to assist with payment for services. OKDHS uses the DDUP [DeDuplication] function to eliminate the duplicate client number so that each client has only one client number. Adult and Family Services (AFS), Child Welfare Services (CWS), Oklahoma Child Support Services (OCSS) use client numbering differently.

Distinct Client Numbers (DCN) are a 09 digit value designed to uniquely identify each individual in the PS2 system. Whenever a new person is created on the PS2 system, or whenever the demographics of an existing person are updated, the information is sent through match criteria to determine if that person already has a DCN. If so, that DCN is used on the case being updated. If not, a new DCN is assigned.

The DCN record contains a field called the "adoption indicator". When an individual is adopted he gets a new DCN, which is not cross referenced to any DCN. This is to protect the privacy of the child and of the adoptive parents. The adoption indicator shows on the DP transaction (This is used to pull up the information in the client numbering database for the Unique Client Identifier and it shows the name, (DOB),
race, sex, SSN(s), other names, and case relationships) and on the "DA" transaction (This is similar to an ALFX search, only of the client numbering database). An Adoption Indicator “B” means the DCN was the DCN used for the child prior to his adoption. This is called the Bio Recipient Identifier (RID). An Adoption Indicator "A" means the Client Number was used for the child on his post-adoptive case. A blank Adoption Indicator means there has been no adoption activity on the individual.

There are situations where multiple DCNs are created on the same individual. When this happens the demographics of the two DCNs should be analyzed to determine if they can be resolved. Once it has been confirmed that they can be resolved the DDUP transaction is used to resolve them.

**Child Support Services:**

- Requires
  - Last name
  - First initial
  - Gender
  - SSN or birth year

- A client ID is not generated for unknown noncustodial parents. OCSS assigns a unique identifier to each person within a case but if the person is in multiple cases, the same Distinct Client Numbering (DCN) is assigned to that person in all cases.

- In the case of a possible duplicate, a worker is presented with a screen that allows them determine which way to proceed.

**KIDS:**

The Child Welfare System auto generates an ID for each of its cases. Clients that are duplicated may be merged in the KIDS system. DCN are assigned to KIDs clients for:

1. Child in OKDHS custody requiring medical services
2. An adopted child
3. Child receiving SNAP, TANF, medical benefits
4. Parent receiving child support
5. IV-E eligible foster care children
   - KIDS sends its information to the DCN system
   - KIDS data is transmitted along with AFS data to OHCA with the associated DCN ID
   - AFS handles cases that need to be merged or deduplicated.
   - Adoption cases present the most difficulty for creating a DCN ID
   - Child Welfare cases may begin with very little information
   - OHCA uses the Client Numbering ID from OKDHS if the data originated with OKDHS application. OHCA uses RID for their unique identifier
Child Welfare Services uses DCN Merge Logic for KIDS Interface Jobs YI523D & YI515D:

**YI523D – Assign DCNs to KIDS clients:**

When a KIDS client is assigned a DCN from the DCN database (CL001), an associated case segment is also added under the assigned DCN root segment; this segment contains the case and person number of the KIDS client. If there is a duplicate client in the KIDS case which has NOT been merged and this client has the same matching criteria, he/she would have been assigned the same DCN, and an associated case segment would have been added for that case/person combination. If the DCN already exists, the process simply adds an associated case segment for the case/person in focus to the existing DCN (root); else, it gets the next available DCN#, adds the root segment to CL001 and then adds the associated case segment under that root segment. Only associated case segments beginning with CW KD (on the left) are added by KIDS interfaces YI523D and/or YI515D.

**YI515D – Delete / Add Associated Case Segments as a result of Client Merge:**

This interface tries to keep the associated case segments (case/person) on the DCN database in sync with the case/person in KIDS when merges occur in KIDS. This is not to be confused with DDUP transactions done in IMS.

When KIDS clients are merged, the following is the list of scenarios that may occur:

1. Both clients have the same DCN
2. Both clients have different DCNs
3. One client has a DCN, the other does not
4. Neither has a DCN

The merge process populates a work table for interface job YI515D to resolve the associated case segments, as needed.

**Adult and Family Services:**

Below, Figure 3 depicts the AFS AS-IS process for assigning a DCN Number.
Figure 3: Adult and Family Services AS-IS process for assigning a DCN number

**DDUP Process:**

The diagram in Figure 4 outlines for OKDHS divisions a process known as DDUP, essentially a process to undo duplicated unique identifiers that have been duplicated in error.
When a referral is received, the receiving entity reviews the information and identifies whether or not a Social Security Number (SSN) is contained within the referral. If so, then they attempt to find the person in their system utilizing the PY or AS function of IMS. Using the information reported back on the SSN the worker checks for matching last name, first name, DOB, sex and race. If all these match the SSN then the DDUP Process is completed. If they do not match the SSN on record, then the worker will continue to the Investigate Family Information process.

The second path taken to initiate the DDUP process is initiated if the SSN does not match the unique identifier in on file or if there is no SSN. The worker will then initiate the UDA Function or FD Function on IMS. For the UDA function, the worker is required to type the First Name, Last Name, Sex and optional information that may be available on the referral of Middle Initial, Race, DOB and a possible SSN. They will then be asked to check the last name, first name, DOB, sex and race for match with what is on record in the system. If not found, the worker can initiate the FD on IMS by typing in at least the first letter of the last name and first name. This will return a list of potential case records in which the worker may choose the best fit, again checking the last name, first name, DOB, sex and race for match. If the SSN and names match, then the worker will initiate the DDUP process to remove duplicated record. If the SSN and names do not match, the worker will initiate the Investigate Family Information to ensure this is not a duplicated unique identifier for the individual in question.
It should be noted here, that this is how things currently are being handled for unique identifiers and that it takes very little time to create a unique identifier, but it could take several hours to actually DDUP a unique identifier record.

The client number matching criteria is depicted in the diagram below. Figure 5 depicts the TO-BE cleansing process for AFS proposed by the Six Sigma Team after working on a Six Sigma Project process improvement for Distinct Client Numbering. This algorithm has not been implemented yet for Distinct Client Numbering. Primary matching criteria validates SSN and DOB. Then the following matching criteria include the case number person number, first name, last name etc.

![Diagram of TO-BE Matching Criteria Proposed by Six Sigma Project for AFS](image)

Figure 5: TO-BE Matching Criteria Proposed by Six Sigma Project for AFS

Details of the Distinct Client Numbering process to locate whether a client is in the system in an open or a closed case is depicted in the Figure 6.
Figure 6: Details of the DCN Process to Locate a Client

2.2 Oklahoma Health Care Authority (OHCA)

Figure 7 depicts the current OHCA solution architecture at a high level.
Figure 7: OHCA Solution Architecture

OHCA has one source system configured which is the Medicaid Management Information System (MMIS), an Oracle DB system. The ongoing updates from the source systems are made at will in real time via the Initiate Web Services Interface to the Client Matching Web Services. OHCA’s participants search the Initiate Citizen Hub via Web Services API.
Some facts on AS-IS eMPI generation for OHCA, are listed below:

- OHCA collects demographic information from Online Enrollment screens when an applicant applies for benefits.
- IBM Initiate Master Data Services Program is used for eMPI to generate a unique client number.
- Merge of data takes place after the fact.
- The application customization for IBM’s Initiate is handled by HP.
- The client number that OKDHS generates is being used as a unique client identification number in cases where Initiate does not generate a unique client number.
- There is no ESB being used for eMPI.
- IBM Initiate uses Address Doctor (product by Informatica) for address verifications.
- Currently there is mismatch between data like length of names in PS2 (OKDHS) and Online Enrollment (OHCA), so names are truncated on OHCA’s side. OHCA has a scoring system for name matching.

2.3 Oklahoma State Department of Health

OSDH are in procurement for a system that will include an eMPI. While they are in the process of selecting a vendor, they are developing their business requirements which include data standards (ISO standards) and minimum error levels. Once they have an
eMPI established that meets their internal needs it is the intent of OSDH to support the use of the eMPI as a shared service for other health agencies. Unfortunately, they do not currently have a timeline for when that would be available as a shared service.

3 SCOPE

The scope of this interoperability exploration and planning effort includes developing a roadmap for integration of to allow interoperability, fully automated data exchange and service reusability for all services exchanged between OKDHS, OHCA, OSDH and other initiatives. In addition to the inter-agency interoperability initiatives, intra-agency initiatives for interoperability exist between three main business unit divisions within OKDHS. These include OCSS, AFS and CWS. Figure 9 shows the interactions between OKDHS agencies (e.g., PS2 – AFS, OSIS – OCSS, KIDS – CWS), and other departments and organizations (e.g., OHCA – MMIS, Office of Management and Enterprise Services (OMES), OSDH)).

Through collaboration with OKDHS, OSDH, OHCA, and OMES, a roadmap will be developed to improve interoperability and integration in eligibility and enrollment, case management, and other related functions across human services information technology systems, as well as explore integration with other programs. The Interoperability Grant project will create a plan to increase eligibility determination, plan for eMPI, SOA, and data warehouse monitoring, along with improving processing times, and assisting more eligible households to retain their benefits over time.

3.1 Options Cost Benefit

The eMPI Interoperability project delivery team received approval from the Oklahoma Interoperability Project Sponsor to adopt the eMPI Cost Benefit Analysis created by Cognosante, a vendor supporting the OSDH in support of the Systems Tactical Plan, published in quarter 4 of 2011 (see attachment #1 of Appendix G from the final Report). By adopting this methodology, our Interoperability team was able to create a Rough
Order of Magnitude (ROM) estimate, using this Cost Benefit Analysis (CBA) as the model, tailoring the estimates to the participating agencies needs to implement an eMPI solution.

**eMPI Solution Options Considered:**

The Interoperability Grant eMPI project team considered four solution options:

1. Purchase a COTS solution such as Initiate, or Oracle FusionSuite
2. Use another state’s system, in house solution similar to Spider (consolidator of information)
3. OKDHS – client numbering system; expand to an enterprise level
4. Purchase a COTS solution and require that each agency participate, but allow each agency to continue to use whatever system works for them internally, and let them go ahead and maintain it. Under this solution each agency maintains unique identifier, but is required to conform to the enterprise eMPI standard. *(selected)*

Using the Cognosante report as the Basis for Estimation (BoE) for the CBA, the cost data for the proposed eMPI solution was extrapolated to determine a ROM estimate. Additional research was completed during contributed significantly to this analysis. We gathered additional data and identified additional assumptions. Adjustments to the baseline findings were made based on our assessment of the population (number of clients, patients, and records).

Cognosante created three scenarios that included technologies such as SOA and ESB to acquire and disseminate information using highly secure shared services and role-based security models:

- **Scenario 1:** Fully integrated approach where OSDH would use OHCA Health Information Technology (HIT) tools for processing transactions and shared services.
- **Scenario 2:** OSDH systems are independently maintained with their own eMPI, Provider Index, and translation capabilities and use OHCA’s OpenHIO for information exchange.
- **Scenario 3:** Optimized hybrid approach is developed using HIT assets from both organizations.

For each scenario, the Cognosante team, analyzed the pros and cons and developed a logical architecture, analyzed and discussed use of an eMPI, and developed a cost benefit analysis with a focus on identifying the percentage of HITECH funding that could be obtained under each.

The Cognosante team recommended that OSDH adopt the optimized hybrid architecture, cited in Scenario 3, which is an optimized hybrid solution sharing eMPI services between OSDH and OHCA. The eMPI provides a unique identifier that spans
across and within agencies and systems allowing multiple local identifiers to be mapped
to a single unique identifier. The use of a common identifier and/or the ability to map
local identifiers to a common identifier was determined to be an essential component for
data exchange. The key benefits in this approach are the ability to leverage existing
software licenses, contractors, and expertise while allowing OSDH to maintain control
over their data.

The complete eMPI CBA/ROM report may be found in Appendix B.

3.2 Options Enterprise Architecture and/or Modules

OKDHS, OHCA, OSDH, and OMES continually attempt to identify approaches to
process improvement through the utilization of supporting IT solutions. Although each
partner may have taken an individual approach to-date, this partnership offers the
opportunity to focus as partners on a repeatable, enterprise model that meets the needs
of the partnership’s interaction points as defined through the NHSIA and MITA
Architectures.

There is quite a lot that fits under the umbrella of MDM, but a key part of it is the
matching of records from different systems, or new/updated records entering the
system.

The tools will be developed or purchased to merge source data into the master-data list.
This is often an iterative process requiring tinkering with rules and settings to get the
matching right. This process also requires a lot of manual inspection to ensure that the
results are correct and meet the requirements established for the project. The trick is to
lessen the false matches. Too many missed matches make the master data less
useful, because you are not getting the benefits you invested in MDM to get. See Table
6 below for factors that affect the eMPI solution.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configurability</td>
<td>An eMPI Solution should be flexible enough to be configured and tuned for the application at hand.</td>
</tr>
<tr>
<td>Integration</td>
<td>An eMPI Solution must be able to integrate with other systems to receive records and propagate changes/updates back to the systems.</td>
</tr>
<tr>
<td>Data Governance</td>
<td>A user interface and tools must be provided for comparing, merging, editing, and tracking the records</td>
</tr>
<tr>
<td>Security/Auditing</td>
<td>Securing access to the data with role-based access controls as well as a complete audit trail of access is critical</td>
</tr>
<tr>
<td>Accuracy</td>
<td>The whole point of matching algorithm of eMPI Solution is too automatically match the appropriate records so that the number of records a human has to match manually check upon is reduced significantly.</td>
</tr>
<tr>
<td>Performance/Scalability</td>
<td>Initial load performance as well as ongoing performance is important, especially as the volume of data grows</td>
</tr>
<tr>
<td>Reporting</td>
<td>Getting reports on system performance and data quality metrics can be very valuable. Other reports such as reports on matches, questionable records.</td>
</tr>
</tbody>
</table>
Extensibility | The ability to extend backend functionality for specific domains or customize the user interface is often required.

Probabilistic algorithms are much better at making guesses whether a record should be linked together or not compared to rule-based deterministic algorithms. Probabilistic algorithms rely on frequency-based weights that tunes to a particular dataset that is stored on a data store (e.g. demographic data). This roadmap would recommend an eMPI solution that uses probabilistic algorithm for matching.

### 3.3 Exploration Answers

See section 1.8.1.

### 4 GOVERNANCE

In addition to the identified key personnel, Oklahoma will draw on a depth of talent from across the partnership’s organizations to ensure success for the Oklahoma Interoperability Grant Project. The additional assignment of resources and Business decision making will be guided by a Governance process. Our Governance recommendation is an expansion of a current structure called the OHCA/OKDHS Executive Steering Team, which is currently a group of officers who meet monthly or as necessary to resolve issues, delegate projects to sub-teams and monitor the interagency agreements which is the detailed governance agreement between OKDHS and OHCA. Under our interoperability efforts the recommendation is to expand this group to include the OSDH and the OMES-ISD and to ensure that this Governance team is comprised of decision makers that have the authority to approve business related decisions that streamline interoperability.

Oklahoma is currently undergoing an IT transformation that places IT under the OMES, including a newly developed IT governance process for the State of Oklahoma. Existing IT Governance processes through each partner will be utilized, in conjunction with the Implementation of the OMES IT Governance Process for technical decisions. OMES-ISD Managers for Health and for Compliance and Eligibility & Insurance will be engaged in this plan and will assist with the alignment into the transformation of our services into the Oklahoma Federated Model of the Enterprise.

There are major concerns around eMPI and data governance and client privacy. eMPI can initiate solutions addressing the common challenges of data governance and ownership with adaptable data models (i.e., federated, centralized or hybrid) that meet the needs of stakeholders concerned with sharing sensitive data. An eMPI system should offer a collaborative data stewardship tool to allow individual participants to proactively manage their own data quality.

### 4.1 Overview
To guarantee prolonged good data quality, it is indispensable to contemplate a data governance initiative to accomplish the metrics for data accountability.

An eMPI would need a governance that ensures that data quality, data integrity, data sharing, data transparency are maintained across the systems. eMPI governance would require participation from all participating agencies. Both business and IT personnel participation is required to ensure that the IT solution meets the business needs of the stakeholders.

4.2 Data Stewardship

Data stewardship is the management and oversight of data by designated personnel who are responsible for tasks such as developing common data definitions and identifying data quality issues. The Data Stewardship (or Governance) consists of a set of Data Stakeholders who come together to make data related decisions. They may set policy and specify standards, or they may craft recommendations that are acted on by a higher-level governance board.

At the enterprise level, for eMPI, data stewards will be responsible for ensuring that the following features are in place:

- Data ownership
- Data quality
- Data integrity
- Data privacy
- Data security rules (for data in motion and data at rest)
- Business rules
- Data transparency.

They will also ensure an efficient data synchronization (update, deletes/deactivations, inserts, etc.) between the systems. The maintenance of data within the agency's (OKDHS, OSDH, OHCA) premises will be the responsibility of each agency.

Governance ensures compliance to policies and procedures, resolution of conflicts in a smooth manner and providing ongoing services.

4.2.1 Policies and Rules (Data access, Data reusability, Data integrity, Data deduplication)

- Compliance to State and federally mandated Policies and rules for secure storage and transfer of data
- Compliance to Enterprise wide Standards (recommended by the SOA strategy) for services and data
- Policies for accountability of the data need to be established.
- Rules for sharing of data need to be established

4.2.2 Challenges for eMPI Governance Committee

- Work with state mandates, agreements for data privacy and data sharing and other business rules
- Come up with commonly used/core attributes that are shared by all or most agencies
- Identify strategies to maintain data quality of core data that is available at the enterprise level
- Ensure that changes to the data are securely replicated and are consistent enterprise wide

5 TO-BE SYSTEM

5.1 eMPI System Overview

The eMPI, or person registry, has an essential role to play, facilitating trusted data exchange while protecting the privacy of a person’s information. An eMPI provides a real-time way to locate, identify, match and cleanse information about a person from many sources to create a comprehensive view for authorized personnel. It is proven to reduce duplicate records within and across systems to improve person administration and care. Further information on the functionality and architecture of the participating systems is given in the subsequent sections. In particular, each system should be briefly summarized with special emphasis on the functionality related to the interface. The hardware and software components of each system are also identified.

Identify existing record(s) about a person with a high degree of accuracy (few false positives or false negatives), in which the main objectives of eMPI are:

- Avoid duplicate records about the same person
- Retain the pedigree of the information sources
- Keep accurate current information
- Register data about a person
- Link to data about a person
- Support “Unique Person Identifier” if adopted
- Maintain historical look-up data

The eMPI concept in NHSIA framework supports the capabilities listed below in Table 7. The concept provides primary support to the Locate Client Data capability.
Table 7: Capabilities for eMPI in NHSIA framework

<table>
<thead>
<tr>
<th>Support</th>
<th>Capability Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Locate Client Data</td>
<td>An assistor/caseworker can locate client data based via a MPI using an index or statistical matching algorithm.</td>
</tr>
<tr>
<td>Secondary</td>
<td>Access Client Data</td>
<td>An assistor/caseworker can access client-related data from authoritative sources anywhere in the country from anyplace with Internet access.</td>
</tr>
<tr>
<td>Secondary</td>
<td>Change Jurisdictions</td>
<td>An applicant or client can move from one jurisdiction to another and conveniently transfer information and maintain benefits or move to the equivalent benefits in the new jurisdiction.</td>
</tr>
</tbody>
</table>

Virginia’s Master Data Management approach uses IBM’s Initiate Master Data Service to implement MPI services. Maryland’s CRISP (Chesapeake Regional Information System for our Patients) also uses IBM’s Initiate product for a federated MPI.

5.1.1 Interface Overview

The State of Oklahoma has chosen to use a hybrid architecture for eMPI, which is an optimized hybrid solution sharing eMPI services between State Agencies. The eMPI provides a unique identifier that spans across and within agencies and systems allowing multiple local identifiers to be mapped to a single unique identifier. The use of a common identifier and/or the ability to map local identifiers to a common identifier was determined to be an essential component for data exchange. The core, common data along with the keys pointing to different systems will be available at the enterprise level as shared data for easy and fast access and maintenance.

5.2 Functional Allocation

The required operations for eMPI are:

- Initial Load
- Identify
- Match
- Cleanse/Deduplication
- Update
- Incremental Load
- Reports

Most of the operations will be handled by the eMPI system. We have to ensure that the update mechanism handles the synchronization of information between eMPI and the other interfacing systems.

Information Aggregation patterns must be implemented in such a way as to support source data from a variety of sources in a variety of formats.
5.3 Data Transfer

NHSIA defines any data exchange and messaging as including NIEM for data exchange and using web services for message intake, processing and handling, as depicted in Figure 10. The XML Exchange Message is created and wrapped following agreed-upon exchange protocols for routing, security and authentication. The message is then transmitted by an exchange method, such as a Web Service. There are many methods of Information Exchange Package (IEP) delivery such as:

- Web services
- Message queuing
- Message switching or brokering, or
- ESB

The method of exchange must be agreed upon between two stakeholders so that their systems can exchange information successfully.

![Figure 10: NHSIA Information Exchange Mechanism](image)

The product or solution that is recommended using for the eMPI should support NIEM data exchange standards.

5.4 Transactions

Overall the transactions must be generic, platform independent, and standards based complying with NIEM/NHSIA framework for data exchange.
5.5 Security and Integrity

eMPI service should provide responses that adhere to the person’s authorization about sharing information, as well as interagency agreements, rules, and policies that affect sharing information. The person’s Confidentiality/Privacy Authorization should be one of the items registered in the eMPI entry. This will enable the service to look up who should have access to different kinds of information about the person. The service should not return information to the requester unless the requester is authorized to receive it.

Authentication will be handled by the eMPI system by integrating with the Identity Management and Directory Services. It could either use the Identity Management and Directory Services that is being built by OHCA or the State could build one or buy an Identity Management System to satisfy the requirements. Authorization will be handled by the respective systems. Identity Management can call the systems (using a web service) after authentication and get a response back from the interfacing systems after the system has authorized the request.

Access Control of the data in master databases will be configurable in the eMPI Solution through an API. Access control of the data residing within the other system’s premises will be handled by the systems.

Data in motion as well as sensitive data at rest will be encrypted.

Interoperability inter-agency web services security should be defined by governance which is under development and being led by the Inter-Agency Executive Steering Team.

Secure Socket Layer (SSL)/Transport Layer Security (TLS) must be used on all web applications and Web/WCF Services that are transmitting secure data, whether internal or external. Any other Web/WCF Service security methods must be approved by the EAES unit before use.

5.6 TO-BE eMPI Strategy

NHSIA recommends an Information Aggregation Pattern for data exchange. The Information Aggregation pattern is one example of an Infrastructure pattern. Information Aggregation patterns integrate data across multiple sources, formats and locations. There are four sub-patterns included:

- Federation, which provides access to multiple data sources across multiple locations
- Population, which gathers data from one or more sources, processes that data and applies it to some data target
- Synchronization, which keeps data consistent across locations
- Information Access, which provides end-user and application access to data

The Figure 11 below depicts the Information aggregation pattern.

![Data Integration Patterns](image)

**Figure 11: NHSIA Architecture Pattern Example: Information Aggregation Use Case**

There are a number of ways in which data can be transferred, transformed and aggregated. The infrastructure must be capable of processing and transforming the incoming data into useable formats. This is accomplished via adaptors. In addition, a number of IT components are used to implement this pattern, including:

- Enterprise Service Bus
- Web Services
- Web Servers
- Application Servers
- Data Integration Servers

Implement an enterprise wide eMPI, including sharing of client identification number data with other agencies. This is one of the first key steps to identifying who a person is and what information we may have for them across the State. It’s the critical piece for identifying a person’s complete record which will establish a foundation to expand upon for identifying a person’s needs and benefits across Oklahoma.

Every business is driven by its processes—and every business process relies on complete and accurate data. Ideally, businesses endeavor to do anything and
everything to ensure the accuracy and validity of their data. However, in the real world, data comes from many different sources, often without it being consolidated, cleansed or governed. As a result, data gets duplicated, and updated information in one system may not be used by operational business processes. This leads to inefficiency across the enterprise, including time wasted on exception handling. That’s why there’s a need for a MDM. Using MDM to master data only for a single domain proves to be costly and limited in scope. Multi-domain MDMs cover a broader range and saves us from purchasing multiple products down the road.

Another downside is that single-domain solutions don’t provide overall governance of mastered data. Companies end up with siloed data being mastered and governed by different systems, which is not ideal. Relationships between the data, and overall enterprise data governance and centralization are impacted negatively.

MDM technology that only addresses one domain or type of use case is incredibly inefficient, may not save any initial costs and creates new types of data silos. This can lead to unnecessary risk, poor business decisions and lost revenue. Siloed master data with no integration loses valuable information, particularly for additional sales opportunities and business intelligence purposes.

Multi-domain MDM platforms are comprehensive, flexible and expandable. Multi-domain MDM solutions may not cost any more than a point solution, and they have the added benefit of being able to master additional subject areas as the need arises. They also provide governance and relationships between the mastered data domains. Multi-domain MDM can save organizations time and money with both short- and long-term gains in efficiency throughout the enterprise.

Compared to traditional single-domain MDM, multi-domain MDM offers many benefits, most realized almost immediately, including:

- Centralized, consolidated data management
- Improved governance of enterprise data
- Increased transparency of enterprise data
- Support for more accurate audits, reporting and optimization
- Efficient, real-time relationships between data domains
- Better tool familiarization and minimal training for mastering new domains
- Lower Total Cost of Ownership (TCO)
- Higher ROI as other domains are mastered and it extends to other lines of business

A true multi-domain MDM platform should support within a single instance of the system (webMethods OneData from Software AG offers all of these capabilities):

- Multiple data subject areas (such as product, customer, hierarchy, reference data, metadata, assets and location)
- Open data models
• Multiple architectures
• Operational and analytical use cases
• Enterprise integration advantages
• End-to-end MDM lifecycle capabilities
• Workflows with notifications and escalations

An eMPI would be developed and deployed either as a service utilizing the ESB or would be implemented using a COTS solution that meets the requirements. The overall architecture of eMPI is depicted in Figure 8:

![Diagram of eMPI architecture]

Figure 12: Proposed TO-BE architecture for eMPI

The main components of eMPI would be:

• MDM
• Identity Management
• ESB
• Workflow
• Business Rules Engine
• Portals
• Directory Services
Different layers that eMPI system would include:

1. Presentation Layer (client facing portals, applications, catalogue)
2. Integration Layer (other applications tied to portals, web services, ESB, Business Rules, identity management)
3. Backend Services/Data management services (databases, backend services, directory services)
4. Hardware components (Servers.....)

**Analysis:**

Analysis involves looking what data on the systems look like and evaluating it.

**eMPI Features:**

1. **Accuracy** – Accuracy is top concern. Probabilistic algorithms are much better at making guesses that rule-based system. Probabilistic algorithms rely on frequency-based weights that tunes to a particular dataset that is stored on a data store (demographic data). Increase accuracy by providing a means for false-positive detection.
2. **Performance and Scalability** – Very important aspect. Hundreds and thousands of transactions a day and need to be able to deal with it real-time and often with every transaction need to put an enterprise wide identifier as part of the message going out. The eMPI sits at the middle of traffic flow.
   - Cross platform support
   - Fast initial and incremental loads
   - Quick response time
   - Multi threaded and deployable on multiple servers
3. **Flexibility** – be able to adapt to data requirements; what element is stored and how the data are matched together. All that is very important for a successful eMPI. Interoperability is becoming a big thing so national interoperability standards should be used
   - Configurable match fields and thresholds
   - Configurable stewardship interface
   - Configurable object model
4. **Security** – Security involves keeping the audit trail, access to the system, user security, tracking the information
5. **Experience and expertise** – Good and experienced team are the key factors for successful implementation of eMPI.

### 5.7 Detailed Interface Requirements
NHSIA proposes that every jurisdiction implement these shared eMPI services, as shown in Table 8.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Find Person**                 | 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). In today’s environment, likely search criteria (and, hence, identifying information about a person in the eMPI) include:  
  - Name
  - Gender
  - DOB
  - Place of birth
  - Mother’s maiden name
  - Previous surname
  - Address
  - Phone
  - ID (e.g., SSN, case number, person ID) |
| **Identify Available Person Records** | Identify human services information available about the person. Based on the eMPI entry parameter input, return a list of pointers to available records about the person. |
| **Match Person**                | Using matching algorithm(s) identify the best match in the eMPI 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 eMPI entry, return basic demographic data, contact data, and a list of pointers to available records about the person. |
| **Create Person Index Entry**   | Create an entry in the eMPI for a person                                                                                                          |
| **Register Person Data**        | Update an existing eMPI entry to add one or more pointers to additional information. Specify metadata fields necessary to access the information. |
| **Update Person Identifying Information** | Update an existing MPI entry to modify or add to the information that identifies the person (e.g., name or address).  
This service is nominated as a candidate for implementation in each jurisdiction: |
| **Transfer Person Index Entry** | Shift responsibility for maintaining a person’s active index entry from one eMPI to another. This would occur when the person applies for services in a region with a different MPI or when the person legally attains residency in a different region. This service also registers a pointer to the previous eMPI so that the inactive records are easy to locate. |

Fundamental principles associated with these services are:

- Person privacy protection
- Vendor and platform neutral
- Best practices; agile and extensible
• Promotion of widespread adoption
• Flexible implementation models

The concept for the MPI is described in the NHSIA document “Master Person Index Services White Paper”. That paper provides the illustration in the Figure 13 below, which identifies the key types of information that would be stored in a typical MPI. NHSIA points out the major data likely for search criteria (and, hence, identifying information about a person in the MPI) include:

• Name
• Gender
• DOB
• Place of birth
• Mother’s maiden name
• Previous surname
• Address
• Phone
• ID (e.g., SSN, case number, person ID)

![Diagram of MPI identification and pointer information](image)

Figure 13: Information Types identified in NHSIA’s Master Person Index Services White Paper

In our scenario, for the three agencies, the identifying criteria are given in the table below in Table 9. A further detailed collection of information which was harvested to identify eMPI data is located in Appendix A – Harvested eMPI Criteria.
Table 9: Identifying Criteria for OKDHS, OHCA, and OSDH

<table>
<thead>
<tr>
<th>Unique Identifier Data Element</th>
<th>RECOMMENDATION</th>
<th>MITA (Y=Req’d, N=Opt’l)</th>
<th>NIEM (Y=Req’d, N=Opt’l)</th>
<th>CWS (Y=Req’d, N=Opt’l)</th>
<th>OKDHS OCSS (Y=Req’d, N=Opt’l)</th>
<th>AFS (Y=Req’d, N=Opt’l)</th>
<th>OHCA (Y=Req’d, N=Opt’l)</th>
<th>OSDH (Y=Req’d, N=Opt’l)</th>
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<tbody>
<tr>
<td>Name</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Place of Birth</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>Gender</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Mother’s Maiden Name</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Previous Surname</td>
<td>Y</td>
<td>Y</td>
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<td>Race</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
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<td>Citizenship</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
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<td>N</td>
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<td>Marital Status</td>
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<td>N</td>
<td>Y</td>
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<td>Alternate Contact</td>
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<td>Y</td>
<td>N</td>
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<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

5.8 Security Requirements

XML-based technologies such as SOAP, XML Schema and WSDL provide standards to build interoperable web services.

Table 10 outlines current generally accepted standards at a glance. For further details on each standard, please see Appendix B of the Web Services Suite Roadmap, TO-BE SOA Web Services Security Standards and Terminology.
### Table 10: Current Generally Accepted Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Current Version</th>
<th>Future Version</th>
<th>Roadmap Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Size</td>
<td>NA</td>
<td>NA</td>
<td>Max size &lt; 5 megabyte, very low frequency</td>
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<tr>
<td>XML</td>
<td>1.0</td>
<td>NULL</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>WSDL</td>
<td>NA</td>
<td>2.0</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>SOAP</td>
<td>1.2</td>
<td>NULL</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>WS-I Basic Profile</td>
<td>1.0</td>
<td>1.2</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>HTTP</td>
<td>1.1</td>
<td>NULL</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>SSL</td>
<td>3.0</td>
<td>NULL</td>
<td>Current/Suggested</td>
</tr>
<tr>
<td>WS-Trust</td>
<td></td>
<td></td>
<td>Future</td>
</tr>
<tr>
<td>WS-Federation</td>
<td></td>
<td></td>
<td>Future</td>
</tr>
<tr>
<td>SAML</td>
<td></td>
<td>2.0</td>
<td>Future</td>
</tr>
<tr>
<td>WS-Security</td>
<td></td>
<td>1.1</td>
<td>Future</td>
</tr>
<tr>
<td>WS-Addressing</td>
<td></td>
<td>1.0</td>
<td>Future</td>
</tr>
<tr>
<td>WS-Policy</td>
<td></td>
<td>1.2</td>
<td>Future</td>
</tr>
<tr>
<td>WS-I Basic Security Profile</td>
<td></td>
<td>1.0</td>
<td>Future</td>
</tr>
</tbody>
</table>

Web services security standards are depicted below in Figure 14.

![Figure 14: Web Services Security Standards](image)

SOAP messages enable the partner and FFM, via the Hub, to send and receive data using services. The Hub, the FFM, and partner use two-way SSL/TLS with client side certificates for SOAP-based services over the Internet.

The Team has not finalized the username and password authentication process.
Required security standards for implementation of the Federal DSH Secure service between the FFM and the Hub, and the Hub and the partner agency, are as follows:

- Web Services Security (WS-Security) v1.1
- SOAP v1.2
- X.509
- A trusted Certificate Authority (CA) must sign the certificates
- Certificates must use 2048-bit keys
- Certificates must use Secure Hash Algorithm (SHA)-2 for the message digest. It can be any of the following strengths: 256, 384, or 512

Each request contains a WS-Security header.

**Data Security:** Web applications or Web/WCF Services that access databases have the responsibility to verify that the person accessing the data has the authority to do what they are asking to do. The database will be accessed by the application using a proxy ID after the application has verified the request is authorized.

Databases that need to be accessed by web applications in the DMZ must reside inside the OKDHS network and be accessed by an internal Web or WCF Service that is called by the web application. In addition to the web application determining if the user has access, the internal Web/WCF Service will perform its own security to make sure the application calling is authorized to call it.

### 6 ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACA</td>
<td>Affordable Care Act</td>
</tr>
<tr>
<td>ACF</td>
<td>Administration for Children and Families</td>
</tr>
<tr>
<td>AFS</td>
<td>Adult and Family Services</td>
</tr>
<tr>
<td>APD</td>
<td>Advance Planning Document</td>
</tr>
<tr>
<td>API</td>
<td>Application Protocol Interfaces</td>
</tr>
<tr>
<td>BPMN</td>
<td>Business Process Management Notation</td>
</tr>
<tr>
<td>CA</td>
<td>Certificate Authority</td>
</tr>
<tr>
<td>CBA</td>
<td>Business Process Outsourcing</td>
</tr>
<tr>
<td>CHIP</td>
<td>Children’s Health Insurance Program</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial off-the-shelf</td>
</tr>
<tr>
<td>CWS</td>
<td>Child Welfare Services</td>
</tr>
<tr>
<td>DCN</td>
<td>Distinct Client Numbering</td>
</tr>
<tr>
<td>DDUP</td>
<td>DeDUPlication</td>
</tr>
<tr>
<td>DOB</td>
<td>Date of birth</td>
</tr>
<tr>
<td>CHIP</td>
<td>Children’s Health Insurance Program</td>
</tr>
<tr>
<td>CIO</td>
<td>Chief Information Officer</td>
</tr>
<tr>
<td>COTS</td>
<td>Commercial off-the-shelf</td>
</tr>
<tr>
<td>CWS</td>
<td>Child Welfare Services</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>DCN</td>
<td>Distinct Client Numbering</td>
</tr>
<tr>
<td>DOB</td>
<td>Date of birth</td>
</tr>
<tr>
<td>EHR</td>
<td>Electronic health record</td>
</tr>
<tr>
<td>ESB</td>
<td>Enterprise Service Bus</td>
</tr>
<tr>
<td>FFM</td>
<td>Federally Facilitated Marketplace</td>
</tr>
<tr>
<td>GFIPM</td>
<td>Global Federated Identity and Privilege Management</td>
</tr>
<tr>
<td>HIPAA</td>
<td>Health Insurance Portability and Accountability Act</td>
</tr>
<tr>
<td>HIT</td>
<td>Health Information Technology</td>
</tr>
<tr>
<td>HITECH</td>
<td>Information Technology for Economic and Clinical Health</td>
</tr>
<tr>
<td>HPES</td>
<td>Hewlett Packard Enterprise Services</td>
</tr>
<tr>
<td>HSA</td>
<td>Human Services Application</td>
</tr>
<tr>
<td>IEP</td>
<td>Information Exchange Package</td>
</tr>
<tr>
<td>IMDS</td>
<td>Identity Management and Directory Services</td>
</tr>
<tr>
<td>IO</td>
<td>Insure Oklahoma</td>
</tr>
<tr>
<td>IPHIS</td>
<td>Interoperable Public Health Information System</td>
</tr>
<tr>
<td>IRS</td>
<td>Internal Revenue Service</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>MDM</td>
<td>Master Data Management</td>
</tr>
<tr>
<td>MITA</td>
<td>Medicaid Information Technology Architecture</td>
</tr>
<tr>
<td>MMIS</td>
<td>Medicaid Management Information System</td>
</tr>
<tr>
<td>MOU</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>MPDM</td>
<td>Master Person Data Management</td>
</tr>
<tr>
<td>MPI</td>
<td>Master Person Index</td>
</tr>
<tr>
<td>NHSIA</td>
<td>National Human Services Interoperability Architecture</td>
</tr>
<tr>
<td>NIEM</td>
<td>National Information Exchange Model</td>
</tr>
<tr>
<td>OCSS</td>
<td>Oklahoma Child Support Services</td>
</tr>
<tr>
<td>OE</td>
<td>Online Enrollment</td>
</tr>
<tr>
<td>OHCA</td>
<td>Oklahoma Health Care Authority</td>
</tr>
<tr>
<td>OKDHS</td>
<td>Oklahoma Department of Human Services</td>
</tr>
<tr>
<td>OMES-ISD</td>
<td>Office of Management and Enterprise Services-Information Services Division</td>
</tr>
<tr>
<td>OSDH</td>
<td>Oklahoma State Department of Health</td>
</tr>
<tr>
<td>RID</td>
<td>Recipient Identifier</td>
</tr>
<tr>
<td>ROM</td>
<td>Order of Magnitude</td>
</tr>
<tr>
<td>SHA</td>
<td>Secure Hash Algorithm</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreements</td>
</tr>
<tr>
<td>SOA</td>
<td>Service Oriented Architecture</td>
</tr>
<tr>
<td>SSL</td>
<td>Secure Socket Layer</td>
</tr>
<tr>
<td>SSN</td>
<td>Social Security Number</td>
</tr>
<tr>
<td>SSO</td>
<td>Single Sign-on</td>
</tr>
<tr>
<td>TCO</td>
<td>Cost of Ownership</td>
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<tr>
<td>TLS</td>
<td>Transport Layer Security</td>
</tr>
<tr>
<td>WIC</td>
<td>Women, Infants and Children</td>
</tr>
</tbody>
</table>
APPENDIX A – HARVESTED EMPI CRITERIA
APPENDIX B – COST BENEFIT ANALYSIS

1 OPTIONS COST BENEFIT

According to OMB A-94, a Cost Benefit Analysis (CBA) is a systematic quantitative method of assessing the desirability of government projects or policies when it is important to take a long view of future effects and a broad view of possible side-effects. A CBA is used to determine if undertaking a project is a sound investment decision.

1.1 Overview

The Interoperability Grant awarded to the State of Oklahoma (the State) consisted of six different focus areas (deliverables). Because the size and scope is an enterprise view, the State did not envision including a cost benefit analysis (CBA); a CBA was a suggested minimum requirement. The Interoperability Grant four-agency partnership included analysis to redesign the Eligibility and Enrollment system; integrate SOA, web services, and an ESB; streamline business practices; standardize on NIEM-based data models; and create an eMPI solution to help resolve client and provider identities across disparate systems. Given this enterprise-wide analysis scope, the Director of Division of State and Tribal Systems, OCSE, ACF, HHS, provided guidance to the team to provide a CBA model using one focus area that could be used as a model for future interoperability focus area CBAs.

In response, the Oklahoma Project Sponsor selected eMPI. This selected focus area (1) is in-progress, and (2) is a core component for implementing interoperability and (3) underwent a CBA recently by a participating agency. As a result, Oklahoma adopted the eMPI CBA created by a Oklahoma State Department of Health (OSDH) vendor Cognosante in support of the Systems Tactical Plan, published in quarter 4 of 2011(see attachment #). By adopting this methodology, the Interoperability team created a Rough Order of Magnitude (ROM) estimate, using the eMPI CBA as the model, tailoring estimates to participating agencies’ needs to implement an eMPI solution.

1.2 eMPI Solution Options Considered

The Interoperability Grant eMPI project team considered four solution options:

1. Purchase a COTS solution such as Initiate, or Oracle FusionSuite
2. Use another state’s system, in-house solution similar to Spider (consolidator of information)
3. ODHS – client numbering system; expand to an enterprise level
4. Purchase a COTS solution and require that each agency participate, but allow each agency to continue to use whatever system works for them internally, and let them maintain it. Under this solution each agency maintains a unique identifier, but is required to conform to the enterprise eMPI standard (Solution #4 was selected)
1.3 Interoperability eMPI Findings and Recommendations

The State’s Interoperability eMPI Team recommended the State purchase a COTS eMPI product, hosted by OMES, for storage of all clients, customers, providers and employee identifying data, as well as creating a unique ID number for that person. Identifying data could include any information that uniquely identifies the person, such as first name, last name, gender, and birth date. In addition, the team recommends OMES maintain the ESB and either maintain the master database for access to data stores or integrate with another statewide system that verifies access to the data stores. The ESB would control and direct requests to and from the eMPI system from the state agencies.

Each state agency would have access to this OMES-based system with appropriate select, create, update and dedupe privileges. Each agency would maintain their own legacy case information and exercise control over which users/agency had access to their data. Access to the enterprise wide eMPI information would be managed by the eMPI APIs. Analysis continues with respect to where the firewall will reside. Options currently being discussed are between OMES and the state agencies, and between trusted domains.

The result of the eMPI Team’s research and analysis of these four options is to select option number 4. The rationale among the grant participating partners on the eMPI team revealed that option 4 was the most feasible because of program ownership, current agency investments, and the State’s need for a unique numbering system as well as a desire to avoid additional costs of migrating legacy data. The team recommended purchasing a best-in-class commercial off-the-shelf (COTS) product, and configuring that product to maximize benefits to the State. This option leverages experienced and highly-skilled staff, institutional and domain knowledge in health and human services in Oklahoma, as well as the use of world class business processes and service management.

1.4 Methodology

In 2011 OSDH retained services from Cognosante, an Interoperability partner, to develop a systems tactical plan, which was published in the fourth quarter of 2011. The plan described how Oklahoma Health Care Authority (OHCA) integration tools and services could be used by OSDH to further agency and system interoperability. The plan serves as the basis for an Advance Planning Document (APD) to request enhanced funding. Refer to Cognosante’s OSDH Systems Tactical Plan, dated October 2011, for additional information (Attachment 1 of Appendix G in the Final Report). The Interoperability team used this recent study as the basis for a ROM estimate because the study includes an in-depth cost assessment, a Federal Funds Participation estimate, and a comprehensive view (project summary) of an eMPI solution, which is closely aligned with Oklahoma’s eMPI solution.
In the report, Cognosante recommended purchasing a COTS product - maintained and controlled by OSDH - to provide a unique identifier that spans across and within agencies and systems, allowing multiple local identifiers to be mapped to a single unique identifier. This approach allows OSDH to maintain control over data within their individual applications, only requiring OSDH to exchange demographic data to the shared eMPI to allow the exchange of data between OSDH and OCHA, see Figure 1 below.

Because the Interoperability grant project recommends an eMPI solution with a COTS product to provide a unique identifier, the Interoperability grant project solution deviates from the Cognosante solution. The Interoperability grant project proposes an eMPI solution managed by OMES with demographic data maintained and shared across the enterprise, and used to ensure that requesting agencies obtain a unique person (as opposed to Cognosante’s OSDH-managed solution. An OMES-managed system would provide a single statewide unique identifier. The OMES-managed system would be the
traffic cop directing requesting agencies to data stores residing outside of the eMPI system. Web services and other mechanisms would direct agencies to requested data stores. Non-eMPI data would be managed and maintained within individual state agencies.

Key benefits of an OMES-managed approach include:

- Ability to leverage a single software license
- Ability to leverage a centralized team of experienced contractors
- Allowing individual agencies to maintain control over their data
- Ability to leverage a standardized, enterprise-wide common repository for statewide access and reports
- Maintain a 'single best record' at the enterprise wide level, easy and fast access to information.

An OMES-managed approach requires each agency to only send demographic data to the shared eMPI, minimizing risks associated with sharing full program data files.

Most importantly, this OMES-managed approach enables: 1) Agencies to maintain control of their data, 2) reduces agency and overall State costs, and 3) provides a good foundation for the statewide interoperability. eMPI is one of the most significant components in an SOA. This approach permits greater accuracy and lower costs by providing a single, multi-agency accessible source for unique identification.

Figure 16: TO-BE Approach of eMPI Data Exchange through OMES
1.5 Cognosante Proposed eMPI Solution (CBA Model)

Using the Cognosante report as the CBA Basis for Estimation (BoE), cost data for the proposed eMPI solution was extrapolated to determine a Rough Order of Magnitude (ROM) estimate. Additional research and identification of additional assumptions contributed significantly to the analysis. Adjustments to baseline findings were based on an assessment of the population (number of clients, patients, and records).

Cognosante created three scenarios that included technologies such as SOA and ESB to acquire and disseminate information using highly secure shared services and role-based security models:

- **Scenario 1:** Fully integrated approach where OSDH would use OHCA HIT tools for processing transactions and shared services
- **Scenario 2:** OSDH systems are independently maintained with their own eMPI, Provider Index, and translation capabilities and use OHCA's OpenHIO for information exchange
- **Scenario 3:** Optimized hybrid approach developed using HIT assets from both organizations.

For each scenario, the Cognosante team, analyzed the pros and cons and developed a logical architecture, analyzed and discussed use of an EMPI, and developed a cost benefit analysis with a focus on identifying the percentage of HITECH funding that could be obtained under each.

The Cognosante team recommended that OSDH adopt the optimized hybrid architecture, cited in Scenario 3, which is an optimized hybrid solution sharing EMPI services between OSDH and OHCA. The eMPI provides a unique identifier that spans across and within agencies and systems allowing multiple local identifiers to be mapped to a single unique identifier. The use of a common identifier and/or the ability to map local identifiers to a common identifier was determined to be an essential component for data exchange. The key benefits in this approach are the ability to leverage existing software licenses, contractors, and expertise while allowing OSDH to maintain control over their data.

1.5.1 How the OSDH CBA Model Applies

The OSDH proposed solution requires a new procurement by OSDH, with the possibility of higher contractor rates over current OHCA vendor rates and the likelihood that a new contractor could require a substantial learning curve in understanding the Oklahoma and OSDH environments to be fully effective. Leveraging the current vendor / Interoperability Team and their knowledge and familiarity with the State's environment, would enable the State to achieve greater cost savings.
This section contains Cognosante assumptions for the recommended eMPI solution in the Systems Tactical plan.

### 1.5.2 Assumptions

1. Allocation of eMPI at the enhanced FFP is currently set at 60% of the total cost applying to 90% FFP based on the Medicaid proportion.
   a) The actual proportion will be adjusted after the creation of the eMPI in order to determine an accurate Medicaid proportion.
2. DDI covers 7 calendar quarters.
3. Use of Cognosante independent analysis is scalable and provides a reasonable and accurate basis for a CBA focused on an integrated eMPI solution. Costs for additional agencies (ODHS and OMES) were added to baseline costs in the 2011 independent analysis.
4. Future cost estimates provide sufficient accuracy in the CBA. Current costs are omitted.

Table 1 contains Cognosante’s eMPI solution component costs.

<table>
<thead>
<tr>
<th>Component Cost Scenario</th>
<th>Optimized Hybrid (Integrated) eMPI Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-project 1: EMPI</td>
<td>$887,075.00</td>
</tr>
<tr>
<td>Sub-project 2: API Development &amp; Test</td>
<td>$81,312.00</td>
</tr>
<tr>
<td>Sub-project 3: ESB DDI &amp; Op Hardware/ Software</td>
<td>$2,729,750.46</td>
</tr>
<tr>
<td>Steering Team</td>
<td>$60,489.50</td>
</tr>
<tr>
<td>State SMEs</td>
<td>$537,345.17</td>
</tr>
<tr>
<td>SMEs Internal/Contractor</td>
<td>$2,839,200.00</td>
</tr>
<tr>
<td>DDI Contractor</td>
<td>$1,978,298.40</td>
</tr>
<tr>
<td><strong>Total Estimated Project Cost</strong></td>
<td><strong>$9,113,470.54</strong></td>
</tr>
</tbody>
</table>


The Interoperability Team applied the following assumptions to create the eMPI estimate.

### 1.5.3 eMPI Estimate Assumptions

1. eMPI software purchased by OSDH is scalable, requiring only a need to increase capacity in terms of hardware and licenses.
2. API would be common across the enterprise.
3. Number of clients (persons) served similar across programs (OSDH and ODHS) just doubling capacity and licensing. Research shows the number of clients served is similar. Another assumption is that in most cases, clients are the same group prompting a proposal to double the hardware and licensing needs.
4. Increase labor due to additional agency (ODHS). Assume an economy of scale with this approach as it doesn’t really make much difference if a database services 1M records or 2M records; thus, the associate cost on the Business Rule Engine, security and coordination remains the same.
Table 12: Interoperability Grant Team’s eMPI Solution Component Cost Estimates

<table>
<thead>
<tr>
<th>Component</th>
<th>Cognosante (OSDH/OHCA)</th>
<th>Factor</th>
<th>OSDH/OHCA + OKDHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>eMPI</td>
<td>$ 887,075.00</td>
<td>100%</td>
<td>$ 887,075.00</td>
</tr>
<tr>
<td>API Development &amp; Test</td>
<td>$ 81,312.00</td>
<td>100%</td>
<td>$ 81,312.00</td>
</tr>
<tr>
<td>*ESB DDI &amp; Oper Hardware/Software Equipment and Supplies</td>
<td>$ 2,713,750.46</td>
<td>200%</td>
<td>$ 5,427,500.92</td>
</tr>
<tr>
<td>Steering Team</td>
<td>$ 60,489.50</td>
<td>150%</td>
<td>$ 90,734.25</td>
</tr>
<tr>
<td>State SMEs</td>
<td>$ 537,345.17</td>
<td>150%</td>
<td>$ 806,017.76</td>
</tr>
<tr>
<td>SME Internal/Contractor</td>
<td>$ 2,839,200.00</td>
<td>150%</td>
<td>$ 4,258,800.00</td>
</tr>
<tr>
<td>DDI Contractor</td>
<td>$ 1,978,298.40</td>
<td>150%</td>
<td>$ 2,967,447.60</td>
</tr>
<tr>
<td></td>
<td><strong>$ 9,113,470.53</strong></td>
<td></td>
<td><strong>$ 14,518,887.53</strong></td>
</tr>
</tbody>
</table>

*This estimate includes funding for configuration of selected COTS product as needed.

1.6 Conclusion

The Interoperability Team provided a ROM cost estimate for an eMPI solution that is closely aligned with the Cognosante recommended solution in their recent publication of the eMPI CBA for OSDH. The Interoperability Team’s ROM includes all known component costs to implement and maintain an eMPI solution for support of interoperability implementation among the participating agencies.

1.7 eMPI Benefits

Table 3 below lists some of the benefits to be realized for establishing an eMPI solution. These benefits also compliment those benefits listed above and identified in the Cognosante CBA recommendation for OSDH.

Table 13: Benefits for Establishing an eMPI Solution

<table>
<thead>
<tr>
<th>Item</th>
<th>Examples of Human Services Benefits to Participating Agencies and Clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improved communications for programs and services</td>
</tr>
<tr>
<td>2</td>
<td>Better assessment, outreach and registration of clients</td>
</tr>
<tr>
<td>3</td>
<td>Access to more complete and accurate data</td>
</tr>
<tr>
<td>4</td>
<td>Simplification of process for mating client information across programs</td>
</tr>
<tr>
<td>5</td>
<td>Improved identification of reimbursable services</td>
</tr>
<tr>
<td>6</td>
<td>More accurate access to data to determine fraud and abuse</td>
</tr>
</tbody>
</table>