Implementing Service Oriented Architecture With NIEM – Our Approach

Corrections Technology Conference
May 2008
Agenda

• What is the National Information Exchange Model (NIEM)?
• What is Service Oriented Architecture (SOA)?
• Our approach to using NIEM in a SOA for the Integrated Justice Portal at New York
• Considerations while building NIEM IEPDs
• Use of NIEM in Corrections Technology
• Q&A
What is NIEM?

- National Information Exchange Model (NIEM) is a Framework for Nationwide Information Exchange
- It is a partnership of the U.S. Department of Justice and the U.S. Department of Homeland Security
- It is designed to develop, disseminate, and support enterprise-wide information exchange standards and processes that can enable jurisdictions to effectively share critical information in emergency situations
- The vision for NIEM is to be the standard of choice for Inter-governmental information exchange, thereby:
  - Enhancing the quality of governmental decision making by enabling accurate, timely, complete, and relevant information to decision makers across the broad spectrum of NIEM Communities Of Interest
  - Achieving greater efficiency, effectiveness, and return on investment (ROI) in operations by accelerating information exchange design and development
  - Reducing risk in development efforts for practitioners and industry by having common exchange standards, tools, processes, and methodologies
  - Improving public safety and homeland security by breaking down stovepipes enabling real-time, secure, enterprise-wide information sharing
NIEM Key Concepts

- Data Components are the basic business data elements that represent real-world objects and concepts—for example, information about people, places, material things, and events.
- NIEM Core is a set of Data components within an information exchange that are universally shared and understood among all (or almost all) domains (e.g., person, address, and organization).
- Domains refer to business enterprises broadly reflecting the agencies, units of government, operational functions, services, and information systems which are organized or affiliated to meet common objectives. NIEM currently has 7 domains.
- Information Exchange Package represents a set of data that is actually transmitted between agencies for a specific business purpose (e.g., initiating a charging document by the local prosecutor).

IEPD is the necessary documentation required to complete the IEP and includes XML Schema that use or extend NIEM, supporting artifacts such as use cases, ERDs, catalog of artifacts, metadata for indexing, search, versioning etc.
What are SOA and Business Services?

**Service-Oriented Architecture**

- Not a technology, but an **architecture** whose goal is to achieve loose coupling and high cohesion
- Concept rather than an actual standard
- Comprises of frameworks, policies, methodologies, and standards to define and maintain enterprise business services
- Encapsulates business functions into a collection of services which are easily aggregated to provide unified views and standard presentation

**Business service**

- A service is the **composition** of software interactions that provide meaningful value to the business
- A service represents business functionality, not user interface functionality
- A service can be utilized across the enterprise and/or among business partners
- A service can be short-lived, long running, synchronous, asynchronous, conversational or batch.

There are two grains of business services: Coarse and Fine

### Coarse Grain Services

- External Partner Integration
- Fewer in Typical SOA implementations
- Perform a business transaction e.g. Stolen Vehicle Entry
- Wrap around and orchestrate fine grain services
- Have Security, Parsing, Validation, Routing, Logging logic etc.

### Fine Grain Services

- Internal Integration
- More in Typical SOA Implementations
- Perform an atomic action e.g. Stolen Vehicle Entry into the State Police Database
- Reused across multiple coarse grain services
- Striking a balance between fine-grained and coarse-grained services helps ensure fit of the service to the business or technical need.
Deloitte – NYSPIN Replacement Project
Integrated Justice Portal (IJP)
NYSPIN is the state switch that is being replaced with the new IJP. NY IJP is envisioned as a ‘one stop shopping’ platform for all Law Enforcement related information required. Listed below are some of the key metrics and requirements from the current system, that will be met with the new IJP.

- 351 NYPSIN supported business transactions to be replaced with 117 business services, 8 hot file validation services, 2 training certification services, 15 admin and common services, 46 user interfaces
- 7 criminal justice/public safety related information sources
- Support 20,000 internal and 30,000 external users
- 250 forms to support
- 12 database domains to convert
- 423M message annually/1.16 M messages per day.
- Peak hours are 1100 to 1900
- On average 13 messages per second
- 52 messages per second during peak time
- Seamless integration of information from multiple in-state and out-of-state agencies
IJP – SOA Roadmap

Step 1: Communicate Business Benefits

Step 2: Construct Roadmap

Step 3: Build SOA Supporting Infrastructure

Step 4: Expose Business Functions as Services

Step 5: Create Portal Views and Automate Processes

Step 6: Manage & Monitor Portal and Web Services
1. Select SOA Standards & Tools
   - Enterprise Architecture
   - Resource planning
   - Define Principles

2. Establish SOA Infrastructure
   - Focus on scalability
   - Define and build environments
   - Establish processes
   - Validate architecture
   - Start small
   - Proceed by domain
   - Focus on data model
   - Abstract integration points

3. Pilot SOA
   - Focus on user needs
   - Business process focus

4. Develop Services and Connectors
   - Repeatable processes
   - Define areas of responsibility

5. Develop Channel Applications

6. Deploy SOA and Monitor
IJP – Choosing the right orchestration

- Coarse grain services support a business transaction e.g. Stolen Vehicle Entry
- Coarse grain services orchestrate fine grain services
- Fine grain services perform one agency specific CRUD action e.g. Stolen Vehicle Entry to NCIC
In the new SOA enabled system, troopers will only operate through one standardized user interface. The business service serving the user interface will perform all related tasks and communications via ESB.

**IJP – a service orchestration example**

1. Trooper enters all required information including Vehicle Plate Number.
2. The system looks up VIN from Vehicle Plate Number from the Department of Motor Vehicle.
3. The system fills in automatically the retrieved VIN and all other information which are intelligently retrieved from available sources.
4. Trooper receives a confirmation that a stolen vehicle entry is created.
A systems processing oriented approach utilizing object oriented design concepts (as opposed to a payload centric approach) was used. NIEM was extended to introduce data components and properties that facilitate systems processing.
IJP – NIEM-SOA architecture key features

• A business process implemented through a series of XML transformations
• All services accept NIEM 1.0 XML as request and return the same as response
• Each service has a request and response IEPD
• NIEM parsing XML libraries accelerate development
• Schema validations are not performed for better performance
• Validations are performed programmatically by validation services
• Larger NIEM code lists are extracted into a code table database for easier maintenance
• Constraints involving enumerations are applied in the NIEM Schema and also checked programmatically
• NIEM XML is accepted by a service as an XML Object. Hence, WSDLs don’t show schema constraints e.g. mandatory or optional elements

A coarse grain service accepts a NIEM XML request, transforms it into a NIEM XML fine grain request through XSL and, in a few cases, programmatically.

This minimizes code changes if an agency adds or removes elements to either a request or a response.

This also allows for ability to expose fine grain services as coarse services due to business needs and new partnerships.

Object based fine grain services were considered and this approach was found more flexible.

This reduces errors when the user of the services independently validates their instance against a request schema.

This is mitigated using user friendly documentation and sample XML instances.
Things to consider when implementing NIEM

- Achieve consistency in object definition across multiple IEPDs serving multiple services in a System
- Consistency also means changes to an object in one IEPD should be propagated to all IEPDs that use that object
- Caution in applying constraints – if a constraint is applied to a child element than all parent elements need to be extended
- Add elements to indicate to the service what action to perform
- Standardize definition of Routing, Exception Handling wrappers, No Record Found indicator objects
- Be aware of high cost associated with changing versions of NIEM

NIEM can’t enforce single definition of an object across multiple services. A person entity may have different properties in different IEPDS.

For example a Parole inquiry request may need person first name, last name and DOB, whereas the response may return many more elements such as height, sex code, weight, statute, supervising official etc.

When inconsistent objects are converted to java beans using tools such as XML beans, conflicts occur. It is the Architect’s responsibility to achieve consistency across IEPDs.

We added an object called “BusinessOptions” to all our request schemas. Our services read this object and decide what action to perform on the request e.g. “inquire on vehicle using VIN only”.

NIEM focuses on what the information exchange payload should contain and not on what should a system do with the payload. For example, NIEM can’t enforce how exceptions are handled. The Architect needs to standardize the “wrapper” schemas.

The driver for change should be business needs and not newer versions. The Architect should define a standard canonical across the agency.
Our approach to standardizing IEPDs

Approach is compliant with and supplementary to the NIEM IEPD process:

• Define common business objects like person or vehicle
• Apply Lowest common denominator of constraints
• Extract code lists into a database
• If possible, retain enumerations in the schema itself
• Each service has a request and response IEPD. Reuse IEPDs for similar requests or responses
• Introduce extended elements for systems processing e.g. BusinessOptions, NoRecordIndicator, LegacyText
• Standardize wrapper schemas. This is key for proper service interaction.

NIEM prescribed IEPD

IEPD with standard definition of wrapper schemas:
• Message.xsd
• Header.xsd
• Payload.xsd
• Exception.xsd
• Notification.xsd

Relating IEPDs to IEP
NIEM Exchanges in Corrections Technology

• MA DOC Release Exchange
  – Exchange to send inmate release information from MA DOC to CHSB utilizing GJXDM standards
  – Agencies Involved: Massachusetts Department of Correction and Massachusetts Criminal History Systems Board

• MA DOC – MA Parole Exchanges
  – Completed the specifications and domain modeling for several exchanges including Parole Eligibility Hearing, Hearing Disposition, Home and Work Plan, Warrant Information, and Inmate Admission Information
  – Agencies Involved: Massachusetts Department of Correction and Massachusetts Parole Board

• NYC DOC Inmate Status Notification
  – Inmate status notification pushes the information to a web service which utilizes NIEM exchange standards
  – New York City Department of Correction with New York City Data-share and intended for consumption by multiple users

• NYC DOC Inmate Information Exchange
  – Inmate information can be fetched by multiple users from a Web Service. The exchange utilizes NIEM standards
  – Agencies Involved: New York City Department of Correction with New York City Data-share and intended for consumption by multiple users
Discussion: use of NIEM in Corrections Technology

- Example: Corrections Transfer Document
- Used when subject is transferred from jurisdiction of one state correctional facility to another
- Here are the exchanges involving this document from the Justice Information Exchange Model (JIEM):
  - 8.88.01, Corrections informs state probation and parole that subject is being transferred from out-of-state
  - 8.88.03, Corrections informs state repository that subject is being transferred from out-of-state
  - 8.88.05, Corrections informs victim services that subject is being transferred from out-of-state
- What information will this document contain?
  - Person Information, Court Information, Justice Information, Parole Information
- What is the value of standardizing this document using NIEM?
  - Seamless information exchange between Corrections and Other Agencies using NIEM
  - Easier processing within a Corrections System – document can be assembled from standard data provided from other services such us Person information, Case information from Courts, Charge Code from DCJS
- Which NIEM domains can be used?
  - Common for Person Information, Justice for Charge Codes, Applicable Laws etc.
Questions