NIEM and Rules

David Webber – Public Sector NIEM Team, November 2011
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Topic Areas

• NIEM – Introduction

• Dictionaries and Exchange development
  • Simplifying and accelerating effective exchanges
  • Alignment of vocabularies and information components
  • Toward a better NIEM – canonical component management

• NIEM and Rules
  • Short term
  • Medium term
  • Long term
Officially - What is NIEM?

- Joint DOJ / DHS / HHS program created to promote standardization of information exchange for cross jurisdictional information sharing.
- Provides the tools for enabling interoperability at the data layer within and across systems supporting information sharing, while preserving investments in current technology and optimizing new technology development.
- Going International – Canada, Mexico, EU

Components of NIEM

Built and governed by the business users at Federal, State, Local, Tribal and Private Sectors

Repeateable, Reusable Process
(Exchange Specification Lifecycle)
NIEM Governing Structure

- NIEM’s governing structure is comprised of Federal, State, Local, Tribal and private organizations.
- NIEM is managed at an executive level by the Department of Homeland Security (DHS), Department of Justice (DOJ), and Department of Health and Human Services (HHS).
Who steers NIEM currently?

Founders and Voting Members
- Dept of Justice
- Dept of Homeland Security
- Dept of Health and Human Services

Ex-Officio Members
- Global Justice Information Sharing Initiative
- Office of Management and Budget
- Program Manager, Information Sharing Environment (ISE)
- NASCIO

Partners
- Terrorist Screening Center
- Dept of Defense / Dept of Navy
- Dept of State, Consular Affairs (invited)
NIEM Strategic Next Steps

- Increasing NIEM international adoption (Canadian and Mexican cross-border initiatives)
- Broadening NIEM state & local implementations (including support through new Homeland Security grants specifications)
- Developing enabling standards for NIEM and the Information Sharing Environment (Object Management Group and OASIS engagement)
- Institutionalizing a common privacy & security framework
- On-boarding new and strengthening existing NIEM Domains
- Expanding governance to support other Federal, State, Local and International agencies
The Information Sharing Environment

Maximum value of information sharing occurs when:

- Right workers share
- Right information with
- Right recipients to use at
- Right time
The NIEM Framework

NIEM connects communities of people who share a common need to exchange information in order to advance their missions, and provides a foundation for seamless information exchange between federal, state, local, and tribal agencies. Much more than a data model, NIEM offers an active user community as well as a technical and support framework.

Community
- Formal Governance Processes
- Online Repositories
- Mission-Oriented Domains
- Self-Managing Domain Stewards

Technical Framework
- Data Model
- XML Design Rules
- Development Methodology
- Predefined Deliverables (IEPD)

Support Framework
- Tools for Development and Discovery
- Established Training Program
- Implementation Support
- Help Desk & Knowledge Center
The NIEM Data Model

NIEM’s data model is a set of common, controlled, and approved XML data structures and definitions vetted through the Federal, State, Local, Tribal and Private Sectors.

Data elements are organized into core and domain-specific components

- **Core components** are used by multiple domains and can be described by structure, semantics, and definition universally.
- **Domain-specific components** are continually updated by subject matter experts that are actual NIEM participants and industry experts for their particular domain.
- **NIEM Naming and Design Rules (NDR)** specify how each of these components are defined and utilized.
Available XML Dictionaries

- NIEM 2.1 dictionaries
  - CBRN dictionary
  - Emergency dictionary
  - Family dictionary
  - Immigration dictionary
  - Infrastructure dictionary
  - Intelligence dictionary
  - Justice dictionary
  - Maritime dictionary
  - Screening dictionary
  - Trade dictionary
  - Immigration blueprint
  - NIEM core dictionary

Note: Those marked in bold are model style dictionaries with recursive components.

Available from download site

direct link:
http://sourceforge.net/projects/camprocessor/files
+ includes spreadsheets and sample models
Understanding the moving parts

• NIEM
  • Information exchanges – transactional
  • Business process orientated
  • Common schema / dictionary definitions

• LEXS / GRA
  • Open communications infrastructure
  • Patterns for message exchanges

• IEPDs / SDLC
  • IEPD – Information Exchange Package Documentation
  • Formal deliverables and documentation needed in support of SDLC (Software Development Life Cycle) processes

Oracle NIEM resources site:
http://www.oracle.com/goto/niem

LEXS community site:
http://www.LEXSdev.org

NIEM community site:
http://www.NIEM.gov
Reality – NIEM is still improving…

- Collections of complex XML Schema
- Attempt to marry modelling techniques and XSD Schema syntax
- Verbose components
- Embedded context in names
- Currently facing significant scaling challenges
  - Inconsistencies
  - Too much manual management
  - Slow lifecycles
- Dictionary technology incubating
- Enhanced code lists mechanism incubating
- UML profile is evolving initiative with OMG
Development Lifecycle

- **Scenario Planning**: Plan the project, establish the process, and identify information exchange business requirements.
- **Analyze Requirements**: Selected information exchange is further elaborated to understand and document the business context and data requirements.
- **Map & Model**: Associate local objects with types and elements in NIEM. This process is called mapping an exchange content model to NIEM.
- **Build & Validate**: Create a set of exchange-specific NIEM conformant XML schemas that implement the data model created for the exchange.
- **Assemble & Document**: Prepare and package all related files for this IEPD into a single self-contained, self-documented, portable archive file.
- **Publish & Implement**: Publish IEPD for search, discovery, and reuse.

*IEPD – Information Exchange Package Documentation*
Exchange Delivery Lifecycle

- Design
- Monitor
- Deploy
- Test

- Component Dictionary
- Drag and Drop Designer
- Template Updates
- Production Log Results
- Validated Templates
- Exchange Templates
- XML Samples
- XSD Schema
- XMI/UML Models
- Documentation
In order to be NIEM-conformant, the IEPD must adhere to:

1. NIEM Conformance Document
2. NIEM Naming and Design Rules (NDR) v1.3
3. NIEM Model Package Description (MPD) Specification v1.0
Toward Top Down Exchange Assembly

1. Canonical XML Components Dictionary
2. Component Associations and Couplings
3. Exchange Templates and Rules
4. W3C Schema and Model Representations
5. Delivery Control, Messaging, Security
6. Implementation Artifacts and Examples

Components

Dictionary Collections
- Emergency Management Collection
- Emergency v2.0 components
- SAR 1.5 components
- NIEM core v2.1

Navigation and Query Tools

Domains Reuse Library

Automatic Rendering Tools

Deployment Environments and Middleware

Testing Workbench, Rules Engine, Data Samples, Integration ETL
Developing domain dictionaries (EIEM)

- Allows domains to manage their components libraries
- Provides consistency for project development teams
  - Sets of NIEM consistent XML exchange components
  - Aligned to enterprise data stores
  - Optimized for reuse and interoperability
- Save time and effort across the enterprise
  - Perennial question for developers – when should I use NIEM components, and when our own local ones?
  - Are there components already available for that purpose?
- Provide formal mechanisms and procedures to share components and collaborate across SDLC process
- Provide external parties consistent data views

Opportunities for rules/agents

*EIEM – Enterprise Information Exchange Model*
**EIEM/BIEC**

- **Business Information Exchange Components (BIEC)**
  - NIEM-conforming XML schema data component definition that meets a particular *recurring* business requirement for an enterprise

- **Enterprise Information Exchange Model (EIEM)**
  - NIEM-conforming schemas that define data components to be *reused in IEPDs* developed by an enterprise; *collection of enterprise BIECs* organized into a subset and one or more extension schemas
Vendor Enabled Innovation

NIEM Tools Strategy Vision
Community practitioners have relevant, adoptable, and adaptable tools that will improve the efficiency and effectiveness of NIEM lifecycle processes
CAM toolkit and CAMV validation engine

- Open source solutions – designed to support XML and industry vocabularies and components for information exchanges
- Implementing the OASIS Content Assembly Mechanism (CAM) public standard
- CAMV validation framework and test suite tools
- Development sponsored by Oracle

CAM Editor resources site: http://www.cameditor.org
NIEM and Rules

- NIEM and Rules

- Short term
  - Immediate short term needs revolve around specific application areas and provide the potential for quick wins where rule and agent technology can be applied directly to information exchange data points and uses

- Medium term

- Long term
Rule and Context Metadata

- Properties of the access rules and environment.

- Actions.

- Conditions.
  - Subject.
  - Resource.
  - Policy.

- Obligations.
Content Metadata in NIEM

NIEM

- Association
- Data Quality
- Source

NIEM Extensions

- Business Purpose
- Data Type Category
- Data Classification
Policy Authoring Language

- A mechanism to specify policy rules in unambiguous terms.
- XML Access Control Markup Language (XACML).
  - Machine-readable.
  - Supports federated and dynamic policies.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<Policy
 xmlns="urn:oasis:names:tc:xacml:2.0:policy:schema:os"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 PolicyId="gfpm:xacml:2.0:gb:rule:CriminalIntel:policy"
 RuleCombiningAlgId="urn:oasis:names:tc:xacml:1.0:rule-combining-algorithm:deny-overrides">
  <Rule>
    <Description/>
    <Target/>
    <Rule>
      <RuleId="gfpm:xacml:2.0:gb:rule:CriminalIntel:rule"
        Effect="Permit">
        <Description/>
        <Target>
          <Subject>
            <SubjectMatch>
              <MatchId="urn:oasis:names:tc:xacml:1.0:function:string-equal">
                <AttributeValue
                  DataValue="http://www.w3.org/2001/XMLSchema#string"">true</AttributeValue>
                <SubjectAttributeDescriptor
                  AttributeId="gfpm:2.0:user:SwornLawEnforcementOfficerIndicator"
                  DataValue="http://www.w3.org/2001/XMLSchema#string"/>
              </SubjectMatch>
            </Subject>
          </Subject>
        </Target>
      </Rule>
    </Rule>
  </Rule>
</Policy>
```
Florida Sunshine Law 119.07

Policy Statement

“Inspection and copying of records; photographing public records; fees; exemptions.—

(1)(a) Every person who has custody of a public record shall permit the record to be inspected and copied by any person desiring to do so, at any reasonable time, under reasonable conditions, and under supervision by the custodian of the public records.”

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Policy Matrix Analysis</th>
</tr>
</thead>
</table>
| **Subject Attributes** | Organization: [Government: State, Local, Executive]  
Authorization: [Custodian]  
Role: [Public Record Custodian] |
| **Resource Attributes** | Record Type: [Public Record],  
Record Use: [Official Business],  
Record Role: [Non Exempted]  
Approved/Reviewed by Custodian: Request can be Fulfilled  
Request falls within Allotted “Reasonably” policy. |
| **Actions** | Transmit, Access, Share |
| **Conditions** | Resource Conditions Assertions:  
Reasonable time frame (True)  
Reasonable Conditions (True),  
Under supervision by custodian of public records (true) |
<p>| <strong>Rule</strong> | Rule Target = Resource: Public Record |</p>
<table>
<thead>
<tr>
<th>Policy</th>
<th>XACML Policy Rule Statement</th>
</tr>
</thead>
</table>
NIEM and Rules

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  - Short term
  - Medium term
    - In the medium term we can envision adoption of specific rule and semantic capabilities that address more complex challenges and information analysis. This may involve extensions to the existing NIEM information model to enable new capabilities
  - Long term
NIEM and Rules

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  - Short term
  - Medium term
  - Long term
    - Rule technologies can offer advantages for NIEM with regard to business accuracy, costs and timeliness of analysis and consistency of application of functional processes
    - Fundamental challenges in information processing and reasoning and interpretation
    - Healthcare diagnosis, citizen services
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