U.S. Department of Justice (DOJ)
Implementation Guidance for NIEM-Conformant Exchanges

January 2008

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1. Objective

The objective of this communication is to provide high level guidance to program managers and architects within the U.S. Department of Justice (DOJ) and its Component agencies on implementing NIEM-conformant information exchanges; and to further the Department's information sharing strategy.

1.1 Background and Definitions

The **National Information Exchange Model (NIEM)** is the result of a collaborative effort by the justice and homeland security communities to produce a set of common, well-defined data elements to be used as the basis for data exchange development and harmonization. NIEM defines a set of building blocks that are used as a consistent baseline for creating exchange documents and transactions within the Department, the federal government and between the federal government and state, local and tribal organizations.

An **Information Exchange Package** (IEP) is an XML representation of the information shared for a specific business purpose. An **Information Exchange Package Documentation** (IEPD) is a collection of artifacts (describing the purpose, structure and content of IEPs) that governs an information exchange. A NIEM-conformant information exchange is one that is based on an IEPD that follows the rules for NIEM conformance and is registered in one of the established NIEM IEPD repositories. The rules for NIEM conformance are described in the *NIEM Implementation Guidelines* document found at http://www.niem.gov/implementationguide.php.

The goal of NIEM conformance is for the sender and receiver of information to share a common, unambiguous understanding of the meaning of the information being exchanged. Conformance to NIEM ensures that the data being shared (conveyed in common NIEM components) is well understood and has consistent meaning across various communities. The result enables a level of interoperability to occur that would be unachievable with a proliferation of custom or program-specific schemas and dictionaries.

Today, the most widely used NIEM-conformant exchanges include several based on the Law Enforcement Information Sharing Program (LEISP) Exchange Specifications (LEXS). **LEXS**, a family of IEPDs, aligns to NIEM and is used by DOJ for many common types of law enforcement information exchanges. In particular, it specifies how law enforcement information should be packaged and delivered to information sharing applications (**LEXS-PD**). Additionally, LEXS includes specifications that define how partnering applications can implement federated search capabilities to access distributed information for their users (**LEXS-SR**). LEXS IEPDs are available for NIEM versions 1.0 and 2.0 and can be found on the IEPD Clearinghouse at http://www.it.ojp.gov/jsr/common/list1.jsp?keyword=1&forlist=1&community=yes.

## 2. Guidance on Implementation of NIEM-conformant Exchanges in DOJ

The specific business context for an exchange is essential for determining whether and how to implement a NIEM-conformant exchange. To aid decision makers, DOJ has developed the following high level guidelines in the form of a decision flow process and implementation options.

This document identifies five distinct options for implementing information exchanges between systems when new systems are developed or existing systems are enhanced. Figure 1, provides a high-level decision flow for determining the most appropriate option for implementing NIEM-conformant exchanges. A system may require several IEPDs to meet its business requirements, and thus may need to leverage more then one option described in the decision flow.

The decision flow initiates with the validation that a NIEM-conformant exchange is required. Unless there is a compelling business reason not to use NIEM, all Components of the DOJ should implement NIEM-conformant information exchanges between systems when new systems are being developed or existing systems are enhanced. Use of NIEM is especially relevant for information exchanges between DOJ Components and between DOJ and external partners. If another widely supported standard exists, a business case can be made not to use NIEM.

The decision flow then continues to help decision makers target the most suitable option to enable DOJ to achieve a high level of interoperability in the implementation of NIEM-conformant information exchanges. More detailed descriptions of the five options are provided in the sections following *Figure 1*. In addition, decision makers can consult with the Enterprise Architecture Program Management Office (EAPMO) for further clarification and to assist in yes/no determinations at each decision point in *Figure 1*.

Figure 1 - Decision Flow
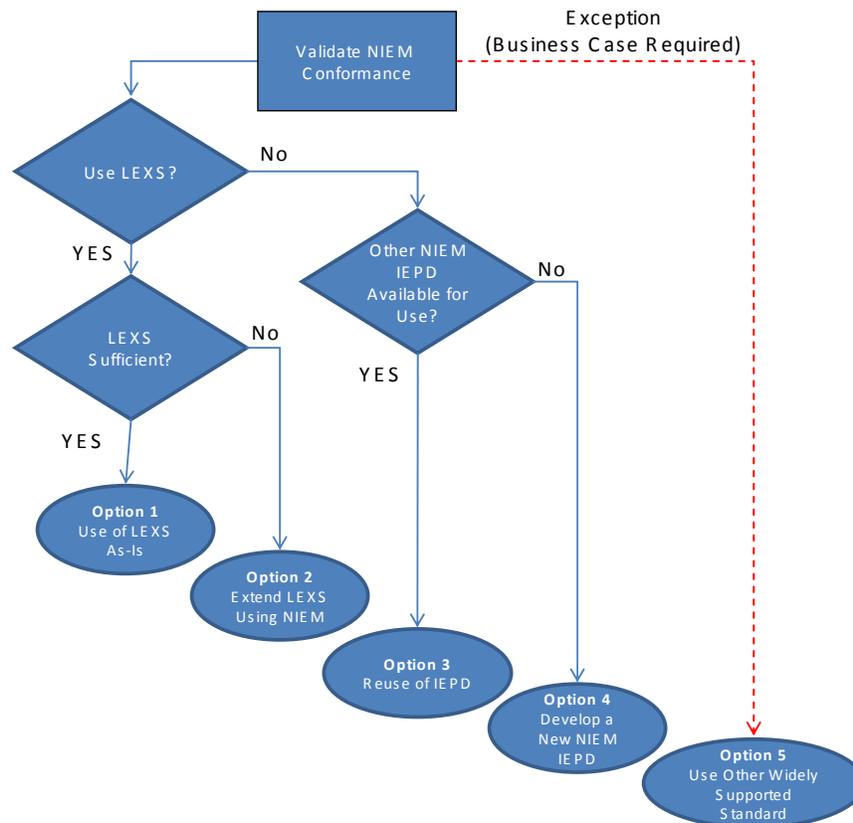
2.1 Option 1: Use of LEXS As-Is

LEXS is a family of IEPDs that defines flexible structures developed to support a wide variety of applications. LEXS defines a standard set of high level entities, roles, associations, and other capabilities which are NIEM-conformant. An exchange implementing LEXS is NIEM-conformant. Any application that participates in OneDOJ, is a part of LEISP, or supports law enforcement information sharing must participate in LEXS exchanges. If additional structures beyond those supported through the base LEXS are required for an exchange, the base LEXS should be extended by using NIEM (Option 2).

> *Examples:*
> - **LEXS Publish and Discover (PD)** is used by DOJ data sources publishing data to the DOJ's information sharing applications. Participants include all OneDOJ data sources (key operational systems of the Bureau of Alcohol, Tobacco and Firearms (ATF), Bureau of Prisons (BOP), Drug Enforcement Agency (DEA), Federal Bureau of Investigation (FBI), and the U.S. Marshall Service (USMS)). The information sharing applications include the OneDOJ System (formerly known as R-DEx), National Data Exchange System (N-DEx), Organized Crime and Drug Enforcement Task Force (OCDETF) Fusion Center (OFC) System, and Foreign Terrorist Tracking Task Force (FTTTF) System.
> - **LEXS Search and Retrieval (SR)** is used to connect the OneDOJ System with regional and federal information sharing systems in a federated search model.

2.2 Option 2: Extend LEXS Using NIEM

LEXS provides an extension mechanism to easily include additional structures within base LEXS. This is accomplished by specifying one or more Structured Payloads that carry additional information beyond that provided through LEXS. These structured payloads are, for all intents and purposes, a separate IEPD that has hooks into the LEXS IEPD. This feature allows LEXS to support very specific exchange requirements while maintaining a level of compatibility across all applications that understand the base LEXS.

These schema extensions should be built using NIEM to ensure NIEM conformance. The NIEM ConOps (http://www.NIEM.gov) describes the process to build schemas using the NIEM model and tools such as the NIEM Schema Subset Generation Tool (SSGT).

> *Examples:*
> - LEXS-PD with N-DEx Incident Report extension is used by state, local and federal organizations publishing data to N-DEx.
> - LEXS-PD with Suspicious Activity Report (SAR) extension is planned to be widely used by state fusion centers collecting data from local agencies and sharing with federal partners.

2.3 Option 3: Reuse of Other IEPDs

The Information Exchange Clearinghouse, at http://it.ojp.gov/iepd, describes a number of IEPDs that have been built by federal, state, local and tribal agencies and are available for re-use. The EAPMO is available to assist in identifying if there are suitable IEPDs for reuse. The EAPMO works closely with different governance groups such as the CJIS Advisory Policy Board (APB), the LEISP Coordinating Committee (LCC), the NIEM Business Architecture Committee (NBAC), the FBI Information Sharing Policy Board (ISPB) and the Program Manager of the Information Sharing Environment (PM-ISE) to track IEPD development activities throughout their lifecycle.

This option should be considered if the previous options are not sufficient, based on business requirements of the exchange. This option saves development time and cost, but some customization of the schemas may be necessary to meet all business requirements; however, an exchange will not need to be developed completely from scratch.

> *Examples:*
> - eGuardian and state/local fusion centers are reusing the SAR IEPD. SAR is also an example of Option 2 because it leverages LEXS-PD with NIEM extensions.

2.4 Option 4: Develop a New NIEM IEPD

If an existing IEPD is not available for use, then a new IEPD should be developed following the NIEM IEPD development process and using the NIEM model and tools. This option should be selected only after a thorough evaluation of the previous options has been completed. The Clearinghouse can also be used as a tool to publish IEPDs and associated artifacts as they are being developed.

The NIEM ConOps (http://www.NIEM.gov) describes the process to develop IEPDs using the NIEM model and tools.

Examples:
- The Litigation Case Management System (LCMS) is developing a new NIEM-conformant exchange with the Consolidated Debt Collection System (CDCS).
- SENTINEL will develop new exchanges with partners such as LCMS.

2.5 Option 5: Use of Other Widely Supported Standard

A NIEM-based exchange should not be implemented if another widely supported standard already exists that is better suited for a specific exchange type.

Example:
- The OASIS Directory Services Markup Language (DSML) or LDAP Data Interchange Format (LDIF) are more appropriate specifications for exchanges with directory servers, versus NIEM and LEXS.

3. How to Get Started

This section provides some useful links for technical assistance, available training, specifications and exchange development tools.

Points of Contact:

- Email DOJ Enterprise Architecture Program Management Office (EAPMO) at: dojea@usdoj.gov
- Email DOJ LEISP Program Management Office at: leisp-pmo@usdoj.gov

NIEM Training:

- NIEM Executive Webinar (http://niem.gov/library.php#webinar)
- NIEM XML Refresher and Practical Implementer's Course (http://www.niem.gov/calendar/month.php)

LEXS Specifications:

- LEXS 2.0 (http://it.ojp.gov/jsr/common/viewDetail.jsp?sub_id=245&view=yes&keyword=1)

    o LEXS 1.0, established in April 2005, supported the sharing of unstructured data (e.g., text, narratives). LEXS 2.0, established in February 2006, introduced a structured data model to describe real world objects (e.g., persons, places, locations) and associations between these objects. Since LEXS 2.0 supports the representation of structured data, LEXS 2.0-based systems can support functionality such as link charting / analysis and geospatial mapping. LEXS 1.0 is no longer recommended for use because it does not offer support for structured data.

- LEXS 3.0.4 (http://it.ojp.gov/jsr/common/viewDetail.jsp?sub_id=246&view=yes&keyword=1)
    o LEXS 3.0.4, established in January 2007, further enhances LEXS 2.0 and introduces:
        - Additional details for representing some structured elements (e.g., illegal drugs);
        - Representations for activities (e.g., incidents)
        - Additional metadata identifying personal contact information relevant to law enforcement personnel associated with the information being shared;
        - Support for riche media attachments (e.g., photos, audio recording, video footage, PDF files);
        - Concept of "roles" ;
        - Rendering instructions; and,
        - A mechanism that allows implementers to define customized (e.g., regional, community, domain, agency specific) structured content that can be carried as payload within a LEXS 3.0 envelope.

- LEXS 3.1 (http://it.ojp.gov/jsr/common/viewDetail.jsp?sub_id=256&view=yes&keyword=1http://it.ojp.gov/jsr/common/viewDetail.jsp?sub_id=245&view=yes&keyword=1)

- o LEXS 3.1 is based on NIEM 2.0. It adds a new Substance entity, additional roles and associations. LEXS 3.1 also explicitly defines roles for systems and organizations that share information (data origin, data destination, data submitter, and data owner). This enables more effective tracing of shared information. LEXS 3.1 adds support for search and retrieval (LEXS SR 3.1) in addition to the publication capabilities inherent in LEXS 3.0. LEXS SR 3.1 defines a query language for use between cooperating service providers to support information sharing in a federated model and specifies:
    - How to convey search parameters to a remote system
    - How the remote system will respond with results
    - Choreography of exchanges between systems and sequence of valid interactions between service providers (e.g. search first, user review of snippets, followed by retrieval)
    - Queries to understand the capabilities of a remote system (e.g. What are your data sources? Are wildcards supported in search? Are date / numeric range searches supported?)

Development Tools:

- Navigate, browse, and search the NIEM dictionary using the NIEM Schema Subset Generation Tool (http://niem.gtri.gatech.edu/niemtools/ssgt/index.iepd)
- Map local data requirements to NIEM using the NIEM Component Mapping (http://niem.gtri.gatech.edu/niemtools/mapping/index.iepd)
- Build and validate IEPDs using the NIEM IEPD Development Tool (http://niem.gtri.gatech.edu/niemtools/user/login.iepd)
- Migrate between NIEM 1.0 to NIEM 2.0 or GJXDM 3.0.3 and NIEM 2.0 using the NIEM Migration Tool (http://niem.gtri.gatech.edu/niemtools/migration/index.iepd)
- Save, share and register IEPDs using the Information Exchange Clearinghouse (http://it.ojp.gov/iepd/)

Technical Assistance:

- NIEM Helpdesk (http://it.ojp.gov/NISS/helpdesk/)