# Standardized Interfaces and Exchanges for Justice and Public Safety

**IJIS Institute Public Safety Technical Standards Committee (IPSTSC) White Paper**

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## Introduction

This paper is intended to create awareness and educate justice and public safety personnel on the benefits of employing standardized information sharing. The rapid growth and acceptance of the National Information Exchange Model (NIEM), the use of Information Exchange Package Documentation (IEPD), and the development of the Justice Reference Architecture (JRA), have demonstrated how custom proprietary interfaces can be replaced with cost-effective solutions for interfacing disparate systems.

## The Issues of Data Exchange without Standards

Justice and public safety applications were not originally designed to interoperate and interfaces have been custom and proprietary based on application-specific solutions. In order to implement information sharing, agencies have historically developed unique, point-to-point data exchanges as shown in Figure 1(a). Point-to-point implementation results in large development efforts and costs for each data exchange with no reuse from one data exchange to the next. Without standards, each interface is unique, costs to implement and maintain remain high, and the ability to exchange information is limited.



| Point-to-Point Mapping | Multi-variable Mapping |
|---|---|
| Figure 1 (a) | Figure 1 (b) |
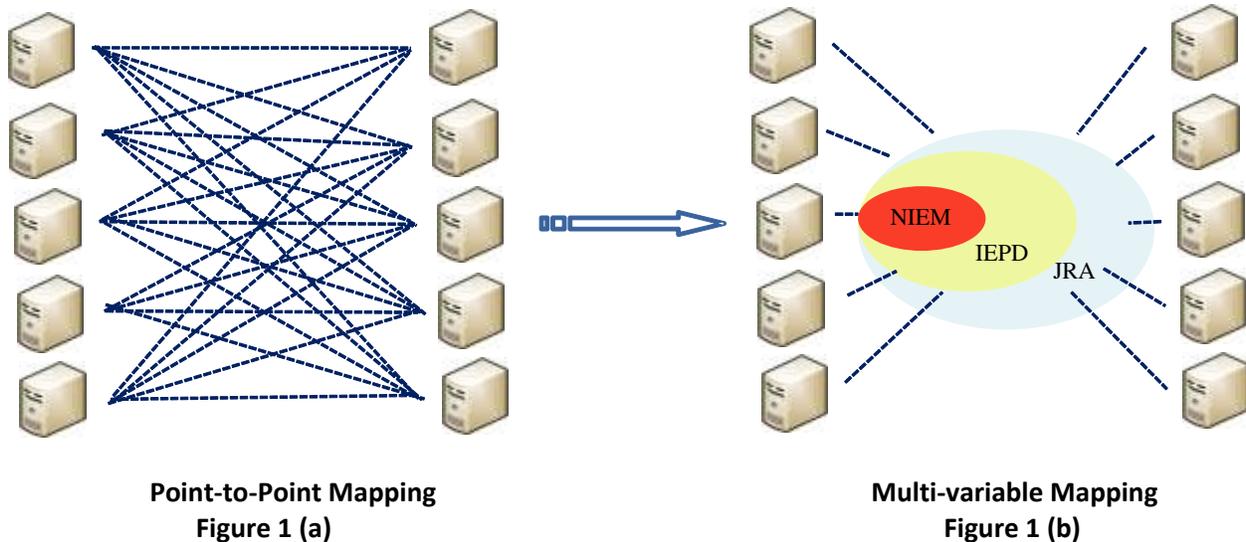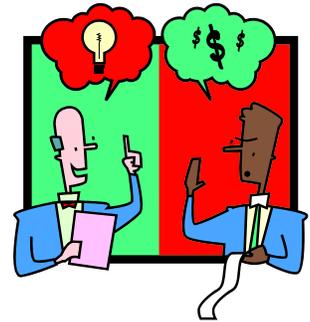
## Solving the Problem

In order to solve these issues, several key initiatives have taken place within the justice and public safety communities. Among these are the National Information Exchange Model (NIEM), Information Exchange Package Documentation (IEPD), and Justice Reference Architecture (JRA) Service Specifications.

> ***What is needed to solve the problem?*** *A common format for defining and exchanging information allows for improved interoperability and for cost effective interfaces that lead to increased information sharing.*

<u>NIEM</u>

In 2002, the Department of Justice launched a program that would create the [Global Justice XML Data Model (GJXDM)](#). The purpose of the program was to provide a common language for criminal justice agencies to share information via a single data model. The benefits of GJXDM/common data model included:

- A common understanding of the domain saves time during design
- Reusability of existing components saves both time and money

In February 2005, the Global Justice model was incorporated into the NIEM. The NIEM model incorporated not only the elements from the GJXDM justice domain, but included designs to plug-in future functional domains such as intelligence, emergency management, transportation, immigration, family services, and others. The core set of elements within NIEM supports all of these domains and provides a common vocabulary for many government agencies. Using this model, participants in data exchanges that use NIEM all have a common understanding of the data being exchanged and the data is formatted and structured in a consistent manner. As shown in Figure 1(b), NIEM provides a common vocabulary for exchanging data resulting in more effective information sharing, program instruction code reuse, and reduced cost for public safety organizations.

<u>Information Exchange Package Documentation (IEPD)</u>

Reusable components to exchange information are constructed as an Information Exchange Package (IEP). These packages are built upon the NIEM data model for a specific business purpose. An IEP may be sent from one agency to other agencies, between systems within an agency, or between a user client and a server. An IEP uses XML, which is a machine readable format for exchanging information.

An IEPD, or Information Exchange Package Documentation, is a set of artifacts that define the content and structure of an IEP. The IEPD Clearinghouse ([http://it.ojp.gov/framesets/iepd-clearinghouse-noClose.htm](http://it.ojp.gov/framesets/iepd-clearinghouse-noClose.htm)) provides information on a variety of IEPDs that have been submitted by individuals and organizations who have implemented GJXDM and NIEM.

<u>JRA Service Specifications</u>

The Justice Reference Architecture (JRA) is a service-oriented reference architecture for justice and public safety information sharing. The mission of the JRA is to enhance justice and public safety through a service-oriented approach to information sharing, but it applies to domains beyond justice and public safety. In order to achieve this goal, there is a need to define a consistent approach to identifying and describing services and their interactions that can be implemented in many different technical environments, across multiple government lines of business, at all levels of government and with other partner organizations[1]. JRA was originally developed to address a domain-specific problem in the public safety environment, but the architecture is applicable to any environment, and uses common tools and methodologies that are widely available.

There are approximately 100,000 justice agencies that have the critical need to share information across their various information systems, and this variety creates multiple layers of interoperability problems because hardware, software, networks and business rules for data exchange are different. The need for information sharing has lead to this interoperability strategy and the [Global Justice Information Sharing Initiative](#) (Global) JRA. A reference architecture is a tool information sharing implementers can use to make it easier to develop a well-conceived, formal approach to designing information sharing solutions/systems. A key benefit of reference architecture is that it helps promote consistent thinking and approaches among the people who use it, even if they have not shared information with each other. A service is the means by which one partner gains access to one or more capabilities offered by another partner. A Service Specification is the formal document describing the capabilities made available through the service.

Information about the JRA, including published Service Specifications can be found at [http://www.it.ojp.gov/default.aspx?area=nationalInitiatives&page=1015](http://www.it.ojp.gov/default.aspx?area=nationalInitiatives&page=1015).

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[1] *The Global Justice Reference Architecture (JRA) Service Specification Guideline Working Draft V 0.9.7, The GISWG Services Committee, November 2009.*

Similar to the NIEM IEPD Clearinghouse, the Justice Standards Clearinghouse for Information Sharing (JSC) is available as a repository of communications and XML standards and specifications submitted by practitioners. To use the JSC, refer to www.it.ojp.gov/jsc.

In summary, the NIEM program and the library of Information Exchange Package Documentations (IEPD) have grown tremendously and are in use by hundreds of agencies today. The use of NIEM, IEPDs, and JRA Service Specifications enable standardized data communications between individual public safety systems and other supported domains (homeland security, emergency management, etc.) as well as between agencies. Using Service Specifications and IEPDs will allow eliminating point-to-point integration interfaces and, as a result, foster effective, efficient, and less-costly information sharing.

## Specific Benefits of Standardization

The use of standards allow for consistent and cost-effective solutions to be implemented, enabling improved information sharing through standardized data exchanges. This has been repeatedly demonstrated across a wide variety of technologies, from electrical outlets providing 120 Volts/60 Hertz power for equipment to the Transmission Control Protocol/Internet Protocol (TCP/IP) that allows computers to communicate with the Internet and with each other. Similarly, the ability to accurately exchange information between agencies or systems is enhanced when a standard format for data exchange exists. As an example, if a user wants to pass information about a person to another system, and the user represents the fact that the person has blonde hair and blue eyes by sending the codes BD and BL, this could easily be misunderstood unless there is a standardized and agreed-upon format for the information.

The goal in developing standards is to provide a common and efficient way to communicate, particularly in the justice and public safety domain, where the language used and the terms applied can vary from one agency to another. A common format for defining and exchanging information will allow for improved interoperability, and for cost-effective interfaces that lead to increased information sharing. In addition, the following benefits can be achieved:



*An Analogy:*
*The standardization of the shape, size, and voltage of electrical outlets and plugs allows for electrical devices to be used at most any location without having to redesign and implement these things every time a device is used or implemented. Standardization affects data exchange in much the same way.*

- Improves efficiency for the agency with standard interfaces that eliminate the need to develop customized solutions and associated documentation and testing.
- Establishes and maintains levels of compatibility and quality.
- Enables information exchange and interoperability between systems and between agencies, allowing information to be shared and made available to end users who need the information in a timely manner.
- Enhances the ability to upgrade existing systems with common interface protocols.
- Standards are internationally respected.
- Cost savings are realized throughout the product lifecycle including development, implementation, and maintenance.
- Enables access to more and wider information exchanges, which will provide an edge in enforcement, increase safety, and improve decision-making with timely and accurate data.
- Accelerates the flow of information through the public safety and justice process.
- Increases visibility to actionable information.
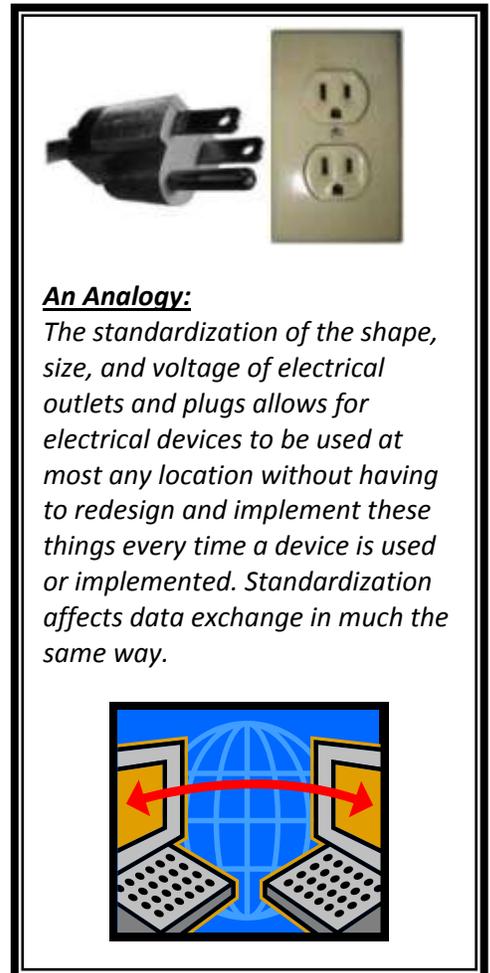
In addition to the benefits that are achieved at an agency/practitioner level, additional benefits can be realized for developers and system providers which include:

- Increased product availability (wider target market) and lower integration costs (reduced documentation, training and development).
- Standardized products that are interoperable.
- A level of assurance provided on compatibility for existing or future products and services.
- Standardized conformance testing.
- Availability of reusable, open source components, such as NIEM IEPDs and JRA Service Specifications (reuse the work of others!)

## Ongoing Support for Standards

In order to increase awareness of, and benefit from, existing standards, as well as spread the word about their usefulness, the following actions need to be performed:

- For practitioners, be aware of existing standards and include implementation of standards when issuing Request for Proposals (RFP). By including these standards, you raise awareness and force usage, which, in-turn, increases their usefulness and effectiveness. A good example of this is provided in the *NIEM Conformance for RFPs Whitepaper* created by the IJIS Institute Public Safety Technology Standards Committee (IPSTSC), which can be found at http://www.ijis.org/docs/NIEM_Conformance_for_RFP_20091028.pdf.

- For implementers, if solutions do not exist, consider sharing your IEPD and posting it to the IEPD Clearinghouse. This is a core foundation of the NIEM concept, to share and reuse code rather than developing new code for every instance.

## Conclusion

The use of standards such as NIEM, IEPDs, and JRA has demonstrated significant benefits to agencies that have implemented these technologies. A standard interface methodology supports information exchanges required for day-to-day operations, and can enable jurisdictions to more effectively share information during critical incidents allowing interoperability and access to timely information. The increasing number of IEPDs and JRA Service Specifications provide a growing database of reusable code for new users and for new interfaces. Savings are achieved when existing components are reused, and when systems are upgraded or replaced. Service and software product provider companies are responding to the demand for standards, and incorporating the technology in their latest product line.

The number of agencies with successful implementations and benefiting from these standard interfaces is growing rapidly. In 2009 the "Best of NIEM" award was initiated to highlight successful projects and implementations. Five projects were selected that have been operational since 2008 and collectively integrate data across hundreds of data sources. Additional information on these projects can be obtained from http://niem.gov/Awards2009.php. Additionally, NIEM Adoption and Use Case Studies are available at www.niem.gov to highlight successful NIEM projects in a variety of agencies in varying stages of completion.

As new systems and interfaces are upgraded or replaced, the use of the standards described herein will provide increased access to information, more seamless integration, and enhanced information exchange. More importantly, timely and accurate information is made available to enable decision making where and when it is needed. This information will help practitioners do their job better and safer. Without these standards, access to information will become increasingly costly, requiring custom interfaces with increased maintenance, and will likely limit access to information that may be readily available from other agencies and jurisdictions. In the justice and public safety environment what you don't know can hurt you, and standards will enable information exchanges to take place quickly and cost effectively.

**Additional Resources**

Additional information related to public safety information sharing standards can be found at the following web sites:

- National Information Sharing Standards Knowledge Base and Help Desk - http://www.it.ojp.gov/framesets/niss-noClose.htm
- The IEPD Clearinghouse - http://it.ojp.gov/framesets/iepd-clearinghouse-noClose.htm
- National Information Exchange Model (NIEM) - www.niem.gov
- NIEM Conformance document from the NIEM Technical Architecture Committee (NTAC) - www.niem.gov/conformance.pdf
- NIEM Conformance for RFPs document from the IJIS Institute - http://www.ijis.org/docs/NIEM_Conformance_for_RFP_20091028.pdf
- Justice Reference Architecture (JRA) - http://it.ojp.gov/default.aspx?area=nationalInitiatives&page=1015
- Justice Standards Clearinghouse – http://www.it.ojp.gov/jsc