



**Industry Advisory Council**  
*Transition Study Group*

**A Breakthrough in  
Information Sharing Is  
Accelerating Homeland Protection**

December 16, 2008



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## **Executive Summary: Government Federated Identity Management**

TV shows and movies lead viewers to believe that police, fire, and emergency management personnel can easily find all the information they need to make an arrest, prevent a terrorist plot, or respond to a hurricane. The media view portrays the effortless collection of information from thousands of disparate computer systems spread through federal, state, and local governments when nothing could be further from the truth. Instead, the national capacity to put the right information into the right hands at the right time has not yet been created. As a nation, we often leave our public safety officials unable to see clearly what they need to know to make the best decisions.

Hardly a day goes by without someone in America being killed or injured because of our national inability to share information about career criminals, serial killers, and identified risks. The landscape is littered with cases where court orders are not communicated to law enforcement, prosecutors fail to discover past criminal records, or police have no basis for solving crimes because they cannot exchange information on prior cases. Information sharing is at the core of improving our system of justice and defending our homeland.

Information technology has evolved to the point where information systems can readily communicate with each other, allowing the timely and accurate exchange of information within the law enforcement and justice community (police, prosecutors, courts, corrections, and community supervision) and also between law enforcement and schools, transportation, and emergency response. The impediment to information sharing has been the lack of a standard set of terms and definitions for the data that needs to be exchanged.

There has been a recent breakthrough that has established a new open source standard that reduces the cost and cuts the time and effort to create this kind of interoperability—the National Information Exchange Model (NIEM). This has been developed jointly by the Department of Justice (DOJ) and the Department of Homeland Security (DHS) in support of public safety, justice, and homeland security missions. ([www.niem.gov](http://www.niem.gov)). Because of the advances in technology and the development of such open standards as NIEM, the lack of interoperability can be solved by helping agencies at all levels of government adopt this new standard. Its widespread adoption will allow all agencies to improve their ability to detect, deter, prevent and respond to acts of crime, terrorism and emergencies at all levels of severity.

The NIEM standard was defined through a partnership agreement between DOJ and DHS in 2005. It has defined a set of universal data components such as people, places, events, and things with a means of communicating those components using the Extensible Markup Language (XML). Instead of having to develop individual connections to every system that may be a source or user of information, government organizations, including those with old legacy systems, can receive an NIEM packet and understand its contents. They can also put their information into a packet that has the correct structure and semantics to share it with others.

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NIEM has won broad praise as a standard for cross domain information sharing. IT systems incorporating NIEM conformance as part of their requirements show a very high return on investment. Governmental organizations at all levels can participate in the public data sharing architecture by accepting data packets utilizing the NIEM model.

NIEM has successfully passed through its adolescence and proven itself with a number of success stories. Now is the time for NIEM to mature in its adoption throughout the nation in its capabilities for the communities of interest that desire this cross-domain information sharing, and in its tools and techniques to reduce the cost of implementation. The potential benefits are large cost savings and a direct contribution to the critical missions of the agencies that will save lives, reduce injuries, reduce the fear of crime, and secure our homeland.

ACT/IAC strongly recommends that the new administration:

- (1) Establish NIEM as a model for intra and inter-government information sharing using an open Federation of Systems approach.
- (2) Support the widespread adoption of NIEM as a critical component to improving public safety, justice, and homeland protection, and continue to expand the capabilities that NIEM provides.
- (3) Support the NIEM community to become more closely tied to the social networking and collaborative technology efforts of the open source community of developers to add more stakeholders in this standard.



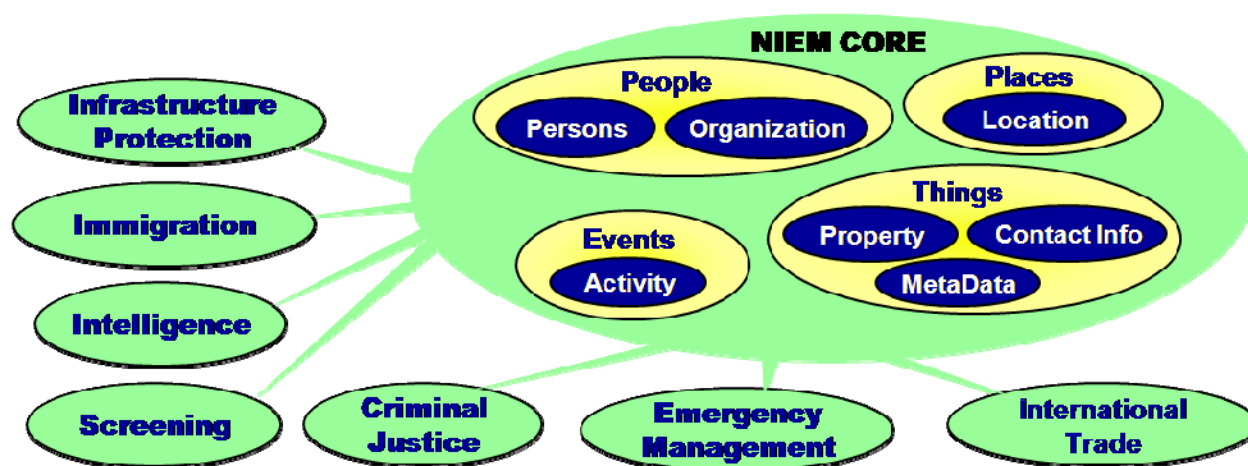
## NIEM Overview

Today, the goal of information sharing across all relevant communities and branches of government remains elusive. The sheer magnitude of data existing and created every day, the absence of any clear road map to that information or even knowledge of its existence make solving the information management puzzle daunting. Moreover, the plethora of business processes and data formats in information systems from jurisdiction to jurisdiction and agency to agency only compounds the seemingly insurmountable challenge of sharing information to solve problems in the public interest.

The National Information Exchange Model (NIEM) standardizes data exchanges across multiple communities of interest. Separation of terms, definitions, and formats from the way data is stored in individual systems gives NIEM its information sharing agility.

NIEM makes possible mission-critical information exchanges and significantly advances information sharing among emergency and public safety organizations by providing common language and vocabulary. This commonality lowers costs by reducing technical barriers and endless discussions and planning cycles focused on figuring out the format to share information. By entering the process with agreement on the structural data connecting elements, the information available and the problems to be solved are more quickly defined and established.

The short term utility of NIEM provides a consistent, extensible, maintainable eXtensible Markup Language (XML) schema for data elements and types that represent the data requirements of the communities involved. The long-term purpose is to provide baseline consistency for the many data management problem solving efforts. It also provides longevity to the model for the data dictionary represented in possible advanced technologies beyond an XML schema.



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The seven NIEM Domains are shown above: Immigration, Emergency Management, Justice, Person Screening, Intelligence, International Trade, and Infrastructure Protection. They are actually communities of interest that share the need to exchange information on specific persons, places, things or events. An example is the justice community which includes law enforcement, prosecutors, courts, and corrections agencies at all levels of government. Each community of interest (domain) has its own governance capability and can issue enhancements to the domain specific part of NIEM without having to release a complete new version of the data model. The domains operate differently and are at different stages in their usage of NIEM, but have a common interest in an open standards approach such as NIEM. The inherent flexibility of NIEM reinforces the argument for enhanced support. Individual domains have a need to share information with each other and within their respective communities, and can do so without all participants having to be in perfect harmony with NIEM versioning. A NIEM History and Technical Overview are attached as Appendix 1.

### **Information Sharing Approaches**

The concept of information-sharing standards in the government is not new. The Department of Defense (DoD) Shared Data Environment) Initiative (SHADE) attempted to create a monolithic data model for use across the entire DoD. SHADE and other similar data efforts at standardization failed because they didn't take into account the very dynamic nature of the data, and the federated nature of the organizations and systems that create, use and manage the data. Today's data is dynamic and different from the data we had yesterday. Likewise, the various stakeholders of the data are continuously changing over time.

The IT community recognizes these challenges and has slowly started to migrate away from the System of Systems (SOS) approach towards a Federation of Systems (FOS) approach. The SOS approach focuses on the integration of tightly coupled function processing and information. This system failed because it is impractical if not impossible to define and design a system without addressing the dynamically evolving data requirements of the community and the ever-changing federation of stakeholders who need that information. NIEM uses the FOS approach which focuses on interoperability instead of tightly-coupled integration, and strategically removes tight coupling (e.g., dependencies and other system relationships) between system functions and data.

NIEM has been very successful across the current seven domains. The existence of seven different domains within NIEM is a clear indication that diversity in the data model is both required and advantageous. It is encouraging that other data models such as DoD's UCORE, also have standard data dictionaries using XML which will allow for the FOS approach for information sharing and will bring the same savings and benefits that NIEM has to all of government.

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## **The Value NIEM Has Brought To Information Sharing**

The early results are that NIEM already demonstrates clear viability as a solution to the Herculean task of rational information exchange. The many success stories illustrate a methodology for leadership in an area necessarily fractured by the vast number of jurisdictional interests across the governmental landscape. Review of the history of information sharing initiatives over the past 20 years is testament to the problems faced by those who sought a common denominator that would facilitate a shared understanding and framework. NIEM provides that common platform to help overcome jurisdictional and technological boundaries to share information in the interests of public safety.

Agencies that have used NIEM in their development of information exchanges have reported that costs savings of 50-75 percent based on the use of NIEM. Further, there is an even higher return on investment when additional exchanges are constructed.

The goal of NIEM is to define common data components that are highly reusable, to improve the economy of implementing information exchanges, to increase comprehension of those exchanges, and to reduce errors in exchanges. NIEM further reduces the eventual cost of information sharing by its design as a translation mechanism rather than requiring replacement of legacy systems. By relying on Web technologies, NIEM leverages the power and speed of private industry's development of rapid information exchange in the commercial world.

Because of NIEM, the broad acceptance of XML-based standardization in the commercial world is now carrying over to governmental agencies. NIEM finds strong leadership in the partnership between the Department of Justice (DOJ) and the Department of Homeland Security (DHS). Together these two agencies provide critical financial support and technical assistance through the IJIS Institute to thousands of state and local agencies across the United States.

The challenge of sharing reliable, relevant and timely information in the service of public safety spans many different government and private constituencies. Successfully resolving problems where law enforcement ultimately takes the lead can only be enhanced through the leadership of DOJ and DHS. NIEM provides the technological leadership in its common platform to share information in the interests of public safety.

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## RECOMMENDED ROADMAP

### **1. View NIEM as a model for intra and inter-government information sharing.**

ACT/IAC is recommending that the new administration establish a policy to expand the application of NIEM as an open source, open standard that can become a model for facilitating information sharing within the federal government and between the federal, state, and local governments crossing multiple communities of interest. It is critical that the continued support for the governance of an information sharing standard be sustained with the simple objective of maximizing adoption of the standard. There must be support for model maturation, tool support, new agency training, technical support and the other outreach functions needed to gain acceptance on a wide spread basis. Further, the Federation of Systems approach using open source standards like NIEM should be the basis for information sharing across all of government.

### **2. Encourage widespread adoption of NIEM is a critical component to improving public safety, justice and homeland security.**

While NIEM has clearly achieved early successes in promoting increased information sharing across federal and state communities of interest, it is far from being the dominant data standard that would enable greater improvements and cost avoidance in information sharing. Strong support by the new administration for the NIEM standard will foster the implementation of effective sharing of critical information necessary to homeland security and other law enforcement missions. System and service providers as well as government agencies at all levels should be encouraged by administration policy to engage in the application of NIEM to these new capabilities for forward progress. The use of NIEM should be encouraged by procurement policies such as special conditions on grants and on budget approvals.

Resources are needed to provide incentives for agencies to adopt NIEM at the federal, state, and local levels and across all communities of interest. Greater attention is required to ensure that the governance model for NIEM is sustained and improved, and that it recognizes and endorses the transparency and open standards that are at the heart of the NIEM concept.

### **3. The NIEM community must become more closely tied to the social networking and collaborative technology efforts of the open source community of developers in order to add stakeholders in this standard.**

Contemporary and emerging technologies such as Web 2.0 and Web 3.0 will benefit from open standards for data models as embodied in NIEM. The success of large scale collaborations and stakeholder interactions that are possible with advanced technologies still require concurrence on the meaning of terms and the relationships of data in information exchanges. NIEM provides

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a framework to take the application of advanced technology in government to the next threshold. The new administration should encourage the NIEM Executive Steering Committee and the Program Management Office to increase NIEM's use of social networking and other tools to foster a higher level of involvement by the open source software development community. Real success will come when the pull of government agencies asking for open source integration capabilities such as NIEM is complimented by the push of the software development community bringing to government solutions that are built around standards like NIEM.

## **CONCLUSION**

The goal of efficient government information sharing poses a long-term challenge. A large part of this challenge consists of simply understanding that the goal can be realized by engaging in a process, not searching for a technological talisman. Achieving meaningful public benefits from widespread information sharing comes from consistency in approach.

The public needs an effective public data sharing architecture. The point is passed when we can afford more endless debate on the technical structural elements of data connectors. NIEM has provided a significant first step as a solid methodology for open source information sharing. NIEM's flexibility offers assurance that it can evolve in tandem with the pace of technological development. Decisive support will enhance the overall return on investment to the public by improving services and problem resolution. It will save tax revenue by speeding up the process of system design and implementation. Further assessment of solution alternatives only highlights a failure to recognize the critical importance that information sharing has to public well-being and safety.

We recommend that the new administration take NIEM to the next level. It can be the solid underpinning on which we can build the much needed public data sharing architecture and use this success as a model for other government communities for information sharing.



## APPENDIX

### 1. NIEM Background and Technical Overview

#### History of the NIEM Standard

NIEM was launched on Feb.28, 2005 through a partnership agreement between the Department of Justice (DOJ) and the Department of Homeland Security (DHS). It leverages and extends the data exchange standards from the highly successful Global Justice XML Data Model (GJXDM), version 3.0.3. NIEM complies with the Homeland Security Presidential Directive (HSPD-5) naming the Secretary of DHS as the principal federal official for domestic incident management. It also complies with Section 1016 of the Intelligence Reform and Terrorism Prevention Act (IRTPA) of 2004, through which, among other things, the president established the Information Sharing Environment (ISE) to facilitate information sharing pertaining to terrorism.

Since its initial implementation in 2005, NIEM experienced a rapid development phase with over a dozen releases and numerous homeland security and justice pilot projects conducted at federal, state, and local levels. The release of NIEM 2.0 in July 2007 marked a significant turning point as NIEM transitioned from a pilot project to an operational program. This change brought new opportunities and challenges as federal, state, and local jurisdictions and agencies nationwide began aggressive programs to adopt and use NIEM.

#### Technical Overview

NIEM, as a platform for information sharing, is based on the eXtensible **Markup Language** (XML). XML is a structured language for describing information being sent electronically by one entity to another. XML schema defines the rules and constraints for the characteristics of the data, such as structure, relationships, allowable values, and data types. XML is in a text format, readable by both machines and humans. It is license-free, platform-independent, and well-supported by industry.

While the NIEM data model is represented in XML, it provides specialized XML tag names and other structure for data that is constrained to meet the specific information exchange requirements of the justice and homeland security domains. In other words, NIEM utilizes XML to provide a concise and defined vocabulary for sharing critical information throughout the nation. This is true regardless of whether the agency sharing the information is local, state, tribal, or federal and regardless of whether the information is exchanged horizontally or vertically within existing or emerging systems.

Developing and implementing NIEM-based exchanges allows agencies to leverage existing investments in information systems by building the bridges to connect them. NIEM standards enable different information systems to share and exchange information, irrespective of the particular technologies in use in those information systems. Moreover, creating and adopting NIEM standards means that local, state, tribal, and federal organizations can reap significant cost benefits through adoption and reuse, rather than building proprietary, single-use software

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from scratch. The fact that NIEM requirements are driven from the user community rather than a federal mandate paves the way for faster adoption and more closely aligned outcomes.

The NIEM architecture consists of two sets of vocabularies—**NIEM Core** and the individual NIEM domains. NIEM Core includes **Universal (U)** and **Common (C)** components. The identities for U and C components in NIEM Core are maintained with metadata. Universal data components are concepts that are commonly understood across all business domains such as dates, times, and locations. They do not have to appear in every exchange and do not have to apply all the time—they simply have to be well-defined and well-known enough to be understood by all or the majority of domains. Common data components, on the other hand, are used in exchanges between two or more domains but not universally shared. By contrast, the individual NIEM domains contain domain-specific data components for the current domains including Emergency Management, Justice, Infrastructure Protection, Intelligence, International Trade, and Immigration. There are over 5,000 individual data components in NIEM that have definitions set by the user community.

There is also a methodology for applying the NIEM to construct specific exchanges. It follows a strict process for creating what are referred to as Information Exchange Package Documentations (IEPD's) that spell out the data to be included and the rules for formulating a specific exchange. Hundreds of IEPD's have been created by federal, state, and local agencies to take advantage of the data model. Once an IEPD has been created, programmers can rather easily create the actual information exchange so that computer to computer interaction is possible.

The NIEM program also includes tools and support functions to help agencies at all levels of government take full advantage of this powerful data model. Tools for creating XML schemas that conform to NIEM are freely available on the web, as is a help desk, IEPD clearinghouse, NIEM users guide and other documentation which can all be viewed at [www.niem.gov](http://www.niem.gov).



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### 3. Bibliography of information on NIEM

#### General NIEM Sources

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| <a href="http://www.niem.gov/library.php">http://www.niem.gov/library.php</a>           | NIEM documents and downloads   |
| <a href="http://www.niem.gov/training.php">http://www.niem.gov/training.php</a>         | NIEM training  |
| <a href="mailto:Information@niem.gov">Information@niem.gov</a>                          | General NIEM information inquiries   |
| <a href="http://it.ojp.gov/NISS/helpdesk/">http://it.ojp.gov/NISS/helpdesk/</a>         | National Information Sharing Standards Help Desk   |
| <a href="http://www.niem.gov/library.php#case">http://www.niem.gov/library.php#case</a> | NIEM Adoption and Use Case Studies featuring local, state, tribal, and federal NIEM projects |
| <a href="http://it.ojp.gov/iepd/">http://it.ojp.gov/iepd/</a>                           | IEPD Clearinghouse   |

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