Acknowledgements

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- Principal Contributor: Joel Byford – Microsoft
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INTRODUCTION

The National Information Exchange Model (NIEM) is a dynamic standard that has evolved and been updated over time. As a part of this evolution, the standard itself has gone through several revisions (or versions) and is expected to continue on this growth path well into the future.

This document is meant to provide a summary of the ways organizations typically version and respond to changes in NIEM evolving over time. The information provided here depict how organizations could version control local exchanges in order to further control changes to their organizational interfaces.

DISCUSSION

Standard and Specification Change

Both the nationally-published NIEM specification, and any internal agency/organizational standards based on this specification, change over time and have similar reasons or needs for change. The primary reason a standard changes is to meet a business need. On occasion, the standard also evolves to incorporate a new aspect of technology; however, more often than not, even the technology change itself can be traced back to a business requirement. The changing standard is simply addressing the business need, as depicted in Figure 1.

![Figure 1: Standards Evolution Driven by Business Need](image-url)
Local and National Version Relationship

The local version numbering for a given data exchange, web service, or standard often differs from the NIEM version underpinning the service. For example, a Warrant or eFiling standard created locally and based on NIEM need not be called Warrant 2.1 if it is based on NIEM 2.1. Instead, it may be named version 1.0 or 1.0.1 if the agency so desires. Figure 2 depicts how the local version numbering often differs from the published NIEM standard.

**Figure 2: Versioning Local Data Exchange Rationales**

Typical Version Numbering

Most agencies have adhered to a three-segment version number. This segmentation provides a clue to service consumers as to the extent of change. Additionally, many agencies have chosen to group together their services into common collections that can be versioned together in order to maintain consistency between similar exchange groups. For example, it is common for an agency to correlate the versioning of all Warrant-related exchanges in order to reduce confusion with the developers who are attempting to consume the service, as shown in Figure 3.
Also depicted in Figure 3 is the type of release (common in the industry, as a whole) where: the first digit in a version triplet points to the major release, the second digit points to a minor release with new functionality yet maintaining backwards compatibility, and the third digit points to a patch release that only includes bug fixes or other minor modifications.

**Supporting Multiple Versions**

Very often, organizations are required to support or maintain multiple versions of a local data exchange at once. This is very feasible given modern routing and transformation technologies implemented by the traditional hub-and-spoke model for information sharing. The hub acts not only as a traffic router but is also infused with the necessary maps to help transform one standard to another standard, depending on the need of the recipient.

For example, if a system can only consume version 1.0.0 of a local standard, any documents being routed to that system that originate in 2.0.0 are converted on-the-fly by the hub by applying the appropriate mapping before the intended target system receives it. This approach is depicted Figure 4.
Extensible Stylesheet Language Transformations (XSLT)

The most common technology used to perform these conversions is through the creation and application of XSLTs. While it is not mandatory to use this technology, it is often the most well-suited tool given its broad acceptance and platform independence.

Direct or Indirect Transforms

When managing the conversion or transformation between disparate versions of a local standard, one must choose either to create a mapping directly between all supported legacy versions of a standard or to simply maintain single incremental maps applied in succession. This concept is depicted in Figure 5.
As shown in Figure 5, in order to get from version 2.0 to version 3.0, one may choose to take one of the following approaches outlined in Table 1:

**Table 1: Transform Approaches**

<table>
<thead>
<tr>
<th>Transform Approach</th>
<th>Steps Required</th>
<th>Developer Effort</th>
<th>Testing Effort</th>
<th>Error Risk</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect</td>
<td>v2.0 → v2.1, v2.1 → v3.0</td>
<td>Less</td>
<td>Less</td>
<td>More</td>
<td>Worse</td>
</tr>
<tr>
<td>Direct</td>
<td>v2.0 → v3.0</td>
<td>More</td>
<td>More</td>
<td>Less</td>
<td>Better</td>
</tr>
</tbody>
</table>

- *Indirect transforms* are typically easier to maintain and test as they are gradually added over time; however, indirect transforms are often more time consuming to apply at runtime, which can lead to poor system performance.

- *Direct transforms* are typically very efficient and fast to leverage at runtime but are more difficult to develop and test as multiple point-to-point maps are required for each scenario supported.
While these differences exist, either approach is considered acceptable by the industry. Organizations are encouraged to choose the option that best meets their needs. In some cases, this may mean implementing a mix of both techniques in the same environment.

**CONCLUSION**

Business need drives the need for change. Implementation of any standard – local or national – may require the need for versioning. Versioning of a national standard does not require updating of the local standard. Transformation options exist that allow for flexibility of multiple local versions.

Organizations have tools and techniques at their disposal to manage complexity around versioning, yet each organization must choose how and when to leverage these tools.

To submit questions or feedback on this paper, contact: Joel Byford, Chairman, by email at joel.byford@microsoft.com.
ABOUT THE IJIS INSTITUTE

The IJIS Institute unites the private and public sectors to improve mission-critical information sharing and safeguarding for those who protect and serve our communities. The IJIS Institute provides training, technical assistance, national scope issue management, and program management services to help government fully realize the power of information sharing.

Founded in 2001 as a 501(c)(3) nonprofit corporation with national headquarters on The George Washington University Virginia Science and Technology Campus in Ashburn, Virginia, the IJIS Institute has grown to nearly 320 member companies and individual associates from government, nonprofit, and educational institutions from across the United States.

The IJIS Institute thanks the IJIS Technical Advisory Committee (I-TAC) for their work on this document. The IJIS Institute also thanks the many companies who have joined as members that contribute to the work of the Institute and share in the commitment to improving justice, public safety, and homeland security information sharing.

For more information on the IJIS Institute:

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 Follow the IJIS Institute on Twitter: @ijisinstitute.

 Read the IJIS Factor Blog, and

 Join us on LinkedIn at: Justice and Public Safety Information Sharing.

About the IJIS Technical Advisory Committee (I-TAC)

The I-TAC advisory committee develops policies, programs, and training or educational materials in support of the Department of Justice, Office of Justice Programs information sharing initiatives that can be adopted or disseminated by industry as a whole. (I-TAC was formerly the XML advisory committee.)

I-TAC reviews significant issues under consideration to develop and document industry recommendations and positions by the various national committees including: XML Structure Task Force (XSTF), NIEM Business Architecture Committee (NBAC), NIEM Technical Architecture Committee (NTAC), and Justice Training and Technical Assistance Committee (JTTAC). The Committee assists in facilitating industry participation in NIEM Information Exchange Package Documentation (IEPD) development activities and encourages content contribution and reuse by IJIS Institute members and other organizations. As the Steering Committee for the IJIS Institute National Information Sharing Standards (NISS) Help Desk project, I provides guidance, review, and issue resolution to the IJIS Institute staff. The
committee also liaises with the Information Sharing Architecture Committee in the support of the current Justice Reference Architecture efforts, supports the coordination of testing and reporting of test results for evolving eXtensible Markup Language (XML)-based initiatives, and explores and recommends new and emerging information sharing technologies.

The I-TAC Committee welcomes inquiries regarding participation on the Committee.

To learn more about the IJIS Institute or the I-TAC, contact: Joel Byford, chairman, by email at joel.byford@microsoft.com, or Bob Slaski, vice-chair, by email at bslaski@comcast.net.

ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym or Abbreviation</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>BJA</td>
<td>Bureau of Justice Assistance</td>
</tr>
<tr>
<td>DOJ</td>
<td>U.S. Department of Justice</td>
</tr>
<tr>
<td>IEPD</td>
<td>Information Exchange Package Documentation</td>
</tr>
<tr>
<td>IJIS</td>
<td>IJIS Institute; or, integrated justice information sharing</td>
</tr>
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<td>I-TAC</td>
<td>IJIS Technical Advisory Committee</td>
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<td>eXtensible Markup Language</td>
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<td>XSLT</td>
<td>Extensible Stylesheet Language Transformation</td>
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