IJIS Institute

CONSULTING ENGAGEMENT REPORT

GJXDM/IEEE 1512 Compatibility Analysis Report

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1. Acknowledgements

The IJIS Institute acknowledges the work of MTG Management Consultants, LLC, and in particular, Jim Cabral in preparing this report.

This report, and the many ongoing activities of IJIS Institute's Intelligent Transportation Systems (ITS)/Public Safety (PS) Exchange Standards Project, would not exist without the full support of the ITS Joint Program Office, Federal Highway Administration (FHWA), Department of Transportation (DOT), and the Bureau of Justice Assistance (BJA) of the Office of Justice Programs (OJP) in the U.S. Department of Justice (DOJ). The continuing leadership and guidance of DOT and BJA are key elements to the success of this project, from which Traffic Management Centers and Public Safety Dispatch Centers across the United States will derive benefits.

The IJIS Institute is grateful for the support of the member companies and their professional representatives, as well as justice and transportation practitioners who devote time and share their invaluable expertise for projects such as these.

Scott Parker
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2. Guiding Project

In 2005, the U.S. Department of Transportation, in partnership with the U.S. Department of Justice, Bureau of Justice Assistance, established the Intelligent Transportation Systems and Public Safety (ITS/PS) Information Exchange Project, managed by the IJIS Institute. The project's goal was to establish a standards-based approach to critical information exchange between transportation and public safety agencies, validated through laboratory and field testing. By facilitating faster and better communications and coordination, this project is enhancing daily operations and helping to ensure more immediate, safe, and effective response to routine incidents, natural disasters, terrorist acts, and other major incidents. Both public safety and transportation agencies will benefit from having more accurate and timely information to perform their role and the public will be better served.

To this point, each community has developed information exchange specifications unique to their own needs and systems. Transportation incident management utilizes standards developed in conjunction with the Institute of Electrical and Electronics Engineers (IEEE, 1512). In contrast, public safety relies on DOJ's Global Justice XML Data Model (GJXDM), supported by the Global Justice Information Sharing Initiative (Global Justice[i]), to define information exchange standards for the justice community.

Led by a steering committee comprised of both practitioner and industry representatives, and supported by technical working teams and subject-matter experts, the ITS/PS project is in the process of developing standard exchanges that incorporate both GJXDM and IEEE specifications. This work will allow transportation and public safety agencies to share information using the same standards, bridging the two communities in a real-time manner to improve communication

and increase collaboration, while saving time and valuable resources. This project does not seek to supplant those existing intra-community standards, but instead focused on identifying the common information of interest to the two communities and focusing on the needs where those interests intersect. These GJXDM/IEEE exchanges provide a flexible methodology now and in the future for the transfer of this information, and will work in harmony with other information exchange initiatives such as the National Information Exchange Model (NIEM).

2.1. Consulting Team

In order to further the efforts of the project and create this report, the IJIS Institute solicited the assistance and participation of senior and qualified consultants from its member firms. The following firms were selected by the IJIS Institute as the project consultants:

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2.2. Project Steering Committee

In order to further the efforts of the project, the IJIS Institute solicited the assistance and participation of senior and qualified consultants from its member firms and practitioners from justice and transportation. The following individuals were selected as participants in the Project Steering Committee:

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3. Executive Summary

One objective of the IJIS Institute's Intelligent Transportation System (ITS)/Public Safety (PS) Exchange Standards Project (ITS/PS Project) was to understand the issues and complexities in defining eXtensible Markup Language (XML) information exchanges using two sets of standards – the Global Justice XML Data Model (GJXDM) used by public safety and the IEEE 1512 specification used by transportation. Another objective was to create several standardized high-value exchanges associated with traffic-related incident management – 12 information exchanges resulted. During the course of the project, the project team arrived at the following findings:

- While both standards define data structures and elements using XML schema, the IEEE 1512 provides a more complete set of messages for traffic-related incident management exchanges, while the GJXDM provides a more flexible set of content, leaving it up to the implementer to define the messages appropriate for each exchange.
- There is significant overlap in the content of the two standards due to the reuse of several large GJXDM data structures in the IEEE 1512 specification.
- Due to the focus of the specification on traffic-related incident management, the IEEE 1512 specification mapped to a much higher percentage of properties[ii] in the data model for the 12 information exchanges than the GJXDM.
- The eXtensible Stylesheet Language Transformation (XSLT)[iii] language is a feasible option for implementing transformations to convert between GJXDM and IEEE 1512 representations of the same exchange.

4. Background

The Global Justice XML Data Model (GJXDM) defines XML elements and data structures for describing information commonly exchanged between public safety systems. Similarly, the DRAFT P1512 specification IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers (IEEE 1512) defines XML elements and data structures for describing information commonly exchanged between Traffic Management Center (TMC) systems. The ITS/PS Project included the modeling of 12 of the most useful public safety/transportation information exchanges for traffic-related incident management using both the GJXDM and IEEE 1512 specifications and the development of XSLT stylesheets between the two data models. This report is a summary of the lessons learned in that project, including:

- A comparative analysis of the relative strengths and weaknesses of the GJXDM Version 3.0.3 and the Draft P1512 specification IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers, Rev35 specification for describing traffic-related incident management information exchanges between public safety computer-aided dispatch (CAD) systems and TMC systems.
- A compatibility analysis between the GJXDM and IEEE 1512 specifications within the context of the defined traffic-related incident management information exchanges.

5. Introduction and Approach

Global Justice publishes guidelines for the development of Information Exchange Package Documentations (IEPDs)[iv] using GJXDM content. An IEPD defines messages used in the implementation of one or more exchanges. In order to support both the GJXDM and the IEEE 1512 specifications, the ITS/PS Project adapted the standard IEPD development process as follows:

5.1. Model Information Exchanges

In the initial step, a Justice Information Exchange Model (JIEM) was developed that identified and described the most common exchanges between public safety CAD systems and TMC systems based on the experience of participating subject matter experts from the public safety and transportation industries. Each exchange included the sending and receiving agencies and the processes, events, and conditions related to the exchange, as well as the name of the documents or messages that were transferred. The project committee identified 22 potential incident management information exchanges and selected 12, deemed as the most important, for XML modeling in the ITS/PS Project. (These exchanges are listed in Appendices A and B.)

The project committee was comprised of five representatives of transportation (including local, state, and federal), five representatives of public safety (including local, state, and federal), five technology industry representatives, and ten advisors (a mix of practitioners and industry). These members represented a mix of subject matter experts and technologists.

5.2. Develop Data Models

Next, the subject matter experts collaboratively developed Unified Modeling Language (UML) models for each of the 12 exchanges selected for XML modeling. These models defined the business objects (i.e., vehicles, places, and things) in the exchange, the properties for each object (e.g., make, model, license number), and the relationships between objects. These data models provide the data requirements for each exchange independent of any particular technology. Three hundred and thirteen (313) properties were identified in this process.

5.3. Map Data Models to XML

In the third step, the consulting team—familiar with the GJXDM and IEEE 1512 specifications—identified XML structures and elements from each standard that corresponded to the objects and properties in each of the 12 data models. When the GJXDM and IEEE 1512 specifications did not include an appropriate XML structure and element for an object or property, the analysts defined local extensions[v] appropriate to that standard. The lessons learned from mapping the data models to the GJXDM and IEEE 1512 specifications are the focus of this report, and the process of mapping the structures and elements is detailed in Section 6.

5.4. Develop Schemas

Based on the XML mappings, the consulting team generated both GJXDM and IEEE 1512 XML Schema Definition (XSD) files that covered the scope of exchanges. The GJXDM files included a set of GJXDM subset schemas, a local extension schema, and a document schema for each exchange. The IEEE 1512 files included schemas defined within the specification, as well as a set of local extensions.

5.5. Develop Instances and XSL Stylesheets

Based on the schemas, the consulting team generated example GJXDM and IEEE 1512 instances and eXtensible Stylesheet Language (XSL) stylesheets for each exchange. The instances included example data and simulated actual messages. The stylesheets provided a mechanism to view an XML instance as an HTML Web page.

5.6. Develop Transformations

Finally, in the case of one exchange (the Incident Notification exchange), the consulting team developed XSLT stylesheets for converting a GJXDM instance to an IEEE 1512 instance and vice versa.

6. Scope and Constraints

The scope of the ITS/PS Project was limited to the following exchanges:

- Exchanges between traffic management center (TMC) systems and public safety CAD systems. These exchanges include initial request and alerts, as well as subsequent exchanges for updated status and clearance sharing.
- Exchanges of information between TMC systems and public safety CAD systems to assist in understanding the location and availability of critical resources (e.g., dynamic text signage, cameras) and the existence of planned or current events or activities.

Early in the project, a Justice Information Exchange Model (JIEM) was developed that identified and described the most common exchanges within this scope. From the JIEM exchanges, 12 representative exchanges were selected based on anticipated benefit for data modeling and mapping to the GJXDM and IEEE 1512 specifications. The complete list of information exchanges analyzed in this project is provided in Appendix A.

To date, XSLT stylesheets have been developed between the GJXDM and IEEE 1512 for the Incident Notification exchange.

7. Findings

This section is a comparative analysis of the issues of mapping the data models in the 12 traffic-related incident management information exchanges to the structures and elements in the GJXDM and the IEEE 1512 specifications.

7.1. Intellectual Property Rights, or "Ownership"

Although not a technical finding, it is important to make a note of the difference between the two standards regarding intellectual property rights, or "ownership".

GJXDM is a non-proprietary standard provided by the Global Justice Information Sharing Initiative (Global Justice) operating under the auspices of the Office of Justice Programs (OJP), U.S. Department of Justice.

The IEEE 1512 family of standards is provided by the Institute of Electrical and Electronics Engineers (IEEE), working in cooperation with the United States Department of Transportation (USDOT). IEEE retains intellectual property rights for the IEEE 1512 family of standards.

7.2. Structure

7.2.1 Description of Analysis Methodology

Objects in the data model were mapped to GJXDM types and IEEE 1512 message sets and data frames. When mapping objects in the data models to these structures in each standard, the consulting team used the following process to determine the best possible mappings:

- Selected a structure with the same definition as the data model object.
- If no structures matched, selected a structure and elements with similar definitions to the properties contained in the data model object.
- When choosing between multiple structures, selected the structure that matches the highest number of properties in the data model object.
- When no structures matched the data model object, identified the object as mapping to a local extension in that standard.
- When an object mapped to a structure in one standard (e.g., GJXDM) and a local extension in the other standard (e.g., IEEE 1512), defined the local extension based on the structure in the other standard.
- When an object did not map to a structure in either standard, defined a local extension structure that was compatible with both standards.

7.2.2 Similarities

The structures in the GJXDM and IEEE 1512 specifications share the following similarities:

- Both standards use XML schemas to define data structures and elements.
- Both standards use a limited set of XML schema options. In other words, not all XML schemas are acceptable GJXDM or IEEE 1512 schemas.
- Both standards use compatible schemas for a number of complex structures, including those for person, property, and vehicle.

7.2.3 Differences

The structures in the GJXDM and IEEE 1512 specifications have the following differences:

- The GJXDM makes great use of object inheritance, the definition of a specific type (e.g., j:Event/ActivityID) based on a more abstract type (j:IDType). GJXDM structures generally inherit elements from a multilevel hierarchy of complex objects. The IEEE 1512 specification makes very limited use of object inheritance. Most IEEE 1512 elements (e.g. ReferenceID) are based on the simple types defined by the XML specification (xs:string).
- Due to the size and complexity of the GJXDM, implementation of GJXDM exchanges generally requires the definition of a subset of the complete GJXDM schemas appropriate to the specific exchanges. The IEEE 1512 does not support the creation of subset schemas.
- As a general data model, messages that include GJXDM content are defined in Information Exchange Package Documentations (IEPDs) that are defined outside the GJXDM according to

a set of standard guidelines. Since the IEEE 1512 specification is specific to traffic-related incident management, the standard defines the messages that must be supported in order to be compliant with the specification.

- In addition to messages, the IEEE 1512 specification also defines certain structures known as "data frames," which are logical groupings of data elements that describe parts of messages. The GJXDM does not distinguish between different types of data structures.
- Extensions to the GJXDM may be inserted at any point in the data model as long as the extensions conform to the GJXDM IEPD Guidelines. The IEEE 1512 specification provides defined extension points and extensions at other points in the data model are not allowed.

7.2.4 Summary

While both standards define data structures using XML schema, the GJXDM and IEEE 1512 specifications differ in their requirements for compliance with the standard. While the IEEE 1512 specification defines the complete set of messages required for an implementation, the GJXDM defines the content and allows implementers to define the messages themselves.

7.3. Elements

7.3.1 Description of Analysis Methodology

Once the objects in the data models were mapped to GJXDM and IEEE 1512 structures, the 313 properties in the data models were mapped to GJXDM and IEEE 1512 elements, message sets, and data frames. When mapping properties in the data models to these elements in each standard, the consulting team used the following process to determine the best possible mappings:

- Selected the element in the structure with the same definition as the data model property.
- For data model properties that matched coded elements in both standards, selected either the GJXDM or the IEEE 1512 code list that best matched the definition of the property. If necessary, defined a local extension in one standard based on the code list in the other standard.
- If no elements in the structure matched, selected an element from the complete GJXDM or IEEE 1512 standard with a similar definition of the property in the data model.
- When choosing between multiple elements, selected the element that best matched the definition of the property in the data model.
- When no elements matched the data model property, identified the property as mapping to a local extension in that standard.
- When a property mapped to an element in one standard (e.g., GJXDM) and a local extension in the other standard (e.g., IEEE 1512), defined the local extension based on the element in the other standard.
- When a property did not map to an element in either standard, defined a common local extension element that is compatible with either standard.

7.3.2 Similarities

Mapping the data models to GJXDM and IEEE 1512 elements illustrated the following similarities between the two standards:

- 121 of the 313 properties (or, 39%) in the data model mapped to elements in both standards (Reference Code "A" in Appendix C table). This suggests that there is a significant overlap between the two standards related to modeling traffic-related incident management information exchanges. Many of these similarities are due to the fact that both standards use compatible schemas for a number of complex structures, including those for person, property, and vehicle. However, some elements that were mapped to both standards are defined in slightly or significantly different structures (e.g. time ranges such as EventInformation/StartTime and EventInformation/StopTime). Examples of groups of elements in common between the two standards include:
  - Address.
  - Person contact information.
  - Dispatcher information.
- 51 of the 313 properties (or, 16%) in the data model did not map to elements in either standard (Reference Code "B" in Appendix C table). This indicates that, even used in combination, there are still gaps in the scope of these standards related to traffic-related incident management. Examples of groups of properties missing in both standards include:
  - Requests for services.
  - Service decisions.

7.3.3 Differences

Mapping the data models to GJXDM and IEEE 1512 elements illustrated the following differences between the two standards:

- 136 of the 313 properties (or, 43%) in the data model mapped to elements in the IEEE 1512 specification but not to the GJXDM (Reference Code "C" in Appendix C table). This indicates that the IEEE 1512 specification is more complete with regard to traffic-related incident management than the GJXDM. Examples of groups of elements in the IEEE 1512 specification that did not map to the GJXDM specification include:
  - Assets (resources).
  - Deployments and planned deployments (resource assignments).
  - Incident command structures.
  - Lanes and links designations.
  - Lane/road closures, detours, and restrictions.
  - Staging areas.
- Five of the 313 properties (or, 2%) in the data model mapped to elements in the GJXDM but not to the IEEE 1512 specification (Reference Code "D" in Appendix C table). This suggests that the GJXDM defines few traffic-related incident management elements that cannot be

mapped to the IEEE 1512 specification. This is logical since the IEEE 1512 specification imports a number of complex structures from the GJXDM, including those for Person, Property, and Vehicle. Example elements in the GJXDM that did not map to the IEEE 1512 specification include:

- Property involved in an incident.
- Vehicle identifiers (e.g., car #1, car #2).

7.3.4 Summary

A significant majority (82%) of the properties in the data model mapped to elements in the IEEE 1512 specification. By comparison, only 40% of the properties in the data model mapped to elements in the GJXDM. This difference can be attributed to the following facts:

- The IEEE 1512 specification is focused on the requirements for management of transportation-related incidents. The GJXDM models for incident management are designed for all incidents and are therefore more generalized.
- The IEEE 1512 specification defines specific messages for most of the information exchanges modeled in this project. The GJXDM is more flexible and does not define messages in the standard itself.

8. Commentary

This section describes some of the lessons learned in this project and recommendations for mapping information exchanges to the GJXDM and the IEEE 1512 specifications.

8.1. Lessons Learned in the Creation of GJXDM/IEEE 1512 Exchanges

To our knowledge, this project was the first attempt to map information exchanges between two data models with the complexity of the GJXDM and the IEEE 1512 specifications. As expected, the project produced a number of lessons learned regarding what works and what does not work related to using these data models. These lessons include the following:

- Although the GJXDM and the IEEE 1512 specifications share some elements, including the GJXDM Person, Property, and Vehicle structures, there are significant differences in the focus, content, and structure of each data model. The similarities and differences between the two models are described in detail in the previous section.
- There was a tendency by some subject matter experts to want to reuse the structures in one standard or the other in the generation of the data models. The decision was made to avoid that approach. While that approach would have made it much simpler to map the data model to one standard, it would not simplify mapping to the other standard and, most importantly, it would not necessarily describe the real-world business requirements.
- When properties mapped to only one or to neither standard, it was useful to map these properties to common structures and elements that could be used with both standards to simplify the transformations between the standards.

- The development of XSLT stylesheets to transform between the GJXDM and the IEEE 1512 versions of the Incident Notification exchange was complicated by the large number of mappings in this complex exchange, as well as the need to convert date and time formats between the two standards. The development of the stylesheets was simplified through the use of Altova Mapforce, a software tool for generating XSLT stylesheets. The date and time conversion issues were overcome through the use of XSLT stylesheets provided by a member of the project team.

8.2. Recommendations for Future Exchanges Between the GJXDM and IEEE 1512 Environments

In addition to the lessons learned in this project, the following considerations are recommended for those defining future exchanges between the GJXDM and IEEE 1512 environments:

- The JIEM model developed in this project includes 64 priority information exchanges between public safety and transportation systems associated with traffic-related incident management, and only a subset of those were modeled in this project (see Appendix D for a list of the JIEM exchanges).[vi] The exchanges not included in the ITS/PS Project should be considered high priority in any future effort to model traffic-related incident management exchanges using the GJXDM and IEEE 1512 specifications.
- The data models developed in this project were intended to be reusable in future projects. For instance, with the co-release of the GJXDM 4.0 and the National Information Exchange Model (NIEM) 2.0, the current data models could be mapped to the new standard with some changes to the existing GJXDM mappings but no changes to the underlying data model. In addition, the data models for any additional traffic-related incident management information exchanges should be able to leverage the existing data models, particularly the Incident Notification data model.

Appendix A: List of Exchanges Modeled and Used in the Analysis

The 12 traffic-related incident management information exchanges modeled in the ITS/PS project included the following:

1)	Incident Notification	Notification and details of non-planned incidents
2)	Incident Status Update	Status updates regarding non-planned incidents
3)	Incident Summary	Summary information about non-planned incidents
4)	Request Incident List	Request for list of current incidents
5)	Event Information	Notification and details of planned events
6)	Event List	List of planned events
7)	Request for Specific Event Information	Request for details of a planned event
8)	Request Event List	Request for a list of planned events
9)	Request for Service	Request for assistance
10)	Decision Response	Response to a request for assistance
11)	Request Road Conditions	Request for a conditions of a specific road
12)	Road Conditions	Response to a request for specific road conditions

Appendix B: List of Exchanges Identified but Not Modeled in the Analysis

The following ten traffic-related incident management information exchanges were identified by the ITS/PS Project committee but not modeled:

1)	Request for Asset Inventory List	Request for a list of available assets
2)	Asset Inventory	Inventory of available assets
3)	Request for Specific Asset Status	Request for the status of a specific asset
4)	Specific Asset Status	Response to a request for status of a specific asset
5)	Request for Usage of a Specific Asset	Request for a specific asset ‘s use
6)	Request for Route Information	Request for route information to/from a specific location
7)	Route Information	Response to a request for route information
8)	Updated Route Information	Update to route information previously provided
9)	Emergency Operations Center (EOC) Plan Information	Provide EOC Plan(s) (evacuation plan, major incident response plan, etc.)
10)	Historical Data	Historical data (incidents, events, road conditions, etc.)

Appendix C: Chart of Properties and Elements

The following table lists the data model properties in the above information exchanges, as well as their corresponding GJXDM and IEEE 1512 elements and the information exchanges in which those properties are used.

Note: The Excel version of this table is available within the final IEPD created by the ITS/PS Information Exchange Project. Visit the project website at www.its.dot.gov/PS_Transinfoexchange.htm for a copy of the IEPD files.

Appendix D: List of Exchanges Identified in the Justice Information Exchange Model (JIEM)

The following 64 priority information exchanges between public safety and transportation systems associated with traffic-related incident management were developed in the JIEM model.

	Exchange	Description
1)	1.01.20	Public Safety Notifies Transportation of incident
2)	1.01.21	Transportation Notifies Public Safety of incident
3)	1.01.22	Transportation requests usage of a specific Public Safety asset
4)	1.01.23	Public Safety requests usage of a specific Transportation asset
5)	1.01.24	Public Safety Requests Services of Transportation
6)	1.01.25	Transportation Requests Services of Public Safety
7)	1.01.26	Transportation inquiries an inventory list of Public Safety Assets
8)	1.01.27	Public Safety inquiries an inventory list of Transportation Assets
9)	1.01.28	Public Safety provides asset inventory to Transportation
10)	1.01.29	Transportation provides asset inventory to Public Safety
11)	1.01.30	Transportation updates Public Safety of incident status
12)	1.01.31	Public Safety updates Transportation of incident status
13)	1.01.32	Public Safety provides decision response to transportation inquiry or request
14)	1.01.33	Transportation provides decision response to Public Safety inquiry or request
15)	1.01.34	Public Safety inquires a specific asset status of Transportation
16)	1.01.35	Transportation inquires a specific asset status of Public Safety
17)	1.01.36	Transportation response with specific asset status to Public Safety
18)	1.01.37	Public Safety response with specific asset status to Transportation
19)	1.01.38	Public Safety Requests traffic conditions of Transportation
20)	1.01.39	Transportation Requests traffic conditions of Public Safety
21)	1.01.40	Transportation provides traffic conditions to Public Safety
22)	1.01.41	Public Safety provides traffic conditions to Transportation
23)	1.01.43	Public Safety Requests Route of Transportation
24)	1.01.44	Transportation Requests Route of Public Safety
25)	1.01.45	Transportation provides Route for Public Safety
26)	1.01.46	Public Safety provides Route for Transportation
27)	1.01.47	Public Safety provides updated Route for Transportation
28)	1.01.48	Transportation provides updated Route for Public Safety
29)	2.01.22	Transportation requests usage of a specific Public Safety asset
30)	2.01.23	Public Safety requests usage of a specific Transportation asset
31)	2.01.24	Public Safety Requests Services of Transportation

	Exchange	Description
32)	2.01.25	Transportation Requests Services of Public Safety
33)	2.01.26	Transportation inquiries an inventory list of Public Safety Assets
34)	2.01.27	Public Safety inquiries an inventory list of Transportation Assets
35)	2.01.28	Public Safety provides asset inventory to Transportation
36)	2.01.29	Transportation provides asset inventory to Public Safety
37)	2.01.32	Public Safety provides decision response to transportation inquiry or request
38)	2.01.33	Transportation provides decision response to Public Safety inquiry or request
39)	2.01.34	Public Safety inquires a specific asset status of Transportation
40)	2.01.35	Transportation inquires a specific asset status of Public Safety
41)	2.01.36	Transportation response with specific asset status to Public Safety
42)	2.01.37	Public Safety response with specific asset status to Transportation
43)	2.01.38	Public Safety Requests traffic conditions of Transportation
44)	2.01.39	Transportation Requests traffic conditions of Public Safety
45)	2.01.40	Transportation provides traffic conditions to Public Safety
46)	2.01.41	Public Safety provides traffic conditions to Transportation
47)	2.01.43	Public Safety Requests Route of Transportation
48)	2.01.44	Transportation Requests Route of Public Safety
49)	2.01.45	Transportation provides Route for Public Safety
50)	2.01.46	Public Safety provides Route for Transportation
51)	2.01.47	Public Safety provides updated Route for Transportation
52)	2.01.48	Transportation provides updated Route for Public Safety
53)	2.01.60	Transportation notifies Public Safety of a pre-planned event
54)	2.01.62	Public Safety notifies Transportation of a pre-planned event
55)	2.01.64	Public Safety requests list of all pre-planned events from Transportation
56)	2.01.66	Transportation provides the list of all pre-planned events to Public Safety
57)	2.01.70	Transportation requests list of all pre-planned events from Public Safety
58)	2.01.72	Public Safety provides the list of all pre-planned events to Transportation
59)	2.01.74	Public Safety requests specific information on an event from Transportation
60)	2.01.76	Transportation requests specific information on an events from Public Safety
61)	2.01.78	Transportation provides the specific event information to Public Safety
62)	2.01.80	Public safety provides the specific event information to Transportation
63)	2.01.84	Transportation notifies Public Safety of updated pre-planned events
64)	2.01.86	Public Safety notifies Transportation of updated pre-planned events

Notes
1.xx.xx series exchanges relate to a specific incident
2.xx.xx series exchanges do not relate to a specific incident

Appendix E: References/Bibliography

The following documents and specifications were referenced in this project:

- Global Justice XML Data Model (GJXDM) 3.0.3, http://it.ojp.gov/topic.jsp?topic_id=228.
- GJXDM Information Exchange Package Documentation (IEPD) Guidelines, http://www.it.ojp.gov/documents/global_jxdm_information_exchange_package_documentation_guidelines_v1_1.doc.
- DRAFT P1512 specification IEEE Standard for Common Incident Management Message Sets for Use by Emergency Management Centers, Rev35, http://www.ieee.org.
- Justice Information Exchange Model (JIEM), http://www.jiem.search.org.
- National Information Exchange Model (NIEM) 1.0, http://niem.gov.
- National Information Sharing Standards (NISS) Help Desk and Knowledgebase, http://it.ojp.gov/NISS/helpdesk/.

For more information about the IJIS Institute or to obtain a copy of this report, visit http://www.ijis.org.

For more information about the ITS/PS Information Exchange Project or to download a copy of the IEPD, visit www.its.dot.gov/PS_Transinfoexchange.htm.

Appendix F: Glossary of Acronyms

The following acronyms are used in this document.

BJA	Bureau of Justice Assistance
CAD	Computer-aided Dispatch
DOJ	Department of Justice
DOT	Department of Transportation
FHWA	Federal Highway Administration
GJXDM	Global Justice XML Data Model
IEEE	Institute of Electrical and Electronics Engineers
IEP	Information Exchange Package
IEPD	Information Exchange Package Documentation
ITS	Intelligent Transportation Systems
ITS/PS	Intelligent Transportation System/Public Safety
JIEM	Justice Information Exchange Model
NIEM	National Information Exchange Model
NISS	National Information Sharing Standards
OJP	Office of Justice Programs
PS	Public Safety
TMC	Traffic Management Center
UML	Unified Modeling Language
USDOT	United States Department of Transportation
XML	eXtensible Markup Language
XSD	XML Schema Definition
XSL	eXtensible Stylesheet Language
XSLT	eXtensible Stylesheet Language Transformation

Endnotes

[i] *Global Justice* – Refers to the Global Justice Information Sharing Initiative which serves as a Federal Advisory Committee (FAC) and advises the U.S. Attorney General on justice information sharing and integration initiatives. Global Justice was created to support the broad-scale exchange of pertinent justice and public safety information. It promotes standards-based electronic information exchange to provide the justice community with timely, accurate, complete, and accessible information in a secure and trusted environment.

[ii] *Properties* – Refers to characteristics or attributes of a class or object in object-oriented paradigms including the UML.

[iii] *eXtensible Stylesheet Language Transformation (XSLT)* is an XML-based language used for the transformation of XML documents. XSLT is designed to transform one XML document into another XML document.

[iv] *Information Exchange Package (IEP)* – Represents a set of data that is transmitted for a specific business purpose. It is the actual XML instance that delivers the payload or information. (The word "package" as used herein refers to a package of the actual data, not a package of artifacts documenting the structure and content of the data.)

IEP Documentation (IEPD) – Connotes a collection of artifacts that describe the structure and content of an IEP. It does not specify other interface layers (such as Web services). The artifacts include normative exchange specifications, examples, metadata, and supporting documentation. The entire package is archived as a single compressed file.

[v] *Local Extensions* – Refers to XML schemas, types, or elements that define data structures necessary for an information exchange that are not present in the standard (GJXDM or IEEE 1512) being used to represent that exchange.

[vi] There are 64 JIEM exchanges, as compared to 12 mapped and 10 unmapped exchanges. The reason the JIEM list is significantly longer is that, in the JIEM model, each exchange is specific to a single direction and also to whether it relates to a single or multiple incident/event.