



**IJIS Institute**

## **EXCHANGE VALIDATION REPORT**

### **A Report on the Validation Testing of 12 Intelligent Transportation System (ITS) / Public Safety (PS) Data Exchanges**

ITS/PS Information Exchange Project

Report Date

January 13, 2009

IJIS Institute Staff

Scott Parker  
Project Manager

**U.S. Department of Transportation**

1200 New Jersey Ave, SE  
Washington, DC 20590

The Honorable Mary E. Peters  
*Secretary of Transportation*

The Honorable Vice Admiral Thomas J. Barrett  
*Deputy Secretary of Transportation*

The Honorable Paul Brubaker  
*Administrator, Research and Innovative Technology Administration*

The Honorable Cheryl McQueary  
*Deputy Administrator, Research and Innovative Technology Administration*

The Honorable Shelley Row  
*Associate Administrator and Director, Intelligent Transportation Systems Joint Program Office*

---

**U.S. Department of Transportation**

[www.dot.gov](http://www.dot.gov)

---

**Research and Innovative Technology Administration**

[www.rita.dot.gov](http://www.rita.dot.gov)

---

**For business opportunities information contact**

**U.S. Department of Transportation**

[www.dot.gov/business](http://www.dot.gov/business)

---



**RITA, Research and Innovative Technology Administration**

This project was supported and funded by the Research and Innovative Technology Administration (RITA) through an interdepartmental transfer provided to the Bureau of Justice Assistance (BJA). RITA is a component of the US Department of Transportation. Points of view or opinions in this document are those of the author and do not represent the official position or policies of the United States Department of Transportation.

**U.S. Department of Justice  
Office of Justice Programs**

810 Seventh Street, NW.  
Washington, DC 20531

The Honorable Michael B. Mukasey  
*Attorney General*

The Honorable Mark R. Filip  
*Deputy Attorney General*

The Honorable Kevin O'Connor  
*Associate Attorney General*

The Honorable Jeffrey L. Sedgwick  
*Assistant Attorney General*

The Honorable Domingo S. Herraiz  
*Director, Bureau of Justice Assistance*

---

**Office of Justice Programs**

[www.ojp.usdoj.gov](http://www.ojp.usdoj.gov)

---

**Bureau of Justice Assistance**

[www.ojp.usdoj.gov/BJA](http://www.ojp.usdoj.gov/BJA)

---

**For grant and funding information contact**

**U.S. Department of Justice, Office of Justice Programs**

**Funding Opportunities**

<http://www.ojp.usdoj.gov/funding>

---



**BJA Bureau of Justice Assistance**

This project was supported by Grant No. 2005-DD-BX-K010 awarded by the Bureau of Justice Assistance. The Bureau of Justice Assistance is a component of the Office of Justice Programs, which also includes the Bureau of Justice Statistics, the National Institute of Justice, the Office of Juvenile Justice and Delinquency Prevention, and the Office for Victims of Crime. Points of view or opinions in this document are those of the author and do not represent the official position or policies of the United States Department of Justice.

## Table of Contents

1. Purpose of This Report .....	1
2. Acknowledgements .....	1
3. Background .....	2
4. Validation Testing .....	6
4.1. Specific Tasks .....	6
4.2. NISS Help Desk Findings .....	7
4.3. Summary of Tasks Requiring Further Investigation .....	11
5. Results .....	12
6. Conclusion.....	14
6.1. Statistics.....	14
6.2. Lesson Learned .....	14
Appendix A: Validation Tracking Spreadsheet .....	15

## 1. Purpose of This Report

“Validation Testing” of the 12 exchanges produced by the Intelligent Transportation Systems (ITS)/Public Safety (PS) Information Sharing project is a defined deliverable of that project. This report provides documentation of the testing and results.

## 2. Acknowledgements

The Intelligent Transportation Systems / Public Safety Exchange Standards Project is funded by the Research and Innovative Technology Administration (RITA), U.S. Department of Transportation (DOT), through an interagency agreement with the Bureau of Justice Assistance (BJA) of the Office of Justice Programs (OJP) in the U.S. Department of Justice (DOJ).

This report, and the many work products of IJIS Institute’s Intelligent Transportation Systems (ITS)/Public Safety (PS) Exchange Standards Project, would not exist without the full support of the Research and Innovative Technology Administration (RITA), U.S. 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 the many justice and transportation practitioners who devote their time and share their invaluable expertise for projects such as these.

Scott Parker  
Technical Project Manager  
IJIS Institute

### 3. Background

Emergencies demand effective communication of information between public safety and transportation agencies responding to any situation; but, the absence of a uniform approach for data sharing remains a barrier. To fill this void, the Intelligent Transportation Systems and Public Safety Information Exchange Project established a standards-based approach to critical information exchange. The benefits to agencies implementing these exchanges include:

- ◆ Faster exchange of information between agencies;
- ◆ Increased accuracy of information exchanged between agencies;
- ◆ Savings in costs by using the same exchanges with a variety of agencies;
- ◆ Better personnel utilization and efficiency;
- ◆ Shortened response times;
- ◆ Faster clearance of events;
- ◆ Improved responder safety through better information; and
- ◆ Enhanced public mobility through reduced congestion and faster clearance.

By facilitating faster and better communications, this project will enhance daily operations and help ensure more immediate, safe, and effective response to routine incidents, natural disasters, terrorist acts, and other major incidents. Public safety and transportation agencies will have more accurate and timely information to perform their role, and the public will be better served in times of emergency.

Initiated in 2005, the Intelligent Transportation Systems and Public Safety Information Exchange Project is a collaborative effort between the transportation and public safety communities. The [U.S. Department of Transportation \(DOT\) Research and Innovative Technology Administration \(RITA\)](#) and [U.S. Department of Justice \(DOJ\)](#) co-sponsor the project, with management support provided by the [IJIS Institute](#).

Both the transportation and public safety communities have been developing information exchange standards unique to their own needs and systems. Transportation incident management uses standards developed in conjunction with [IEEE](#). In contrast, the public safety community has developed the Global Justice XML Data Model (GJXDM), supported by the [Global Justice Information Sharing Initiative \(Global\)](#) operating under the auspices of the Office of Justice Programs of DOJ.

Led by a steering committee comprised of both practitioners and industry representatives, and supported by technical working teams and subject matter experts, the project is engaged in the development of standardized Information Exchange Packages Documentation (IEPDs) incorporating both GJXDM and IEEE standards.

Extensible Markup Language (XML) is the first layer in the foundation of IEPDs. XML offers technologists with a universal way of sending and receiving data. For those not familiar with XML, think of it being much like HTML. While HTML has tags that define how data is displayed on a website or screen (e.g. centered, bold, red, or 12-point font), XML uses tags to describe what the data is (victim, agency, automobile, or suspect). The limitation of XML,

however, is that it does not inherently constrain how one can describe data. That means one could call the Volvo S80 an <automobile>, a second could call it a <make and model>, and another could call it the <get-away vehicle>. So, born was the GJXDM – a way to define common usages of XML for the justice and public safety communities – and the IEEE 1512 standard for transportation.

The standards (GJXDM and IEEE 1512), understandably, contain an enormous number of elements, given the vast and widely diverse communities they support. It is prudent, therefore, to develop Information Exchange Packages (IEPs) which carry a sub-set of elements for a specific information exchange purpose. This allows implementers to limit their focus to only relevant elements for the particular exchange events, triggers, conditions, and agencies their IEP is designed to support. This leads us to the development of IEPDs.

An IEPD is a collection of artifacts that support an implementer’s creation of IEPs. IEP Documents are typically composed of several artifacts:

- ◆ A domain model provides a graphical depiction of those data elements required for implementing an exchange and the cardinality of those data elements. Domain models are typically developed in Unified Modeling Language (UML).
- ◆ IEPDs include a Component Mapping Template, which is a spreadsheet (XLS file) that associates each required data element with its corresponding XML data element.
- ◆ IEPDs include the actual schemas. Since most people are not comfortable reading XML schemas, it is recommended that all IEPDs include at least one sample XML Instance to help practitioners validate the model, mapping, and schemas in a more intuitive way. The XML Instance contains sample data that is formatted according to the rules defined within the schema. Both schema and instance are provided in XML.
- ◆ Stylesheets may be included to transform an XML document into a plain text or HTML document for easy reading. This IEPD includes one such stylesheet for each document type. Depending on the circumstances, stylesheets may also be included to transform an XML document into an XML document conforming to a different XML schema. In this case, the IEPD includes stylesheets to transform GJXDM instances into IEEE 1512 instances and stylesheets to transform IEEE 1512 instances into GJXDM instances. Stylesheets are written in XSLT.
- ◆ Lastly, an overview document which includes a written description of the approach used, people involved, and key assumptions made during IEPD development is included. The overview document is provided as a DOC file.

The collection of IEPD artifacts gives implementers tangible products which can be leveraged for local implementation. Use of IEPDs has proven to save time and money on interface development phases from requirements to testing. Moreover, use of IEPD artifacts advances the widespread adoption of national standards as well as the realization of reuse benefits.

Note that this project does not seek to supplant existing intra-community standards, but instead the project focus is on identifying the common information interests of the two communities and developing exchange methods for data sharing where their interests intersect. These GJXDM/IEEE exchanges provide a flexible method for the transfer of essential information now and in the future.

The 12 information exchanges modeled are:

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 conditions of a specific road
12	Road Conditions	Response to a request for specific road conditions

Two subcontractors were used for the development of these exchanges and the resulting IEPD. The first subcontractor addressed the domain modeling, the mapping to both IEEE 1512 and to GJXDM, and created the initial schema and instances. The second subcontractor created the transformation stylesheets, tweaked the artifacts as necessary for the transformation, and finalized the IEPD. (NOTE: The transformation stylesheets are the key deliverable of the project – the means by which the public safety and transportation communities are expected to perform the transformation of data messages from one standard form to the other.) The IEPD containing all 12 exchanges was completed on April 14, 2008.

The final IEPD contains the following artifacts:

	Artifact	Notes
1	UML Model Domain Diagrams	One for each exchange.
2	Component Mapping Spreadsheet	One for each exchange.
3	GJXDM Schema	One for each exchange.
4	GJXDM Instance	One for each exchange.
5	GJXDM-to-IEEE Transformation Stylesheet	One for each exchange.
6	GJXDM Sample Stylesheet	One for each exchange.
7	IEEE Schema	One provided for all exchanges.  There is actually one XML schema for IEEE 1512, and all 12 message types are instances of it, using different parts of the schema.
8	IEEE Instance	One for each exchange.

<b>9</b>	<b>IEEE-to-GJXDM Transformation Stylesheet</b>	<b>One for each exchange.</b>
<b>10</b>	<b>IEEE Sample Stylesheet</b>	<b>One for each exchange.</b>
<b>11</b>	<b>Overview Document w/ Metadata</b>	<b>One provided for all exchanges; each exchange has its own section for metadata.</b>
<b>12</b>	<b>Other Supplemental Info for Developers</b>	<b>Misc info and work files for developers and implementers.</b>

Other planned deliverables of this project (other than the validation testing) include:

- 12 ITS/PS Exchanges (in one IEPD).
- GJXDM-IEEE 1512 Compatibility Analysis Report.
- Proof of Concept Implementation in Houston, Texas.

## 4. Validation Testing

As the project progressed, a deliverable was added to the scope of the project for “Validation Testing” – laboratory testing of the soundness and accuracy of the exchanges. The original plan for the Validation Testing called for a team of four technologists (three from IJIS Institute member firms and one from a DOT subcontractor) to conduct the tests over a three-day period at the IJIS Institute facility in Ashburn, Virginia. This was later modified to have the testing performed over a period of several weeks by the technologists at the National Information Sharing Standards (NISS) Help Desk. The ITS/PS Information Sharing project manager designed the testing tasks.

### 4.1. Specific Tasks

The NISS Help Desk was provided the entire IEPD and then performed the following specific testing tasks *for each of the 12 exchanges*:

- ◆ Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema.
  - Does the GJXDM schema reflect all elements identified in the domain model?
- ◆ Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements.
  - Make sure the GJXDM instance has sample data for each element identified in the domain model; if not, add the missing data for testing purposes.
- ◆ Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR).
  - Are the artifacts conformant to the GJXDM NDR, and, if not, how so?
- ◆ Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE.
  - Does the instance transform using the IEPD stylesheet?
- ◆ Step 5: Compare the resulting IEEE instance to the GJXDM instance.
  - Does the resulting IEEE 1512 instance contain all data elements in the originating GJXDM instance?
- ◆ Step 6: Comparison of the domain model (UML diagram) to the IEEE schema.
  - Does the IEEE 1512 schema reflect all elements identified in the domain model?
- ◆ Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements.
  - Make sure the IEEE 1512 instance has sample data for each element identified in the domain model; if not, add the missing data for testing purposes.
- ◆ Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM.
  - Does the instance transform using the IEPD stylesheet?
- ◆ Step 9: Compare the resulting GJXDM instance to the IEEE instance.
  - Does the resulting GJXDM instance contain all data elements in the originating IEEE 1512 instance?

## 4.2. NISS Help Desk Findings

Out of 108 total tasks (nine for each of the 12 exchanges), 84 tasks were found to be successful (passed without issue) by the NISS Help Desk, and 24 were not successful. The following is a list of all exchanges and the results for each task.

### Incident Notification

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IIEEE	successful
Step 5: Compare the resulting IIEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IIEEE schema	successful
Step 7: Ensure the IIEEE instance matches the reference schema and is complete regarding the domain model elements	Damaged Property, and Involved Property elements missing in IIEEE Instance
Step 8: Using the transformation stylesheet transform the IIEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IIEEE instance	Damaged Property, and Involved Property elements missing in IIEEE Instance

### Incident Status Update

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IIEEE	successful
Step 5: Compare the resulting IIEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IIEEE schema	IncidentStatus element missing in IIEEE schema.
Step 7: Ensure the IIEEE instance matches the reference schema and is complete regarding the domain model elements	IncidentStatus element missing in IIEEE schema.
Step 8: Using the transformation stylesheet transform the IIEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IIEEE instance	successful

### Incident Summary

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IIEEE	successful
Step 5: Compare the resulting IIEEE instance to the GJXDM instance	successful

Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Request Incident List

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	successful
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	successful
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Event Information

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Event List

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.

Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Request for Specific Event Information

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Request Event List

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	successful
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	successful
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### Request for Service

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	successful
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	successful
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

## Decision Response

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	successful
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	successful
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

## Request Road Conditions

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	successful
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	successful
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	successful
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	successful
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

## Road Conditions

TASK	RESULT
Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 3: Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	successful
Step 4: Using the transformation stylesheet transform the GJXDM instance to IEEE	successful
Step 5: Compare the resulting IEEE instance to the GJXDM instance	successful
Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.
Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
Step 8: Using the transformation stylesheet transform the IEEE instance to GJXDM	successful
Step 9: Compare the resulting GJXDM instance to the IEEE instance	successful

### 4.3. Summary of Tasks Requiring Further Investigation

A compilation of the “Not Successful” tasks is as follows:

EXCHANGES	TASK	RESULTS
Incident Notification	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Damaged Property, and Involved Property elements missing in IEEE Instance
	Step 9: Compare the resulting GJXDM instance to the IEEE instance	Damaged Property, and Involved Property elements missing in IEEE Instance
Incident Status Update	Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	IncidentStatus element missing in IEEE schema.
	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	IncidentStatus element missing in IEEE schema.
Incident Summary; Event Information; Event List; Request for Specific Event Information; and Road Conditions  <b>(these 5 exchanges all had the same findings)</b>	Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.
	Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.
	Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.
	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.

## 5. Results

Subsequent to the testing, the results were provided to the IEPD second subcontractor who finalized the IEPD. The subcontractor supplied the following response:

EXCHANGES	TASK	RESULTS	SUBCONTRACTOR RESPONSE
Incident Notification	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Damaged Property, and Involved Property elements missing in IEEE Instance	Assertion by testers is correct; these elements are not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element names in the appropriate xslt document. <b>Both instance documents have been modified</b> to include these elements. Both have been tested against their respective XSLT's and transform correctly.
	Step 9: Compare the resulting GJXDM instance to the IEEE instance	Damaged Property, and Involved Property elements missing in IEEE Instance	Assertion by testers is correct; these elements are not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element names in the appropriate xslt document. <b>Both instance documents have been modified</b> to include these elements. Both have been tested against their respective XSLT's and transform correctly.
Incident Status Update	Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	IncidentStatus element missing in IEEE schema.	Assertion by testers appears to be <b>incorrect</b> . The element in question can be found at the following location: ...incidentDescription/IdxSubParts/descriptionReports/descriptionreport/header/basics/status.
	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	IncidentStatus element missing in IEEE schema.	Assertion by testers is correct; this element is not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element name in the appropriate xslt document. <b>Both instance documents have been modified</b> to include these elements. Both have been tested against their respective XSLT's and transform correctly.
Incident Summary; Event Information; Event List; Request for Specific Event Information; and Road Conditions  <b>(these 5 exchanges all had the same findings)</b>	Step 1: Comparison of the domain model (UML diagram) to the GJXDM schema	Dispatcher element missing in UML Diagram.	The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivalence to "ContactPerson" (GJXDM) and is, therefore, in our opinion, <b>not an error</b> .
	Step 2: Ensure the GJXDM instance matches the reference schema and is complete regarding the domain model	Dispatcher element missing in UML Diagram.	The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivalence to "ContactPerson" (GJXDM) and is, therefore, in our opinion, <b>not an error</b> .

	elements		
	Step 6: Comparison of the domain model (UML diagram) to the IEEE schema	Dispatcher element missing in UML Diagram.	The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivalence to "ContactPerson" (GJXDM) and is, therefore, in our opinion, <b>not an error</b> .
	Step 7: Ensure the IEEE instance matches the reference schema and is complete regarding the domain model elements	Dispatcher element missing in UML Diagram.	The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivalence to "ContactPerson" (GJXDM) and is, therefore, in our opinion, <b>not an error</b> .

The subcontractor supplied the following six updated artifacts:

- ◆ 01-Incident Notification.xls
- ◆ 01-ITSPS-1512-IncidentNotification.xml
- ◆ 01-ITSPS-GJXDM-IncidentNotification.xml
- ◆ 04-IncidentStatusUpdate - GJXDMto1512.xslt
- ◆ 04-ITSPS-1512-IncidentStatusUpdate.xml
- ◆ 04-ITSPS-GJXDM-IncidentStatusUpdate.xml

On October 24, 2008, these artifacts were incorporated into an updated version of the IEPD, "ITS-PS IEPD 20081024", and are available for use by current and future implementation efforts.

## 6. Conclusion

The effort put forth to test these exchanges was quite beneficial – issues were identified and they were then addressed technically, producing a more viable and accurate IEPD for practitioner and industry implementers.

### 6.1. Statistics

- ◆ 108 testing tasks performed by the testing team; nine for each exchange.
- ◆ 24 tasks were identified as “not successful” (26%) by the testing team.

Of those:

- ◆ Three tasks were confirmed as errors (3%) by the development team and the project manager.
- ◆ 21 tasks were explained as not being errors (23%) by the development team.

Artifacts:

- ◆ Six technical artifacts updated affecting two exchanges.

### 6.2. Lesson Learned

The testers did work to ensure that the test case included all possible data fields present in the domain model for each exchange. Given the structured nature of XML documents and XSLT transformations, this feature covered much of the required ground for testing. However, it did not demonstrate the ability of the transformation style sheets to handle repeated elements (where permitted by the schema), or omitted elements (where permitted by the schema), nor did it rule out the possibility that the style sheets “hard-wired” certain elements to be generated, matching the known content of the test cases. Future exchange testing should take these scenarios into consideration.

## **Appendix A: Validation Tracking Spreadsheet**

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Incident Notification							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and the IEEE master schema - see IM-Local-Draft-03-00-40.xsd		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	Missing 2 elements in IEEE instance	Missing elements in IEEE instance	Damaged Property, and Involved Property elements missing in IEEE Instance (note: see ITS-PS IEPD Overview and Metadata document section 3.6). Task done by checking elements in schema, instance, and UML	Assertion by testers is correct, these elements are not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element names in the appropriate xslt document. Both instance documents have been modified to include these elements. Both have been tested against their respective XSLT's and transform correctly.	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Not Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance except the 2 elements missing from the original IEEE instance were also absent from the resulting GJXDM instance)	None	Damaged Property, and Involved Property elements missing in the original IEEE instance were also absent from the resulting GJXDM instance. Task done by checking elements in both instances against the UML Diagram	Assertion by testers is correct, these elements are not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element names in the appropriate xslt document. Both instance documents have been modified to include these elements. Both have been tested against their respective XSLT's and transform correctly.	Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Incident Status Update							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Not Successful	Missing 1 element in IEEE schema	Missing element in IEEE schema	IncidentStatus element missing in IEEE schema. Task done by checking elements in both UML and schema.	<i>Assertion by Testers appears to be incorrect. The element in question can be found at the following location: ...incidentDescription/IdxSubParts/description Reports/descriptionreport/header/basics/status</i>	Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	Missing 1 element in IEEE schema	Missing element in IEEE schema	IncidentStatus element missing in IEEE schema. Task done by checking elements in instance, schema, and UML.	<i>Assertion by testers is correct, this element is not present in the IEEE instance document. The transformation stylesheet DOES however contain the correct mapping references which can be confirmed by searching for the element name in the appropriate xslt document. Both instance documents have been modified to include these elements. Both have been tested against their respective XSLT's and transform correctly.</i>	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange:		Incident Summary					
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM) and is therefore, in our opinion, not an error.</i>	Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM) and is therefore, in our opinion, not an error.</i>	Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM) and is therefore, in our opinion, not an error.</i>	Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM) and is therefore, in our opinion, not an error.</i>	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Request Incident List							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Event Information							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Event List							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEE) and is therefore, in our opinion, not an error.</i>	Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEE) and is therefore, in our opinion, not an error.</i>	Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEE schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEE) and is therefore, in our opinion, not an error.</i>	Successful
7) Ensure the IEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEE) and is therefore, in our opinion, not an error.</i>	Successful
8) Using the transformation stylesheet transform the IEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange:		Request for Specific Event Information					
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Not Successful	1 element missing in UML diagram	1 element missing in UML diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram	1 element missing in UML diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram but instance elements are complete match to schema elements	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements and attributes in schema, instance, and UML.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Request Event List							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.		Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Request for Service							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange:		Decision Response					
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Request Road Conditions							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match (elements in UML are all present in the instance and schema)	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Successful	Complete Match (elements in UML are all present in the schema)	None	Task done by checking elements in both UML and schema		Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Successful	Complete Match	None	Task done by checking elements and attributes in schema, instance, and UML		Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful

ITS/PS Information Exchange Project - Data Validation (tested IEPD dated 20080414; final IEPD dated 20081024)							
Exchange: Road Conditions							
Tasks	Completed	Outcome	Accuracy	Problems	Additional Comments	Developer Response	Current Status 10-24-08
1) Comparism of the domain model (UML diagram) to the GJXDM schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
2) Ensure the GJXDM instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
3) Validate the IEPD's GJXDM artifacts against the GJXDM Naming and Design Rules (NDR)	Yes	Successful	Artifacts are complete and instance validates against schema	None	Task done by validating the instance using XMLSpy application and using GJXDM User Guide		Successful
4) Using the transformation stylesheet transform the GJXDM instance to IEEE	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
5) Compare the resulting IEEE instance to the GJXDM instance.	Yes	Successful	Complete Match (elements in the resulting IEEE Instance are all present in the GJXDM instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful
6) Comparism of the domain model (UML diagram) to the IEEE schema.	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
7) Ensure the IEEE instance (provided) matches the reference schema and is complete regarding the domain model elements	Yes	Not Successful	1 element missing in UML diagram	Missing element in UML Diagram	Dispatcher element missing in UML Diagram. Task done by checking elements in both UML and schema.	<i>The UML diagram uses business terminology, that does not (usually) match GJXDM. The business term "Dispatcher" (UML) has semantic equivilence to "ContactPerson" (GJXDM &amp; IEEE) and is therefore, in our opinion, not an error.</i>	Successful
8) Using the transformation stylesheet transform the IEEE instance to GJXDM	Yes	Successful	N/A	None	Task done by transforming the instance in XMLSpy application		Successful
9) Compare the resulting GJXDM instance to the IEEE instance.	Yes	Successful	Complete Match (elements in the resulting GJXDM Instance are all present in the IEEE instance)	None	Task done by checking elements in both instances against the UML Diagram		Successful