

Exchange Documentation Package Preparation and Review Process for the Exchange Network

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Prepared by
The Exchange Network
Network Technology Group



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Document Preparation Process and Acknowledgements

The process described in this document is the product of three iterations of revision and enhancement to the Exchange Network’s framework for developing, documenting and reviewing exchange schema, documentation and related artifacts. The initial version was produced in 2003 by the Network’s Technology Resource Group (TRG), entitled the *Schema Review Process for Schema Developers*. In 2005, the Network Technology Group (NTG) prepared version 2.0 of this document, which was titled *Exchange Network Schema Conformance Report Preparation and Review Process*. In this third and latest iteration, the preceding version was updated by the NTG Schema Conformance Task Force to develop a more streamlined process that also takes into account exchange artifacts beyond the XML schema.

The Task Force members and contractors who participated in this and previous efforts are listed in the table below.

| Task Force Participant | Affiliation | Version |
|-------------------------------|---|----------------|
| Tom Aten | Wisconsin DNR | 1.0, 2.0, 3.0 |
| Bruce Bargmeyer | US EPA | 1.0 |
| Mike Beaulac | Michigan DEQ | 1.0 |
| Dennis Burling | Nebraska DEQ | 1.0, 2.0, 3.0 |
| Glen Carr | Oregon DEQ | 3.0 |
| Sarah Calvillo | Ross & Associates | 1.0 |
| Tim Crawford | US EPA | 1.0 |
| Larry Fitzwater | US EPA | 1.0 |
| Terry Forest | US EPA | 1.0 |
| Charles Freeman | EPA Office of Environmental Information | 2.0 |
| Jeff Kohn | US EPA | 1.0 |
| Nick Mangus | EPA Office of Air and Radiation | 2.0 |
| Matt Markoff | Ross & Associates | 2.0 |
| Brand Neimann | US EPA | 1.0 |
| Molly O’Neill | ECOS | 1.0 |
| Kurt Rakouskas | ECOS | 2.0 |
| Bill Rensmith | Windsor Solutions | 2.0, 3.0 |
| Chris Staten | Mississippi DEQ | 3.0 |
| Louis Sweeny | Ross & Associates | 1.0 |
| Steve Vineski | US EPA | 1.0 |
| Nicole Wigder | Ross & Associates | 2.0 |

Abstract

This document describes the process for exchange developers to prepare and submit XML schema and exchange documentation for review and acceptance by Exchange Network Governance. It also describes the review process and outcomes.

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1. Introduction and Intended Audiences

Preparation of an Exchange Documentation Package (package) is required for all exchanges to be published to the Exchange Network (Network). The primary purpose of the package is to provide exchange implementers with a consistent set of documentation and implementation resources for an exchange.

In addition to preparing the package, exchange developers must also complete an Exchange Conformance Review Checklist (checklist). The checklist provides both the exchange developer and Network Governance with a concise tool for evaluating conformance with Network exchange design rules and guidelines.

Section 2 of this document describes preparation of a package, Section 3 describes the exchange package review process, and Section 4 provides step-by-step instructions for preparing and submitting the package.

Purpose of Package and Checklist Review Process

The package and checklist review process has been designed to:

- Provide developers with a tool to check conformance with Network standards and guidelines
- Improve the quality of exchanges and exchange documentation on the Network
- Help Network Governance evaluate the degree to which a package conforms to Network standards and guidelines
- Help Network Governance better understand implementation challenges, and identify areas where support for exchange development could be improved

The checklist and review process also provides useful information to exchange developers looking for good examples of ‘model’ Network exchanges.

Audience for this document

This document is intended to familiarize exchange owners, Integrated Project Teams (IPTs), and exchange developers with the process for approving packages for use on Network. Accordingly, the intended audience for this document is as follows:

- **Exchange owner** - the representative(s) of the entity (or entities) sponsoring exchange development. Exchange owners need to be familiar with package requirements and the review process (Sections 2 & 3).
- **IPT** - the group contributing to exchange design, and responsible for developing or managing development of an exchange. IPTs need to understand package requirements, the conformance review process, and the checklist (Sections 2, 3, and Appendix A).
- **Exchange developer** - technical resource(s) engaged in developing schema and supporting products/materials under the direction of the IPT. The exchange developer is typically responsible for preparing the package and checklist. Schema developers need to understand package requirements, the conformance review process, and the checklist (Sections 2, 3, and Appendix A)

2. Exchange Documentation Package Development

This section provides background information on preparing a package. Separate instructions are provided for groups preparing new or updated packages. Lastly, a description of tools and resources available to exchange development groups is provided.

Guidelines for Preparing Exchange Documentation Packages

Exchange developers should review the applicable portions of the Exchange Design Rules and Conventions (EDRCs) for a list of the requisite components of a complete package. Specifically, developers should consult the sections for Publishing an Exchange and Exchange Documentation.

Exchange developers use the checklist to document a package's conformance to exchange development rules and guidelines. The checklist is included in Appendix A of this document.

NEW Packages

Exchange developers that are creating new Network exchanges must follow all the guidelines listed in the EDRCs for required package components. Packages must include the following components:

- XML schema
- Data Exchange Template (DET)
- Flow Configuration Document (FCD)
- Sample XML instance files
- Completed checklist

In some cases, it may be acceptable to omit a required component from a package. For example, a new exchange that leverages an existing, approved Network XML schema may omit the schema from the package.

REVISED Packages

The Exchange Network Governance bodies expect that groups upgrading an exchange will review and follow the schema and component versioning guidelines as described in the XML Design Rules and Conventions (DRCs) and the EDRCs. Following the proper versioning guidelines is a critical aspect when submitting a package for a revised exchange.

All exchange packages, whether for new or revised exchanges, must include a completed checklist. For revised exchanges, the checklist from the previous release should be used as a basis for the new checklist. If any item in the checklist is marked "no", the explanatory text must be retained from the previous version.

All upgraded schemas must be accompanied by a change control log. The change control log must be located in the same directory in the submission package as the XML schema files. The change control log must retain all previous change history information so that the full history of changes is readily available to exchange implementers.

In addition to a schema change log, exchange developers should include a brief description of the changes to other exchange materials, such as the FCD. This will assist Network Governance in evaluating changes. Governance may also use this text as a basis for a short introductory narrative to the revised exchange on the Network web site.

Tools and Resources for Schema Developers and IPTs

Network Governance is committed to providing the necessary tools and support to create high quality Network schema and exchange documentation. The following resources should be leveraged to streamline the exchange development process and improve the quality of exchanges and associated artifacts

Exchange Development Assistance – Upon request, Network Governance will arrange for contractors to give developers a short technical review of their draft schema and exchange design. This support will take advantage of both implementation experience and current Exchange Network guidance. The review is to help developers identify and resolve design problems as early as possible. The Exchange Network strongly encourages anyone developing a new Exchange Network schema, or preparing a major upgrade to an existing schema, to contact the Network Coordinator to arrange for guidance and technical assistance.

Check the “Knowledge Base” area of the Exchange Network web site for information on obtaining exchange development assistance.

Rules, Guidance, and Best Practices – The Exchange Network web site’s Knowledge Base is the central location for all information and materials related to the development and implementation of Network exchanges. Exchange developers are encouraged to become familiar with and leverage the available materials.

3. Exchange Conformance Review Process

This section describes the process followed by Network Governance to review packages, provide feedback, and post final exchange documentation to the Network web site and Repository¹.

Conformance Review Process Overview

Exchange developers should submit completed packages to the NTG², which will form a Conformance Committee (Committee). The following diagram describes the Committee's conformance documentation review process:

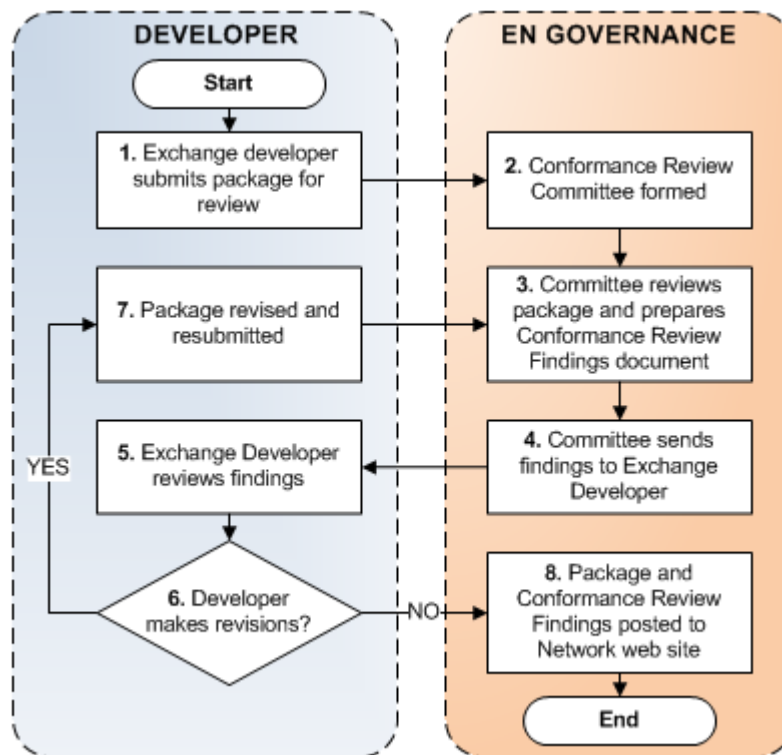


Diagram 1: Conformance Review Process

The steps in the diagram above are described in detail below.

1. After completing the checklist, the exchange components are bundled into an exchange documentation package and submitted for conformance review.
2. Governance forms a Conformance Review Committee to review the package. The committee members are chosen based on availability and familiarity with the exchange's subject matter.

¹ The repository is a browseable directory of all approved Network XML schema. It is located at <http://www.exchangenetwork.net/schema/>. This serves as a resolvable URL that matches the namespace used in the exchange's XML schema.

² Submit flow documentation packages to the NTG co-chairs. Contact information for the NTG co-chairs is available at <http://www.exchangenetwork.net/about/network-management/>

3. The committee reviews the checklist and, at its discretion, may choose to evaluate the schema and accompanying artifacts for conformance with published rules and guidelines.
4. Committee members combine notes and, if deemed necessary, may hold a committee conference call to discuss findings and to further refine the conformance review findings. The consolidated findings are returned to the package developer.
5. The exchange developer reviews the findings. If desired, the exchange developer may request a conference call to clarify or discuss findings.
6. The developer determines whether any of the findings necessitate revisions to the package components. In some cases, it is not feasible to make additional changes due to funding constraints, implementation deadlines, or other factors.
7. If deemed necessary and feasible, the exchange developer may choose to revise aspects of the exchange package. In many cases, certain aspects of the exchange cannot be revised (such as the schema), but other aspects (such as corrections or clarifications in the FCD) can be made. While not all findings may be addressable, Network Governance encourages exchange developers to make revisions where feasible, even if all issues cannot be addressed.
8. If no significant issues are identified or if the exchange developer has completed all feasible revisions, the final exchange documentation package and findings documents are posted to the Network website. In most cases, the Network web site administrator will send out a Network alert, advertising availability of the new exchange.

Posting of Draft Deliverables

Governance acknowledges that in some cases, it is in the best interest of the wider Network community to have access to draft deliverables before the conformance review process is complete. In these cases, exchange developers may request that draft deliverables be posted to the Network website. In these cases, it is critical that exchange developers follow the EDRC rules and guidelines for properly marking draft deliverables. This will help eliminate confusion about the status of a given exchange artifact.

Philosophy of Conformance Review

Network Governance instituted the conformance review process to improve the quality and consistency of exchanges. This process is designed to be a constructive dialog between developers and the Governance groups.

Governance does not expect that all exchanges will adhere perfectly with Network design guidance. Each exchange has unique requirements that may result in aspects of design that do not align with rules. Also, the constraints of budgets and timelines may not allow for multiple iterations of refinement. The goal of this review process is to promote better quality exchanges with reduced overall effort through the publishing of detailed guidance, exchange development assistance, and ongoing dialog.

When Significant Issues Remain Unresolved

Exchanges may have some minor issues that are not resolved before being released to the Network web site in final status. In most cases, these issues are not significant enough to warrant caution on the part of exchange implementers. Since the conformance review findings are always posted on the Network web site along with the exchange package, they are available to

implementers for review. Implementers will ultimately decide whether the issues are significant enough to deter participation in the exchange.

Cases may arise where the Committee determines that a package carries significant risks for implementers due to issues with the schema, exchange architecture, or documentation. In these cases, the Committee may recommend that additional language be included on the Network website, cautioning potential implementers that the package does not sufficiently meet Network guidelines and standards. Again, the availability of conformance review findings allows the Network community to review the reasoning for the warning to determine whether implementation of the exchange is a risk to their agency/department.

In cases where cautionary language is warranted, Network Governance will not prohibit use of the exchange. Instead, non-approval by the NTG is meant to serve as a caution to implementers of the exchange and other exchange developers. Members of the Network community are encouraged to bring questions regarding exchanges whose packages were not fully approved by the Committee.

In rare cases, the Committee may reject a package outright. This situation could occur if the Committee determines that the package contains one or more severe or insurmountable technical issues such as a fundamental incompatibility with the Network's underlying architecture. Non-technical aspects of the exchange architecture (such as business process design) will not be used by the committee as a basis for package rejection.

4. Step-by-Step Guide for Package Preparation

This section of the document provides a step-by-step guide for exchange developers to prepare a package for submission.

A. Confirm that schemas and instance files are well-formed and valid

- **Schema Validity** – It is recommended that schema developers use an XML design tool to assist in the creation of the exchange’s XML schema. While any text editor can be used to create a valid schema, XML design tools have built-in capabilities to ensure that the schema is well-formed and is structurally and syntactically valid. Schemas need to be tested for validity before submitting.
- **XML Instance Document Validity** - Sample instance documents included in the package must also be validated against the exchange’s XML schema.

If EPA’s Central Data Exchange (CDX) will be a participant in the exchange, validating your sample instance documents using the CDX parser is required. CDX hosts a validation service that is available to all Network participants. Schema developers must first send their XML schema files to CDX. CDX will then load the schema into the service available at <https://tools.epacdxnode.net/>. Once loaded, the service can be used to validate XML instance documents. The CDX help desk can be contacted at nodehelpdesk@epacdx.net.

- **Schema Checking using W3C Schema Validator** – As an optional step, schema developers may wish to also validate the schema against the W3C Schema Validator (XSV). The steps for using this tool are as follows:
 - 1) Place the schema files on a web server accessible to the internet.
 - 2) Generate a list of the full URLs to each of the schema files. This can be done in many ways; one method is to get a directory listing for the directory on your web server where you have placed your schema files. After copying and pasting this listing into Excel, use the ‘Text to Columns’ function to extract the filenames of each of your schema. Then, using worksheet functions, construct a full URL for each filename, and link them together into a single space-separated string.
 - 3) Open the W3C’s XSV tool at <http://www.w3.org/2001/03/webdata/xsv> in a web browser. Enter the full URL to each of your schema files into the ‘Address(es)’ text box. Click the ‘Show Warnings’ and ‘Check as complete schema’ checkboxes. Click the ‘Get Results’ button.
 - 4) If the ‘Get Results’ button is not responsive, you may need to do the validation of your schema files in batches (there is a limit for the input text box of around 1600 characters).
 - 5) Fix any errors identified in the results and repeat Steps 1-5 until the tool finds no errors (note that you do not need to address the warnings identified by the tool).

B. Review exchange for compliance with design rules

Exchange developers must review their exchange for compliance with applicable Network design rules and guidelines. The rules and guidelines are outlined in two publications: The XML Design Rules and Conventions (DRCs) and the Exchange Design Rules and Conventions (EDRCs). Both documents are available for download from the Network web site.

- **DRCs** – This document specifically addresses the design of XML schema. The individual or group responsible for developing the exchange’s XML schema should be responsible for evaluating conformance of schema with the DRCs. The document appendix contains a consolidated list of the rules and guidelines. The DRCs have specific examples of how each rule should be used and also provides the rationale for the rule, should there be any question about the rule’s purpose or origin.
- **EDRCs** – This document specifically addresses the design of the exchange, typically documented in the Flow Configuration Document (FCD). The EDRCs also describe exchange component versioning requirements, package content requirements, and documentation requirements. Similar to the DRCs, the appendix contains a consolidated list of rules that can be helpful for performing an efficient crosscheck that all rules were considered in the exchange design.

C. Prepare the checklist

The appendix of this document contains the checklist used by exchange developers to affirm adherence to design standards. Exchange developers are required to provide a completed checklist with their package submission. The checklist will be published along with all other exchange artifacts to the Network web site. Exchange developers are required to provide an explanation for all checklist items marked with a “no” answer.

D. Submit checklist and package for review

Lastly, the final package containing all requisite documents, schema, and other components must be submitted to the NTG³ for review. Packages should be submitted in the form of a compressed (ZIP) file.

Ensure that file names do not contain any “spaces.” If needed, use the underscore character [_] in place of a space. A concise description and version number should be included. Do not use dates in the file names. Examples of properly formatted file names include:

ICIS_Data_Exchange_Template_v4.0.xls
ICIS_Example_XML_Instance_Document_v4.0.doc
ICIS_Flow_Configuration_Document_v4.0.doc
ICIS_Schema_Change_Control_Log_v4.0.xls
ICIS_v4.0.zip
ICIS_XML_Schema_User_Guide_v4.0.pdf

³ Submit flow documentation packages to the NTG Co-chairs. Contact information for the NTG Co-chairs is available at <http://www.exchangenetwork.net/about/network-management/>

The ZIP file must contain the appropriate folder structures as required in the DRCs for XML schema. Exchange developers should review the applicable portions of the DRCs to ensure the proper structure of the schema files before submission. Proper folder structure will help ensure that schemas are posted correctly to the Network schema repository.

Appendix A: Exchange Conformance Checklist

The Checklist below contains a list of rules and guidelines from the Exchange Network XML Design Rules and Conventions (DRCs) and the Exchange Design Rules and Conventions (EDRCs). The checklist is not inclusive of all rules and guidelines; rather it only includes the items that have historically been the source of most issues with submitted exchange documentation packages. Exchange developers are expected to review and comply with the rules and guidelines in the DRCs and EDRCs.

Exchange developers must include a completed checklist with their exchange documentation package. In cases where "no" was indicated for a checklist item, an explanation must be provided on the Exceptions section at the bottom of this worksheet.

| |
|----------------|
| Exchange: |
| Version: |
| Date Prepared: |

Compliance with XML Design Rules and Conventions

| XML Tag Naming Conventions | | Yes | No | N/A |
|----------------------------|---|-----|----|-----|
| GD1-1 | All schemas are valid and conform to W3C technical specifications. | | | |
| GD3-1 | All element and datatype names are in UpperCamelCase. | | | |
| GD3-3 | All attribute names are in lowerCamelCase. | | | |
| GD3-6 | All schema construct names are devoid of underscores, periods or dashes. | | | |
| GD3-8 | All tag names unique throughout the schema. | | | |
| GD3-12 | All lowest-level element tag names follow UN/CEFACT naming standards consisting of Object Class, Property Class, and Representation Term. | | | |
| GD3-17 | All element tag names are in singular form. | | | |
| GD3-A | All datatype tag names end in "Type" or "DataType". | | | |

| Elements and Attributes | | Yes | No | N/A |
|-------------------------|--|-----|----|-----|
| SD3-1 | All elements are declared as global. | | | |
| SD3-9 | Attributes, if implemented, are only used to store metadata. | | | |

| Namespaces | | Yes | No | N/A |
|------------|--|-----|----|-----|
| SD4-2 | All schema constructs namespace qualified. | | | |
| SD4-A | All schemas use the proper Exchange Network namespace naming convention. | | | |
| SD4-D | The schema namespace only contains the exchange's major version number. | | | |

| Schema Configuration and Documentation | | Yes | No | N/A |
|---|--|-----|----|-----|
| SD5-R | Schemas have been modularized into default, message, component, and shared schemas. | | | |
| GD2-A | The schema package includes an "index.xsd" schema that includes each root schedule for the exchange. | | | |
| SD5-A | The schema uses Shared Schema Components where appropriate for the targeted business processes. | | | |
| SD5-34 | Each schema file includes the standard schema header documentation. | | | |

| Schema Versioning | | Yes | No | N/A |
|--------------------------|--|-----|----|-----|
| SD5-F | If the schema represents a minor version increment from a previous schema, the only changes the addition of new optional elements or constructs. | | | |
| SD5-H | If the schema represents a minor version increment from a previous schema, it implements an identical namespace as it's predecessor. | | | |
| SD5-K | The schema file names, XSD version attribute, header documentation, and namespace all contain matching version information. | | | |
| GD2-C, D, E | Schema file names match the naming rules for message, component, and local shared schemas. | | | |

| Information Association and Uniqueness | | Yes | No | N/A |
|---|--|-----|----|-----|
| SD6-4 | If KEY and KEYREF are used, the constructs have been tested to ensure they are implemented properly. | | | |

Compliance with Exchange Design Rules and Conventions

| General Exchange Design | | Yes | No | N/A |
|--------------------------------|---|-----|----|-----|
| XD1-1 | The exchange is prescribed an exchange identifier in the form of a single term or acronym. | | | |
| XD1-2 | The exchange identifier used consistently throughout the schema and exchange documentation. | | | |

| Exchange Development and Publishing | | Yes | No | N/A |
|--|---|-----|----|-----|
| XD2-6 | The exchange package includes all required components including XML schema, schema conformance report, DET, FCD and one or more valid instance files. | | | |
| XD2-9 | If the package is a new version of an existing schema, a schema change log is included in the package. | | | |
| XD2-10 | The exchange package includes a description of use and rejection of SSCs in the exchange schema. | | | |

| Exchange Component Versioning | | Yes | No | N/A |
|--------------------------------------|--|-----|----|-----|
|--------------------------------------|--|-----|----|-----|

| | | | | |
|-------------|---|--|--|--|
| XD3-1, 2, 3 | If the package is for a new version of an exchange, the appropriate versioning principles are applied. | | | |
| XD3-4 | All components of the exchange package share a matching version number. | | | |
| XD3-5 | All documents in the exchange follow the file name requirements. | | | |
| XD3-6, 7 | If the exchange package contains any draft components, they are labeled as draft in the component name. | | | |
| XD3-9 | If applicable, all Query and Solicit data service names unique from previous versions of the exchange. | | | |

| Exchange Documentation | | Yes | No | N/A |
|-------------------------------|---|-----|----|-----|
| XD4-1 | Is the Flow Configuration Document based on the most recent Network-approved FCD template? | | | |
| XD4-5 | Does the FCD document the steps for a new partner to implement and participate in the exchange? | | | |
| XD4-6 | Does the FCD indicate which operations and/or services are required or optional for a partner to implement? | | | |
| XD4-7 | Does the FCD list the specific meaning of each of the applicable GetStatus responses, if applicable? | | | |

| Query and Solicit Services | | Yes | No | N/A |
|-----------------------------------|---|-----|----|-----|
| XD5-1, 2 | All data service names follow the data service naming guidelines. | | | |
| XD5-4 | If any data service accepts XML-formatted parameters, the XML schema is documented and included in the exchange package. | | | |
| XD5-7, 8 | The FCD fully documents the parameter names, data types, occurrence, wildcard behavior and return schema for each data service. | | | |
| XD5-9 | The FCD indicates what constitutes a "row" for any service that is made available as a Query. | | | |

| Exchange Network Header | | Yes | No | N/A |
|--------------------------------|--|-----|----|-----|
| XD6-1 | The Header is implemented in all Submit operations. | | | |
| XD6-6 | The FCD documents allowable values for the Header operation attribute along with a precise description of how each operation affects payload processing. | | | |
| XD6-10 | If the Header is used, the FCD describes whether multiple payloads are supported and how they must be structured. | | | |
| XD6-13 | If the Header is used, it is the latest Network-approved Header. | | | |

