

Document Preparation Process and Acknowledgements

The Network Technology Group (NTG) tasked its Change Management Task Force with preparing a document to set forth principles, rules, and procedures for Change Management in December 2005. The Task Force carefully considered the opportunities and challenges for Change Management on the Network. After vetting ideas and concerns with the NTG, the Network Operations Board (NOB), and a cross-section of the Exchange Network community, the Task Force prepared this document laying out its vision for a comprehensive Change Management strategy for the Network.

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

Task Force Participant	Affiliation
Dennis Burling	Nebraska DEQ
Dennis Murphy	Delaware DNREC
Lico Galindo	EPA Office of Environmental Information
Charles Freeman	EPA Office of Environmental Information
Connie Dwyer	EPA Office of Environmental Information
Louis Sweeny	Ross & Associates
Mike Reich	Ross & Associates
Matt Markoff	Ross & Associates
Bill Rensmith	Windsor Solutions

Abstract

This document describes the change management strategy for the Exchange Network (EN). Change management is vitally important to the continued success and vitality of the EN as it provides clarity to the development process and allows for easy integration of new ideas while helping to maintain consistency and predictability across the Network. The document begins by laying out change management principles for the Exchange Network. The rest of the document describes change management rules and procedures based on these principles, including guidance on change management during development of flow components and other Network resources, and communication procedures required to manage change on the Network in a way that is efficient and transparent to all partners. Two appendices are provided that summarize the guidelines presented in this document.

Table of Contents

Document Preparation Process and Acknowledgements.....	2
Abstract.....	2
Table of Contents.....	3
1. General Principles and Expectations	4
2. Types of Changes on the EN	6
3. Change Management during Development	8
4. Change Management for Flow Components	9
5. Change Communications Procedures	13
Appendix A – Change Management Matrix.....	17
Appendix B – Change Management Phases for Schema Development.....	17

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1. General Principles and Expectations

This document outlines a comprehensive change management strategy for the entire Exchange Network. Generally, the change management process should be followed for any changes made within the EN, regardless of scope. However there are important additional considerations depending on the level of change and the relative impacts to the rest of the EN.

There are two distinct levels of activity within the EN where change management principles apply: changes that affect core EN standards¹ (excluding data standards), guidance, or infrastructure; and changes that affect individual flows. Changes that affect resources such as core EN standards, guidance, or infrastructure are significant to users across the entire Network. Examples include the Node Functional Specification (specification), the XML Schema Design Rules and Conventions (guidance), and the Network Authentication and Authorization Service (infrastructure). Changes that affect resources associated with an individual flow are significant to the users of that particular flow. Examples include the flow schema and the Flow Configuration Document.

Regardless of whether a change affects the entire Network or just an individual flow, all changes should be transparent to the primary stakeholders. It is important to ensure current versions, supported older versions, and proposed changes can be easily found for any EN resource undergoing change.

Appendix A (the Change Management Matrix) provides an overview of the rules and dependencies associated with both types of changes.

1.1. **Complying with All Guidance and Procedures**

A critical part of updating EN components is ensuring that each developed product conforms to any relevant EN Guidance and Procedures. Below is a suggested set of steps for ensuring that your product is in conformance.

1. Review all documentation on the Exchange Network website (<http://www.exchangenetwork.net>). Two sections in particular will be helpful to review; the 'Build a Node' section (<http://exchangenetwork.net/node/index.htm>) and the 'Build an Exchange' section (http://exchangenetwork.net/dev_schema/).
2. Review your product to determine whether you are in compliance with the relevant documentation identified above. If you are developing a Data Exchange, you may use the Schema Conformance Checklist to ensure that you are aware of the correct documentation.
3. Contact the NTG Co-Chairs if you need additional assistance or have questions about which guidance you may or may not be required to follow. The contact information can be located at <http://exchangenetwork.net/operations/nob/ntg.htm>.

¹ For the purposes of this document, the use of the term 'Exchange Network Standards' excludes EN data standards. The process for updating EN data standards is overseen by the Exchange Network Leadership Council and Network Operations Board.

1.2. Changes that Apply to the Entire EN

The Exchange Network consists of multiple diverse partners, with widely varying resources and technical capabilities. When considering changes that affect all Network participants, including changes to core EN standards, guidance, or infrastructure (e.g., web services), impacts across the entire EN must be taken into account.

Changes to core EN standards, guidance, and infrastructure will be managed directly by the Exchange Network Governance. Maintaining user confidence, stability, and interoperability are the highest priorities for the EN Governance's approach to change management. All proposed changes that affect the entire Network must provide material improvements to the EN community commensurate with the cost of making a change.

Exchange Network Governance will manage changes to EN standards, guidance, and infrastructure according to their significance and scope. Major changes, especially those that are mutually exclusive with current approaches, will be broadly vetted with the EN technical community and approved via formal consideration of the Exchange Network Governance. Consideration of proposed changes will examine the associated costs, dependencies and transition plan requirements, as well as the relevance to the mission and goals of the EN. If accepted, all changes will be announced at least 6 months prior to their expected implementation by partners.

Minor changes/updates to infrastructure will be vetted within the applicable technical community, and approved by the NOB. In order to preserve the integrity of the Network, developers should strive for co-existence and "grandfathering" of existing versions as the changeover is implemented. Documentation and reporting of changes to EN standards, guidance, and infrastructure is expected.

1.3. Changes that Apply to Individual EN Flows

Change management for individual flow resources (schema, request names, etc.) and associated documentation is the responsibility of the recognized flow steward(s), in consultation with the primary flow users. Where a flow steward, and/or group does not exist, the NOB may assist in convening an appropriate group, and working with them to appoint a flow steward. The nature and timing of changes to flow resources may be driven by program changes and/or other business needs at the discretion of the flow steward(s).

Flow stewards are expected to follow the versioning guidelines in this document and to ensure users have a consistent, reliable means of identifying the status of revisions (e.g. current version, past version, or superseded) to flow schema and other resources. Prior to adoption, revisions to schema, the Flow Configuration Document, and other critical flow resources must be properly documented and tested by at least two independent implementations. For schema changes, the schema conformance report review process is required (see the Schema Conformance Report Preparation and Review Process document for details).

No network partner (including CDX) is expected to support more than the current and previous major version of a schema. At the discretion of the flow steward, use of versions prior to the current version may or may not be allowed due to maintenance and other business considerations (e.g. changed requirements and content). Adequate advance notice of pending changes to a flow is required to facilitate rapid adoption among the entire flow user base and avoid service disruptions. The specific timing of this may vary depending on the scale and scope of the flow, however, as a general rule, notice of impending changes should be given to the network community at the time a development group is formed.

2. Types of Changes on the EN

Changes to resources fall into two categories: upgrades and revisions. Upgrades introduce new features or otherwise change the intended use of a resource, while revisions fix bugs or clarify language or address small, non-schema changes to Exchange Network documentation.

The interdependencies of resources on the Exchange Network mean that upgrading one resource may require a corresponding change to another resource. The conventions for versioning are outlined in the Change Management Matrix (Appendix A). This matrix lists change requirements on the type of change being made.

Upgrades on the EN are represented using major and minor version numbers, while revisions are represented using letters of the alphabet. The string that conveys version number information in file names and data service names is typically of the form:

`_vMajor.Minor[Revision][Draft]`

where **Major** is the major version number, **Minor** is the minor version number, **Revision** is the optional revision letter, and **Draft** is the optional draft version number. For example, some possible resource names with version information:

- FACID.GetFacilityByName_v2.0 (data service name)
- TRI_ChemicalActivity_v1.2_draft3.xsd (schema filename)
- EN_XML_Schema_Design_Rules_v1.1e.pdf (EN guidance document filename)

Different conventions are used to represent version information in namespaces (where only the major version number is used) and within instance documents (where a version attribute may allow only major and minor version numbers).

2.1. Major Changes

Major version changes denote a significant upgrade from the previous iteration of the resource. Major version upgrades occur when significant new features are introduced, or there is a change in technology or business process that renders the requirements of a

resource incompatible with previous ones. Major changes should typically be driven by business process upgrades or improvements. For example:

FACID.GetFacilityByName_v2.0 (Major Version 2)

When a flow or schema undergoes a major version upgrade, it is expected that modifications necessary to comply with EN standards will be made along with the other changes. When planning a major version change, developers should review existing guidance, identify areas where the resources they are upgrading do not comply, and make every effort to meet current guidelines.

2.2. Minor Changes

Minor version changes denote an upgrade that includes one or more additional features or small enhancements, but does not alter functionality or content of the schema present in the previous version. Minor version changes on the EN must be “backwards compatible” meaning the change is technically interoperable with items developed using the same major version number. Minor version changes are denoted by incrementing the minor version number after the major version number. For example:

TRI_ChemicalActivity_v1.2.xsd (Minor Version 2)

When making a major version change to resources, the product must be upgraded to comply with all current EN standards and guidance. Improving compliance with EN standards as part of minor version changes is recommended, but generally not required.

2.3. Draft Changes

For resources that are currently in development, such as draft Network guidance, draft schema, or draft flow documentation, draft version numbers may be used. This provides a mechanism for indicating that a resource in development has changed, without incrementing the major or minor version number. For example:

TRI_ChemicalActivity_v1.2_draft3.xsd (Draft 3)

Draft version numbers can only be used on a resource that has not yet been “released” or otherwise distributed outside the group involved in making the changes. The draft version number must be removed before the resource can be considered “final” and officially released for use on the Network.

2.4. Document Revisions

Revisions are changes for the purpose of fixing mistakes or clarifying language in documents. If the intended meaning of the document has changed, then a minor or major version upgrade must be used. Documents that may be revised using a revision letter include EN standards and guidance documents, and flow documentation. For example:

EN_XML_Schema_Design_Rules_v1.1e.pdf (Version 1.1, Revision e)

The one Network resource type that cannot be revised using a revision letter are schema – for which revisions are always a major or minor upgrade (or new draft version).

3. Change Management during Development

When a community of interest (such as an IPT, developer group, or EN workgroup) is actively developing products for a flow, shared service, or guidance document, versioning procedures are determined by the participants before the products are distributed to those outside the group². While a product is under active development in a small community, a version upgrade is not required for every change. Formal versioning procedures only apply once products have been distributed beyond the group that is actively developing them.

Once a resource has been distributed beyond the development community, or it is published on the Exchange Network Website, the EN versioning guidelines outlined in this document must be followed.

3.1. Schema

Schema should not have a revision letter or the word “draft” in their namespaces. Files referencing schema should not have to change their namespace declarations when a schema is distributed beyond the development group or is published on the EN Website.

During development, instances files will generally need to use the schemaLocation tag to refer to development versions of the schema. However, if current namespace guidance is followed (see the Namespace Organization, Naming, and Schema File Location document), simply removing the schemaLocation tag from an instance document should enable it to validate against the schema once it is published in the EN Repository.

Iterating draft version numbers is not required as long as the schema is under active development and has not been distributed beyond the development group. Any time a draft version of a schema is distributed beyond the development group, it is strongly recommended the draft version number be incremented. The draft version number is important both to indicate the schema is still a draft, and also to differentiate it from prior versions of the schema.

Additionally, it is recommended that developers put the word “draft” and a revision letter or date in filename of the zip archive used to distribute schema packages. Developers are strongly encouraged to include a README file that contains the date, revision letter, and detailed change history. This allows others to easily differentiate between different schema versions.

² Developers should refer to the *Exchange Network Schema Conformance Report Preparation and Review Process* for information on how to ensure that upgraded schemas and flow products conform with EN standards and procedures (e.g., EN data standards).

Further guidance on change management procedures for each phase of the schema development process can be found in Appendix B (Change Management for Schema Development Phases).

3.2. Guidance Documents

Resources such as guidance documents being developed and reviewed by a workgroup should be clearly labeled as a “DRAFT” on the title page, throughout the document with a watermark, and, optionally, in the file name, so draft documents will not be confused with existing EN Guidance. This labeling is particularly important for documents that may be reviewed by, or distributed to, other parties before they are formally adopted by EN Governance.

It is equally important for EN Governance to ensure the “DRAFT” label is removed from guidance documents once they are approved and published to the EN website.

4. Change Management for Flow Components

An Exchange Network flow is a set of data requests and responses for exchanging data, as defined and documented by the flow schema, the Flow Configuration Document, the Data Exchange Template (DET), and other flow documentation. The Flow Configuration Document (FCD) is the primary document through which flow partners communicate the overall design and status of a flow.

The expectations for flow documentation are listed in the Flow Documentation Checklist. Further detail on the process of flow documentation and review is provided in the Schema Conformance Report Preparation and Review Process document. The various pieces of flow documentation do have dependencies and should generally be updated as a unit. For example, a minor version upgrade of the schema will require a minor version upgrade of the DET, FCD, and other flow resources, as detailed in the Change Management Matrix (Appendix A). The one overriding requirement is that all flow components must share the same major and minor version number. Flow components may share the same revision number, though this is not strictly required.

4.1. Versioning Relationships between Flow Components

This section describes the change management requirements and interdependencies for different flow components. All flow components must have the same major version number. For example, if either the schema, FCD, DET, or any other flow components require a major version upgrade, then the entire flow must undergo a major version upgrade. Minor version upgrades or revisions always require the Flow Configuration Document be updated to reflect the changes in the flow change history. These procedures are discussed in further detail for the main types of flow components below.

4.1.1. Schema

Schemas have unique versioning considerations. Generally, any change to the flow that updates or alters the schema must be noted by a major or minor version upgrade to all flow components. A summary of the requirements outlined in the Design Rules and Conventions v1.1 is included below. These rules, along with the additional guidance provided in this document, comprise a comprehensive versioning strategy for XML schema on the Exchange Network. Appendix B provides an overview of required change management procedures for each phase of the schema development process.

Rules and Guidelines
Description
The W3C Schema version attribute MUST include both a major version component and a minor version component for each schema file root.
Data-centric schemas MUST include a major and minor version number in their filename.
Data-centric schemas MUST define a required attribute named "schemaVersion" in the root element of all message schema.
New minor versions of schema MUST be able to validate instance documents created with preceding minor versions of that schema. However, instance documents should not be expected to validate against versions of schema preceding the one they were created with.
New minor versions of a schema MUST only add new optional elements and/or attributes to prior minor versions.
New minor versions of a schema MUST NOT remove elements and/or attributes from prior minor versions.
New minor versions MUST utilize the exact same namespace as prior minor versions.
All existing instance documents in the same namespace MUST validate against the new minor version.
The schema major version MUST be incremented if any elements or attributes are removed or if new mandatory elements or attributes are added.
The schema file name, XSD version attribute, header documentation, and namespace MUST all contain matching version information.
When any schema construct is altered in a given namespace, all schema in the namespace MUST undergo a version increment.

4.1.2. Flow Configuration Document

The Flow Configuration Document (FCD) is the central information resource for a flow. Users should be able to easily identify the current version of the FCD, and using that, be able to identify the current version of all associated components. The FCD contains the change history for all flow components in its initial pages, and information about the data exchange including a list of current and supported schema versions and Data Services. Any time any flow component is changed the FCD must also be updated to reflect and document those changes.

An FCD's major and minor version must be upgraded when any part of a flow undergoes a major or minor version upgrade. As the document of record for the flow, flow partners must always be able to refer to the change history tables in the FCD to determine the version of schema, DET, and other flow documentation currently operative on the flow.

An FCD may also be changed to add a new Data Service and the revision number incremented. An FCD may be changed to modify flow-level business rules for existing Data Services. If the change to the FCD might break flow implementations using the previous version of the FCD (e.g., a change in business rules that disallows a certain order of operations in calling Flow Data Services that was previously allowed), then a major version upgrade to the FCD and the schema is required. If the FCD change does not cause any disruption for existing flow implementations (e.g. necessitating additional coding) and does not require any changes to the schema (e.g., relaxing flow business rules, or adding Data Services) then only a revision letter increment is required in the FCD. In situations where it is unclear what versioning increment a development change should trigger, the decision should be made by the flow steward with the understanding that versions of flow components should always contain the same major and minor version number.

4.1.3. Data Exchange Template

The Data Exchange Template contains a listing of schema elements and additional information about their origin, use, and business rules.

A DET's major version must be upgraded when any part of a flow undergoes a major version upgrade. For example, adding a business rule that breaks the flow transactions valid under the old business rules, means that the change is not backward compatible and must be made with a major version upgrade to the DET and the rest of the flow. Most often, a major version update will be driven by changes to the schema. A DET's minor version must be upgraded when elements are added or altered through a minor version upgrade of the schema.

Additionally, if the business rules for a flow are altered and therefore require a change to the DET, but not to the schema, then a revision letter increment should be appended to the DET. Regardless of whether business rules are enforced through the use of schematron or other tools, the DET must be kept up to date with the business rules necessary for proper flow operation. However if the business rule change is such that transactions using the old business rules will not be broken (e.g., values added to the allowable values list) then the DET can be modified with a revision increment. Language clarifications, bug fixes, and grammatical corrections may also be reflected by one revision letter iteration as long as the changes do not alter the original intent of the DET in any way.

4.1.4. Data Services

Data services are the requests and submits used to query data from, or send data to, other partners participating in a flow. The FCD defines a flow's data services and describes the business rules governing their use. Data Service names contain version numbers that are linked to the version of the schema they return (see the Exchange Design Guidance and Best Practices document). Therefore, if a schema is upgraded, the data service that utilizes it must also be upgraded.

If a new data service is created which requires a change to the schema, then the schema's major or minor version should be upgraded. In this case, the new data service will have a version number equal to the upgraded schema. If a new data service is created that does not require a change to the schema, the new data service will be noted in the FCD, which will be updated with a revision letter increment. In this case, the new data service will have a version number equal to the updated FCD.

Because the version number of a data service is tied to the schema it supports, a data service must not be changed in a way that would either break an existing implementation, add new functionality (e.g., new parameters), or result in unanticipated behavior on the part of either the sender or receiver of the data service request. In the case where a data service needs to be modified (not related to a schema change), a new data service should be created. The old data service can continue to exist or can be deprecated, but if it is deprecated all flow components must undergo a major version upgrade.

5. Change Communications Procedures

Many previous change management issues on the Exchange Network have resulted from improper (or lack of) version control and have sometimes been exacerbated by inadequate communication to partners regarding changes. Required communications associated with changes affecting the entire EN and changes affecting individual flows are described separately below.

5.1. Communication of Changes that Affect the Entire EN

Exchange Network Governance is responsible for communicating changes to core EN standards, guidance, and infrastructure. Procedures for post-change communication of these resources already exist: after a new guidance document is released or changes to a guidance document are approved by the NOB the new document will be posted to the EN Website. In addition, a Network Alert will often be issued to notify partners of the new document or changes. All documents on the EN website should have a version number in their website description and filename for easier identification. It is critical to the success of the Network that all EN partners receive timely and clear communications regarding changes to core EN standards, guidance, and infrastructure.

5.2. Communication of Changes to Individual Flows

The flow steward or Integrated Project Team (IPT) is responsible for establishing official channels for communication about their flow. IPTs may find it advantageous to establish two channels of communication: one channel would serve as a general purpose channel that has a broad subscription of partners interested in low-volume updates on the flow, the second channel should be reserved for communication by IPT members for higher volume communication for flow partners actively engaged in development, testing, and implementation.

Once the communications channels have been established, the flow steward is responsible for ensuring the EN (website/helpdesk) has received up-to-date information on how interested parties can access the communications channels. If flow stewards or

IPTs choose not to establish and publish an official communication channel for the flow, the EN Governance will do so on their behalf.

Flow stewards are also responsible for ensuring the EN website has the most up-to-date version of the flow resource documentation (FCD, DET, Change Control Spreadsheet, etc.). In instances where products have been upgraded, additional steps such as preparation and review of a Schema Conformance Report may be required.

5.2.1. Communication Required Prior to Changing a Flow

Historically, changes on the EN were communicated after they had been made. When version control procedures were followed (i.e., the proper numbering of resources), post-change notification was generally sufficient to alert exchange partners of new feature availability.

When the community participating in a flow is relatively small, informal communication channels are often sufficient to keep partners in the loop. However, as the Network expands, formal communication channels, broader information distribution, and pre-change communication are more important. Pre-change communication should take place on the “general” flow communication channel. For national system flows, dependent on the discretion of the EN Alert administrator, an EN Alert may be sent out to alert partners of upcoming changes. Partners that have interest in a flow, or have plans to implement it in the future, can be alerted to changes that may impact their implementation decisions. In addition, pre-change notifications allow partners to provide effective input to the IPT prior to changes commencing.

IPTs should consider notifying partners as early as possible about potential changes. In many instances, notifying partners that an IPT is reconvening to undertake a major revision of a flow is a good first step. It can encourage partners that were not active to engage in IPT discussions when discussing revisions. Additional input from states that have recently implemented, or plan to implement, a flow is critical to making sure that flows continue to serve a growing partnership.

After initial planning of a flow revision, the IPT should publish a pre-change notification that outlines the planned changes, which partners will be impacted by the changes, whether support for previous flow version will cease, and the expectations for partners. Expectations for partners should include whether they should or must adopt the new flow version, the expected timeline for adoption, and any other requests regarding testing, implementation, or migration.

Pre-change notifications are intended to keep partners and potential partners abreast of planned changes for a flow. Pre-change notifications are particularly important when the IPT is comprised of a small subset of flow users, or if flow stewards are aware that new partners are implementing or planning to implement major flows. Keeping these partners aware of potential changes prevents significant effort being spent on implementing a flow that is out-of-date due to a major version upgrade.

5.2.2. Communication Required After Changing a Flow

For a new or upgraded flow to be ready for broad implementation on the EN, the IPT must:

- Finalize schema changes and accompanying documentation
- Test finalized schema and instance documents with flow partners
- Request that the schema and accompanying documentation (aka, the flow documentation package) be posted to the EN website

In conjunction with these activities at the end of the flow development process, the IPT should send out a post-change communication notification. The post-change notification should be delivered via the general purpose channel so that all interested parties are aware that changes have been made to the flow.

Flow stewards have the responsibility to ensure that the EN Help Desk and the EN Coordinator are notified when changes have occurred on a flow. The Help Desk and Coordinator should be provided with all required updated documentation, as soon as possible after the change occurs.

Examples of changes that would warrant notification to the Help Desk or Coordinator include:

- A new data service that is accessible to requests from EN Partners
- A partner begins delivering responses using a new schema version
- A new DET version is released due to a change in business rules
- The frequency of an exchange is altered resulting in a change to the FCD
- A new parser is deployed by several partners that can process a schema with new elements
- Partners outside of the IPT begin testing new flow features

Dependent on the scope of the change and the impacts on partners, post-change communication should occur as close to the change as possible.

Post-change communication on the network must contain:

- A contact for questions
- The type of change(s) (major / minor)
- Description of change(s)
- Identification of affected partners
- Implications for currently supported versions
- Expectations of partners

5.3. Identifying current version

A key precept of change management is the ability to unambiguously identify the most current version of any resource. The Exchange Network website, repository, and registry are the sources of information that partners should consult to determine the most current version of resources.

5.3.1. Flow Components

Users wishing to identify the most current schema, DET, or data service versions and older supported versions should consult the flow's FCD. All flow components will be located in the EN Repository (www.exchangenetwork.net/repository/).

FCDs and DETs should be placed in the same folder as the schema files they refer to. In addition the most current version of the FCD for the flow should be placed in the root folder for the flow.

5.3.2. Guidance Documents

Identifying the most current version of a guidance document can be done through visiting the Exchange Network website. The most current version of guidance documents, decision memoranda, and other EN infrastructure resources will always be posted on the site.

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Appendix A – Change Management Matrix

[Separate document]

Appendix B – Change Management Phases for Schema Development

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