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NDRProfile Schema Version 1.0 User Guide

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Abstract

The NDRProfile schema provides a common syntax for exchanging, managing, and reusing XML Schema naming and design rules (NDRs). NDRProfile, used by NIST's Quality of Design (QOD) application as a format for import and export of rule sets, is also useful for general exchange of NDRs and, with accompanying stylesheets and other materials, provides an environment for authoring and formatting NDR documentation. This paper describes the content of the NDRProfile schema and its various uses.

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1. Introduction

XML schema [1] Naming and Design Rules (NDRs) [2] are intended to help organizations enforce best practices, a particular modeling methodology, or conformance to common nomenclature policies. But there are barriers that can prevent NDRs from improving schema interoperability and quality:

- NDR proliferation - no single rule set meets everyone's requirements.
- Absence of NDR document structure - NDR documentation typically is created using a word processor and exists only in a proprietary binary format.
- Lack of automated rule enforcement - the onus is on XML schema developers to ensure that their schemas obey (sometimes ambiguously worded) NDR rules.
- Limited versioning and traceability - it is cumbersome to compare NDRs with one another or to explicitly specify rule reuse.

NIST created the Quality of Design (QOD) web application (<http://www.nist.gov/qod>) to address these barriers. QOD provides a mechanism for checking XML schema design quality against NDRs in a collaborative environment. Plans for the next version include better support for sharing and publication of rules with the intention of maintaining an extensive set of reusable test cases.

Recognizing that some groups might want to develop their own XML schema design quality testing tools rather than use QOD, NIST subsequently created NDRProfile - an XML schema providing a common format in which NDRs can be exchanged, managed and reused. NDRProfile provides the following capabilities:

- Import and export of rule collections into and from the QOD.
- The ability to publish NDR documentation from XML.
- The ability to exchange NDR rule collections, including tests for the rules.

The NDRProfile schema's target audience includes NDR authors, groups wishing to exchange, share, or reuse rule sets, and users of schema quality assurance tools such as QOD that import/export XML conforming to the NDRProfile. Although the NDRProfile schema's development was inspired by QOD, the schema can be used independently of QOD, either as a means of authoring an NDR document or as a vehicle for sharing rules between NDR Profile schema-compliant software applications.

This document is intended both for NDR authors as well as for developers of NDR authoring or testing software. The document contains the following sections:

- Section 2, “NDRProfile Schema Elements” provides information about the elements and attributes that are available in the NDRProfile schema.
- Section 3, “Developing an NDRProfile Instance” describes the various methods for developing an NDRProfile document.
- Section 4, “NDRProfile and QOD” describes QOD and discusses using NDRProfile for import and export. Non-QOD users may wish to skip reading this section.
- Section 5, “Lessons Learned and the Future of NDRProfile” concludes the user guide with some thoughts on improving NDRProfile.

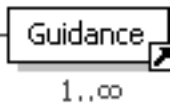


The NDRProfile schema and the accompanying stylesheets and resources mentioned in Section 3, “Developing an NDRProfile Instance” are available in a single package available for download from <http://god.sourceforge.net>.

2. NDRProfile Schema Elements

This section provides an alphabetical listing of all elements and attributes included in the NDRProfile XML Schema. Each element is defined in its own subsection. The information provided for each element includes:

1. Element name
2. Brief definition of each element
3. Data type if the element has simple content (character data with no sub-elements)
4. A graphical representation of the content if the element contains sub-elements
5. A table of attributes providing information about each attribute, if the element has attributes
6. A list of parent elements.

The table below shows how to interpret the symbols used in content diagrams.

Symbol	Meaning
	A rectangle represents an element whose name is the string inside the rectangle. A number range underneath the box specifies the number of occurrences (zero or more for <code>Guidance</code> in the example on the left). If no range is given, the element occurs exactly once.
	An octagon containing a horizontal line connecting a series of dots represents an XML Schema <code>sequence</code> element.
	An octagon containing a vertical line connecting a series of dots represents an XML Schema <code>choice</code> element. If no numerical range is specified, the default is a choice of one from the contained group of elements.

The best way for a user to get an overview of the schema is to first read the definition for `NDRProfile`, the root element of an NDRProfile document instance. Another good element to look at for gaining an overall sense of the schema is `Guidance`.

2.1. Classification

Definition: `Classification` specifies a category for the guidance rule. The taxonomy of categories is determined by the NDR developers.

Data type: `xsd:string`

Parent Elements

- `Guidance`

2.2. Comment

Definition: `Comment` is used to specify any information about a guidance rule not specifiable using other NDRProfile elements.

Data type: `xsd:string`

Parent Elements

- `Guidance`

2.3. ContactURI

Definition: `ContactURI` is used to provide a web or email address for an organizational point of contact.

Data type: `xsd:anyURI`

Parent Elements

- `OrganizationInformation`

2.4. Coverage

Definition: `Coverage` defines what portion of the rule the test case covers.

Data type: xsd:string

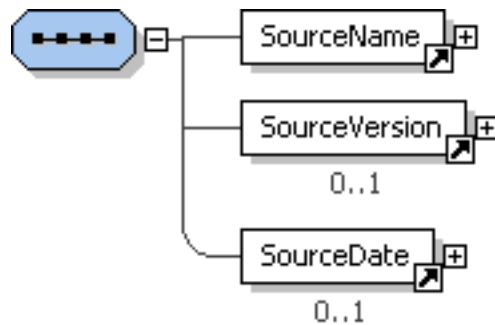
Parent Elements

- TestCase

2.5. DerivedFrom

Definition: `DerivedFrom` contains information about the original source of the rule when this is a new rule that is a modification of a rule from a different NDR. This element is used for traceability.

Content:



Attribute Name	Definition	Allowed Values	Default Value
QODUniqueIdentifier (optional)	QODUniqueIdentifier is an optional attribute containing a unique identifier assigned by the QOD web application. This attribute is populated by QOD when the rule is exported from QOD into a valid NDRProfile instance.	xsd:string	None
URI	URI is an XML unique ID type. The first character of an XML ID must be a letter followed by any XML name characters (letter, number, ., -, _, or :)	xsd:anyURI	None

Parent Elements

- Guidance

2.6. Description

Definition: `Description` specifies text documenting the NDR.

Data type: xsd:string

Parent Elements

- NDRProfile

- TestCase

2.7. EnforcementLevel

Definition: EnforcementLevel defines whether the guidance rule is mandatory, optional, or recommended.

Data type: Mandatory, Optional, or Highly_Recommended

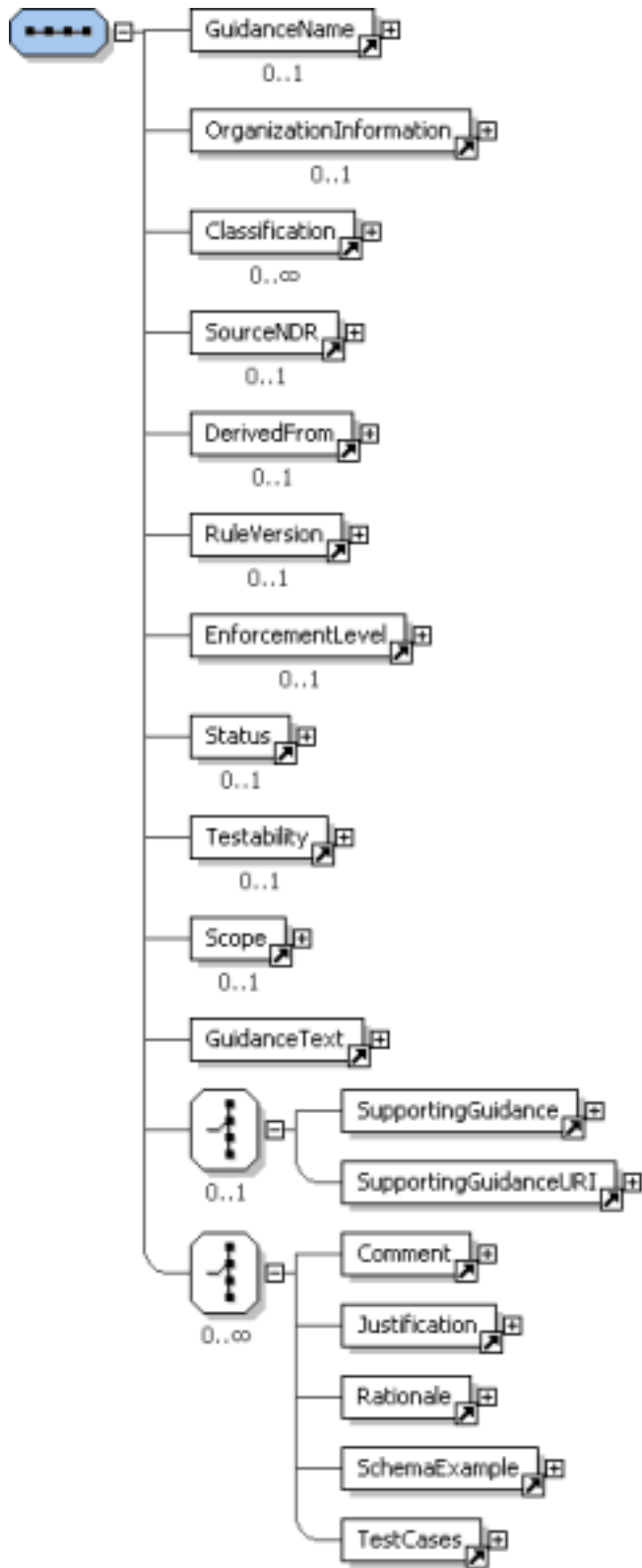
Parent Elements

- Guidance

2.8. Guidance

Definition: Guidance is the top level element for an NDR rule. It represents a test requirement.

Content:



Attribute Name	Definition	Allowed Values	Default Value
documentationID (optional)	documentationID is a link to a unique identifier within the NDRDocumentation. The use of the "NDRDocumentBaseURI" and the "documentationID" attributes provides the mechanism to link internally to the NDR documentation from the NDRProfile schema.	xsd:string	None
guidanceID	guidanceID is a link to a unique identifier within the NDRProfile document and should be unique for each rule or guidance.	xsd:ID ^a	None

^a A guidanceID must conform to additional constraints if the NDRProfile is to be imported into NIST's QOD web application.

Parent Elements

- NDRProfile

2.9. GuidanceName

Definition: GuidanceName defines the succinct title for the rule.

Data type: xsd:string

Parent Elements

- Guidance

2.10. GuidanceText

Definition: GuidanceText is an English language specification of the rule.

Data type: xsd:string

Parent Elements

- Guidance

2.11. Justification

Definition: Justification provides additional supporting information, beyond the value for Rationale, regarding the reason for the guidance.

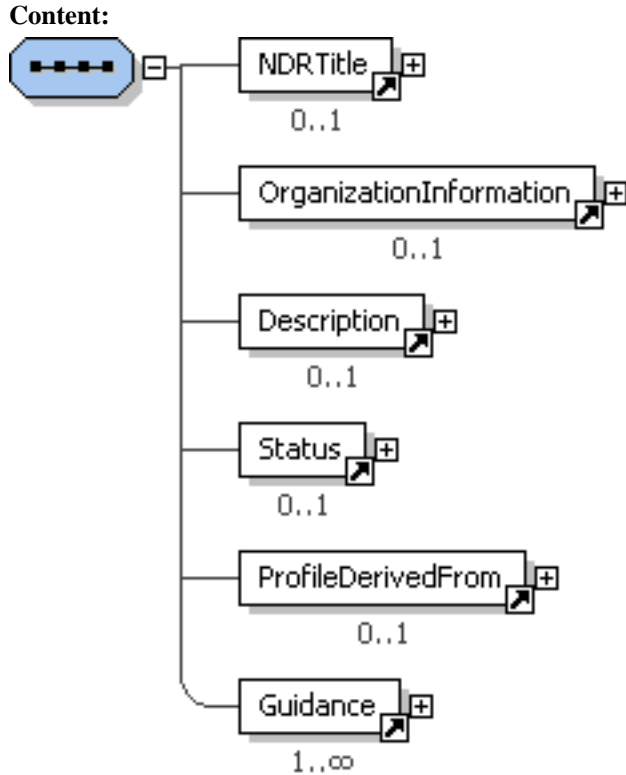
Data type: xsd:string

Parent Elements

- Guidance

2.12. NDRProfile

Definition: NDRProfile is the root element for a document conforming to the NDRProfile schema.



Attribute Name	Definition	Allowed Values	Default Value
NDRProfileID	NDRProfileID is a unique identifier for the NDR.	xsd:ID	None
NDRProfileBaseURI (optional)	NDRProfileBaseURI contains the location of the NDRProfile.	xsd:anyURI	None
NDRDocumentBaseURI (optional)	NDRDocumentBaseURI points to the location of the documentation for the NDR. It is envisioned that the documentation will be encoded using DocBook.	xsd:anyURI	None

Parent Elements

- Root Element

2.13. NDRTitle

Definition: NDRTitle specifies a brief description of the rule set. If the NDRProfile represents a formal NDR document, NDRTitle should contain the document's official title.

Data type: xsd:string

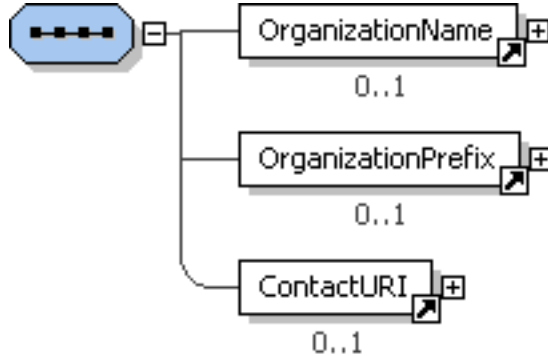
Parent Elements

- NDRProfile

2.14. OrganizationInformation

Definition: `OrganizationInformation` specifies data about the entity responsible for the rule set or guidance rule.

Content:



Parent Elements

- NDRProfile
- Guidance

2.15. OrganizationName

Definition: `OrganizationName` defines the name for an organization.

Data type: `xsd:string`

Parent Elements

- OrganizationInformation

2.16. OrganizationPrefix

Definition: `OrganizationPrefix` defines a character sequence for an organization. This character sequence is used internally by QOD to create identifiers for guidance created within QOD by the organization.

Data type: `xsd:string`

Parent Elements

- OrganizationInformation

2.17. ProfileDerivedFrom

Definition: `ProfileDerivedFrom` specifies the original source of the NDR.

Content:

Attribute Name	Definition	Allowed Values	Default Value
URI	URI is a valid URI.	<code>xsd:anyURI</code>	None

Parent Elements

- NDRProfile

2.18. Rationale

Definition: `Rationale` provides a reason for creating the rule. Although `Rationale`'s data type permits any string value, our intention for the next version of NDRProfile is to restrict the value to an enumerated set similar to that proposed in [3].

Data type: `xsd:string`

Parent Elements

- Guidance

2.19. RuleVersion

Definition: `RuleVersion` defines the version number of the guidance rule.

Data type: `xsd:integer`

Parent Elements

- Guidance

2.20. SchemaExample

Definition: `SchemaExample` associates a sample schema with a guidance rule in order to give an example of rule compliance or violation.

Data type: `xsd:string` with white space preserved

Parent Elements

- Guidance

2.21. Scope

Definition: `Scope` defines the level of granularity of the guidance, i.e., whether it applies to a single value or field, an aggregate component (such as a complex type definition), or to the XML schema as a whole.

Data type: `xsd:string`

Parent Elements

- Guidance

2.22. Script

Definition: `Script` specifies code implementing a test case. The code should be written in the language specified by the `TestCase` element's `ruleType` attribute.

Data type: `xsd:string` with white space preserved

Parent Elements

- TestCase

2.23. SourceDate

Definition: `SourceDate` is the date the derived rule was published.

Data type: `xsd:date`

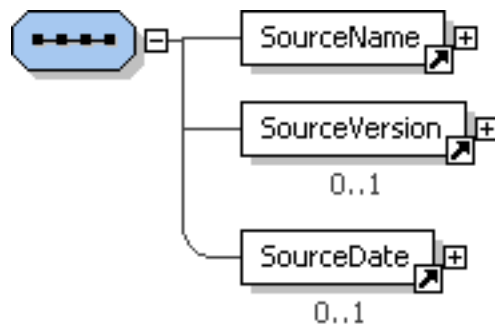
Parent Elements

- DerivedFrom
- SourceNDR

2.24. SourceNDR

Definition: `SourceNDR` specifies the original source of the rule. It is used to indicate if the rule is a copy of a rule already existing in another NDR.

Content:



Attribute Name	Definition	Allowed Values	Default Value
QODUniqueIdentifier	QODUniqueIdentifier is an optional attribute which contains the unique identifier assigned by QOD. This attribute will be populated by QOD when the rule is exported from QOD into a valid NDRProfile instance.	<code>xsd:string</code>	None
URI	URI is an XML unique ID type. The first character of an XML ID must be a letter followed by any XML name characters (letter, number, ., -, _, or :)	<code>xsd:anyURI</code>	None

Parent Elements

- Guidance

2.25. SourceName

Definition: `SourceName` is the name of the NDR the rule was derived from.

Data type: xsd:string

Parent Elements

- DerivedFrom
- SourceNDR

2.26. SourceVersion

Definition: `SourceVersion` is the version of the NDR the rule was derived from.

Data type: xsd:string

Parent Elements

- DerivedFrom
- SourceNDR

2.27. Status

Definition: `Status` specifies the standing of a guidance rule or NDRProfile, e.g., "Draft."

Data type: xsd:string

Parent Elements

- NDRProfile
- Guidance

2.28. SupportingGuidance

Definition: `SupportingGuidance` allows the association of additional information with a guidance rule.

Data type: xsd:string

Parent Elements

- Guidance

2.29. SupportingGuidanceURI

Definition: `SupportingGuidanceURI` allows a URI to be provided for additional documentation for the guidance.

Data type: xsd:anyURI

Parent Elements

- Guidance

2.30. Testability

Definition: `Testability` defines whether a rule can be programmatically evaluated. Actual assessment or confirmation of a rule's quality is outside the scope of NDRProfile.

Data type: Fully-Testable, Partially-Testable, or Untestable

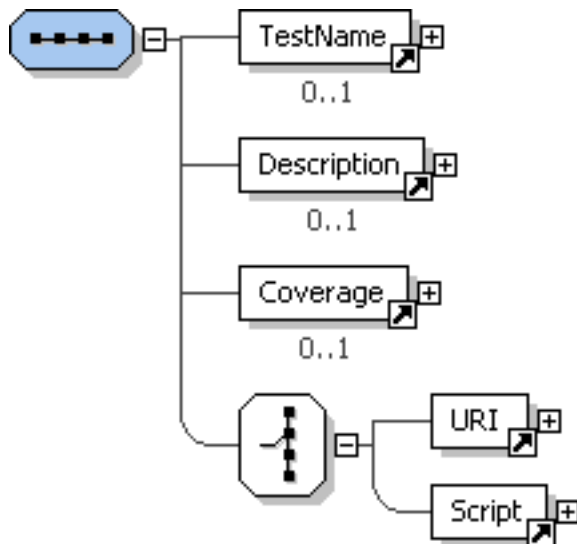
Parent Elements

- Guidance

2.31. TestCase

Definition: `TestCase` is a computer executable script, i.e., a binding of the guidance to a specific implementation. A test case determines whether an XML schema complies with or violates the guidance rule.

Content:



Attribute Name	Definition	Allowed Values	Default Value
<code>ruleType</code>	<code>ruleType</code> identifies the type of validation rule that has been created. If "Other" is selected, the attribute 'typeOther' should be used to identify the type of validation rule that was created.	ISO-Schematron, Schematron1.5, Jess, Other	None
<code>typeOther</code>	<code>typeOther</code> identifies a validation rule that has been created in another language besides Schematron [4] [5] and Jess [6].	<code>xsd:string</code>	None
<code>testCaseID</code>	The <code>testCaseID</code> is a unique identifier for the test case. It must conform to the XML ID rule construct.	<code>xsd:ID</code>	None

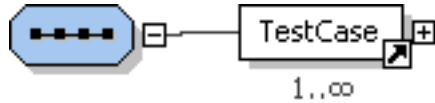
Parent Elements

- TestCases

2.32. TestCases

Definition: TestCases defines one or more test cases.

Content:



Parent Elements

- Guidance

2.33. TestName

Definition: TestName defines a name that a user can assign to a test.

Data type: xsd:string

Parent Elements

- TestCase

2.34. URI

Definition: URI defines a link to a single test case.

Data type: xsd:anyURI

Parent Elements

- TestCase

3. Developing an NDRProfile Instance

This section describes various ways users can develop a document conforming to the NDRProfile schema document. The conforming document can then be formatted for viewing using the `NDRProfile-to-HTML.xsl` stylesheet, imported into QOD (see Section 4, “NDRProfile and QOD”), or imported into some other NDRProfile-aware application.

`NDRProfile-to-HTML.xsl` and other files mentioned in this section are listed in Appendix A, *NDRProfile Resources*, and are included in the NDRProfile download package on SourceForge.

3.1. DocBook Documentation

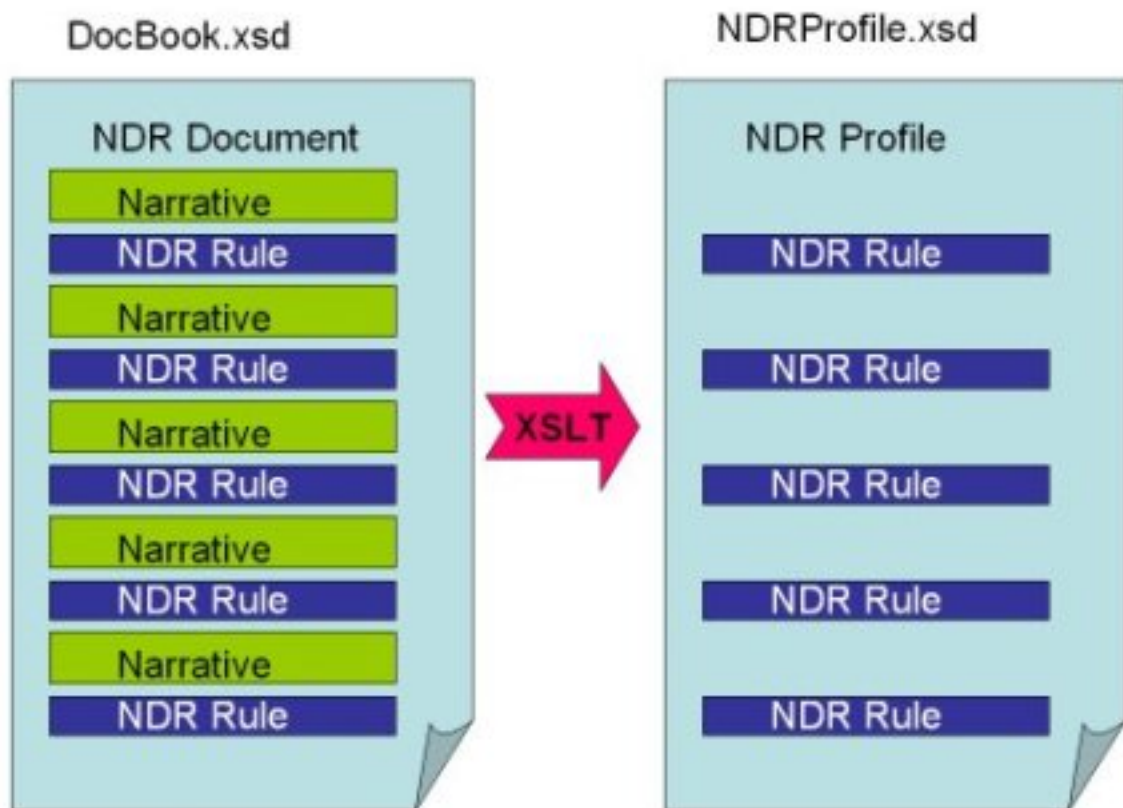
Organizations can develop their NDR using the standard DocBook schema. DocBook [7] is a standard for developing technical documentation. We have developed an XML Style Language Transformation (XSLT) [8] stylesheet that extracts the rules from a DocBook instance and produces XML conforming to the NDRProfile schema.

Several standards bodies, such as the Universal Business Language Technical Committee [<http://www.oasis-open.org/committees/ubl>], have started developing and maintaining their NDRs using the DocBook standard. The use of DocBook XML can provide a mechanism for automatically extracting an NDRProfile document from the full NDR documentation.

We have developed an XSLT stylesheet (`NDRDocumentDocbook-to-NDRProfile.xsl`) to convert a DocBook tagged NDR to the NDRProfile XML document. You should be able to use any XSLT processor to create an NDRProfile xml file from a DocBook XML document, provided the DocBook is tagged as described below.

The figure below shows how rules are extracted from the DocBook XML document. The resulting output from the XSLT extraction is a fully conformant NDRProfile XML document.

Figure 1. DocBook Documentation to NDRProfile



For this method to be used, rules and rule prefixes must be identified within the document instance using DocBook's `role` attribute. The XSLT stylesheet uses the `role` values to transform the DocBook XML into NDRProfile guidance rules.

The XSLT extraction uses the `blockquote` element with a `role` attribute value of `Rule` to extract the rule. The `blockquote` element must also include a unique identifier for uniquely identifying rules.

Note

Both the `role` and `id` attributes are optional attributes within the DocBook schema. Therefore, you must ensure that all rules include the `role` and `id` attributes. We have developed a

Schematron [4] schema, `CheckDocbookNDRRules.sch`, that can be used to ensure that the `blockquote` element includes the required information to support conversion to an NDRProfile.

Example 1. Using `blockquote` with `role` and `id` attributes to define a rule

```
<blockquote role="Rule" id="rule-ELD2">
  ...
</blockquote>
```

DocBook uses the `para` element to define a paragraph. The text documenting the rule should be included in a `para` element.

If your NDR standard uses rule prefixes to disambiguate rules within your NDR, the `emphasis` element should be used with the `role` attribute set to `rule-prefix` within the `para` element. In the following example, the NDR uses "ELD2" as a unique identifier with implied semantics. "ELD" is an abbreviation for "Element Declaration." "2" is appended to the identifier to differentiate the rule from other rules in the NDR dealing with element declaration.

Example 2. Using `para` to provide text of a rule

```
<blockquote role="Rule" id="rule-ELD2">
  <para>
    <emphasis role="rule-prefix">ELD2</emphasis>
    ...
  </para>
</blockquote>
```

Schematron test cases can be included in the documentation using the DocBook element `programlisting`. The `programlisting` element should be included after the `para` element. The example below shows the complete DocBook markup of an NDR rule that includes a Schematron test case. A CDATA section is used to prevent the Schematron from being parsed during transformation from DocBook to NDRProfile. CDATA sections specify to an XML processor that characters such as angle brackets and ampersands should not be treated as markup. [9]

Example 3. Rule with Schematron test case

```
<blockquote role="Rule" id="rule-ELD2">
  <para>[<emphasis role="rule-prefix">ELD2</emphasis>] All element
  declarations MUST be global</para>
  <programlisting><![CDATA[
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.ascc.net/xml/schematron">
  <title>Navy Naming and Design Rules</title>
  <ns prefix="xsi" uri="http://www.w3.org/2000/10/XMLSchema-instance"/>
  <ns prefix="xsd" uri="http://www.w3.org/2001/XMLSchema"/>
  <ns prefix="html" uri="http://www.w3.org/1999/xhtml"/>
  <pattern id="ELD" name="Element Rule">
    <rule id="ELD1" context="//xsd:all |
                          //xsd:choice |
                          //xsd:complexType |
                          //xsd:sequence">
      <assert test="xsd:element/@ref">ELD2: All element declarations MUST
  be global</assert>
    </rule>
  </pattern>
</schema>
]]></programlisting>
</blockquote>
```

Your favorite XSLT processor can be used to create the NDRProfile XML document from the NDR DocBook document. Below is a command line example (with a newline added for readability) using Saxon [10] (an XSLT processor written in Java [11]), of converting an NDR document created with DocBook into an NDRProfile document. For guidance using other XSLT processors, refer to their documentation.

```
java -jar saxon.jar -o NDRProfile.xml NDRDocument.xml
  NDRDocumentDocbook-to-NDRProfile.xsl
```

Saxon interprets the command as follows:

Command Part	Explanation
java -jar saxon.jar	Uses the Java Runtime Environment to invoke the Saxon XSLT processor
-o NDRProfile.xml	Sends the result tree to an output file called NDRProfile.xml. The name of the file is arbitrary and user controlled
NDRDocument.xml	The input file - a complete NDR document tagged using DocBook
NDRDocumentDocbook-to-NDRProfile.xsl	The XSLT stylesheet performing the conversion

The `blockquote` element will be transformed into the following NDRProfile output:

```
<Guidance guidanceID="rule-ELD2" documentationID="rule-ELD2"
  prefixNumber="2" prefixToken="ELD">
  <Testability>Fully-Testable</Testability>
  <GuidanceText>All element declarations MUST be global </GuidanceText>
  <TestCases ruleType="Schematron1.5">
```

```
<TestCase>
  <Script><![CDATA[
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.ascc.net/xml/schematron">
  <title>Navy Naming and Design Rules</title>
  <ns prefix="xsi" uri="http://www.w3.org/2000/10/XMLSchema-instance"/>
  <ns prefix="xsd" uri="http://www.w3.org/2001/XMLSchema"/>
  <ns prefix="html" uri="http://www.w3.org/1999/xhtml"/>
  <pattern id="ELD" name="Element Rule">
    <rule id="ELD1" context="//xsd:all |
                                //xsd:choice |
                                //xsd:complexType |
                                //xsd:sequence">
      <assert test="xsd:element/@ref">
ELD2: All element declarations MUST be global
      </assert>
    </rule>
  </pattern>
</schema>
]]></Script>
  </TestCase>
</TestCases>
</Guidance>
```

3.2. Using an XML Editor

Any XML editor can be used to develop an NDRProfile document. We have developed a cascading stylesheet (CSS) [12] and XSLT stylesheet to format an NDRProfile document for viewing in a browser or editor. These stylesheets should work with any XML editor supporting XSLT or CSS.

3.3. Spreadsheet Transformation

Several standards organizations use spreadsheets to maintain NDR rules. We have created a spreadsheet template in Microsoft's Excel format [13] based on review of the several spreadsheets currently being used. The spreadsheet will allow users to create an NDR using the Excel spreadsheet application. We have also developed an XSLT stylesheet that will transform the NDR spreadsheet to NDRProfile XML. This XSLT can be used to transform a generic NDR to the NDRProfile document instance as long as the fields in the spreadsheet are the same as our fields. If an organization decides to modify the spreadsheet, they can modify the XSLT to support their new structure.

The following table shows the correspondence between spreadsheet columns and NDRProfile schema objects.

Column	Title	NDRProfile Mapping
A	Guidance ID	Guidance/@guidanceID
B	Guidance Name	Guidance/GuidanceName
C	Derived From	Guidance/DerivedFrom
D	Enforcement	Guidance/EnforcementLevel
E	Guidance Text	Guidance/GuidanceText
F	Testability	Guidance/Testability
G	Comment	Comment

The spreadsheet must be saved as an XML file prior to conversion. You can save the spreadsheet to an XML file in Excel by:

1. Clicking on *File -> Save As*.
2. Type the name of the file in the "File name" block.
3. Change the "Save as type" to *XML Data*.
4. Click **Save**.

Once the spreadsheet has been saved to an XML file, it is converted to the Excel XML Format. The XSLT stylesheet, `Excel-to-NDRProfile.xsl`, converts the XML from the Excel format to the NDRProfile XML format. The conversion can be accomplished using an XSLT processor. The following command uses Saxon (newline added for readability):

```
java -jar saxon.jar -o NDRProfile.xml NDRProfile-Template.xml  
Excel-to-NDRProfile
```

The command is interpreted as follows:

Command Part	Explanation
<code>java -jar saxon.jar</code>	Invoke Saxon
<code>-o NDRProfile.xml</code>	Send the result tree to the output file <code>NDRProfile.xml</code> .
<code>NDRProfile-Template.xml</code>	The input file - in this case, a spreadsheet exported to XML
<code>Excel-to-NDRProfile.xsl</code>	The XSLT stylesheet which performs the conversion

3.4. XForms

An XForms [14] form has been developed for creating an NDRProfile using a web browser. The form requires a browser such as Mozilla Firefox with client-side support for the XForms standards.

Note

To use this form, Mozilla's XForms plugin [15] must be installed. Information about obtaining the plugin can be found at <http://www.mozilla.org/projects/xforms>. Follow the instructions for installing the plug-in. The form document, `NDRProfile-Form.xhtml`, uses a template file `NDRProfile.xml` for the initial population of the fields.

The XForm is designed in 2 pages¹. The first page, shown below, obtains metadata concerning the entire NDR. The second page obtains individual `Guidance` elements, i.e., NDR rules.

¹ This form is intended as a proof of concept. Therefore, we have not paid much attention to user interface design principles or readability. Also, as of November 2008, the Mozilla XForms extension is still pre-version 1.0. We present screen shots of the form and show the generated XML in order to illustrate the potential of XForms as a low-cost easy-to-use authoring solution.

Figure 2. Page 1 of Mozilla Form

Developing An NDRProfile

Title:	Source:
al Business Language (UBL) Naming and Design Rules	Draft
Profile Derived From:	Profile Derived From URI:
Profile Date:	Documentation Location:
2006-09-08	http://www.oasis-open.org/committees/download.php
NDR URI:	NDR Identifier:
mittees/download.php/10323/cd-UBL-NDR- 1.0Rev1c.pdf	NDR100
Contact:	Description:
mavis.Cournane@cognitran.com	struction of XML components for the UBL vocabulary.
NDR Status:	
Draft	

Display Guidance Form

Insert Another Guidance

Submit Reset

The second page of the form allows creation of the components for the Guidance portions of the NDR. Page 2 is a repeating group that will allow the user to add as many Guidance elements as needed.

Figure 3. Page 2 (First Screen Shot) Mozilla Form

Guidance

Guidance Identifier: rule-ELD2	Enforcement Level: Mandatory
Documentation Identifier: 	Rule Classification: General
NDR Prefix Token: ELD	NDR Prefix Number: 1
Rationale for Rule: 	Comments:

Figure 4. Page 2 (Second Screen Shot) Mozilla Form

The form is divided into several sections:

- Rule Status:** A dropdown menu with the value "Draft".
- Testability of Rule:** A dropdown menu with the value "Fully Testable".
- Guidance Text:** A text area containing the text "All element declarations MUST be global".
- Schematron Test Case:** A text area containing XML code:

```
//xsd:complexType |  
//xsd:sequence">  
<assert test="xsd:element@ref">  
ELD2: All element declarations MUST be  
global</assert>  
</rule>  
</pattern>  
</schema>
```
- Scope of Rule:** An empty text area.

Complete this section if rule was derived from another rule.

- Derived Profile Name:** An empty text input field.
- Derived Profile Version:** An empty text input field.
- Derived Profile Date:** A date input field with a dropdown arrow.

At the bottom of the form, there are three buttons:

- Display Guidance Form** (green button)
- Insert Another Guidance** (green button)
- Submit** (blue button) and **Reset** (green button)

When the user clicks the "Submit" button, an NDRProfile XML document is created in a file called NDRProfile-new.xml. If you want to modify the resulting NDRProfile XML document, copy this file to NDRProfile.xml in the directory where NDRProfile-Form.xhtml file is located.

Below is the XML file generated from the screenshots shown above:

```
<?xml version="1.0" encoding="UTF-8"?>
<NDRProfile NDRDocumentBaseURI=
"http://www.oasis-open.org/committees/download.php/10323/cd-UBL-NDR-
1.0Rev1c.pdf"
    NDRProfileBaseURI="http://www.eccnet.com/NDRProfile"
    NDRProfileID="NDR100" URI="" NDRPublishDate="2006-09-08"
    contactURI="mavis.Cournane@cognitran.com"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:noNamespaceSchemaLocation="NDRProfile_v-1.xsd">
  <NDRTitle>Universal Business Language (UBL) Naming and Design
Rules</NDRTitle>
  <Description>This specification documents the naming and design rules
and guidelines for the construction of XML components for the UBL
vocabulary.</Description>
  <Status>Draft</Status>
  <ProfileDerivedFrom URI="" />
  <Guidance derivedFromURI=""
    documentationID="rule-ELD2"
    guidanceID="rule-ELD2" prefixNumber="1"
    prefixToken="ELD" ruleLocation="">
  <Classification>General</Classification>
  <DerivedFrom>
    <SourceName/>
    <SourceVersion/>
    <SourceDate>2000-01-01</SourceDate>
  </DerivedFrom>
  <EnforcementLevel>Mandatory</EnforcementLevel>
  <Status>Draft</Status>
  <Testability>Fully-Testable</Testability>
  <Scope/>
  <GuidanceText>All element declarations MUST be global </GuidanceText>
  <Comment/>
  <Justification/>
  <TestCases>
    <TestCase ruleType="Schematron1.5">
      <Script><![CDATA[
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.ascc.net/xml/schematron">
  <title>Navy Naming and Design Rules</title>
  <ns prefix="xsi" uri="http://www.w3.org/2000/10/XMLSchema-instance"/>
  <ns prefix="xsd" uri="http://www.w3.org/2001/XMLSchema"/>
  <ns prefix="html" uri="http://www.w3.org/1999/xhtml"/>
  <pattern id="ELD" name="Element Rule">
    <rule id="ELD1" context="//xsd:all |
//xsd:choice |
//xsd:complexType |
//xsd:sequence">
      <assert test="xsd:element/@ref">
ELD2: All element declarations MUST be global</assert>
    </rule>
  </pattern>
```

```
</schema>  
]]></Script>  
  </TestCase>  
</TestCases>  
</Guidance>  
</NDRProfile>
```

4. NDRProfile and QOD

QOD assists standards developers in consistently using XML Schema for the specification of information. Consistent design of XML schemas within an organization or single integration project can reduce the number and the severity of interoperability problems. In addition, this consistency makes the XML schema easier to extend, understand, implement, and maintain; and, it paves the way for automated testing and mapping. Applying best XML schema design practices and following agreed-upon naming conventions are ways to achieve this design consistency.

Users can develop an NDRProfile using QOD. QOD enables a user to create Test Cases and Guidance Rules (called "test requirements" in the QOD web application), associate them with each other, and store them in a central repository. Test cases can then be selected and grouped into an NDRProfile (or "test profile" in QOD terminology). This QOD test profile can then be exported to an XML file conforming to NDRProfile. QOD can import NDRProfile instances as well.

4.1. QOD Handling of Imported Guidance and Test Cases

QOD's import functionality allows a user to upload an NDRProfile written in XML and conforming to the NDRProfile schema. This enables making changes to an NDRProfile offline and importing these changes back into QOD for testing and validation. If a user uploads a new NDRProfile (one which does not currently exist as a test profile in the QOD repository), a new test profile is created. Based on whether the rules or test cases already exist in the QOD database, different options are displayed to the user to determine how these elements are handled. These options are described below.

- | | |
|--------|--|
| Add | The NDRProfile element does not already exist in QOD. If the user clicks "Add," the element is added to the database, and the user is assigned ownership of it. |
| Insert | The NDRProfile element already exists in QOD, but is not associated with the NDRProfile being uploaded. Selecting the insert option establishes an association in QOD between the existing item and the uploaded NDRProfile. |
| Update | The NDRProfile element already exists in QOD, is owned by the user, and is already associated with the NDRProfile being uploaded. Selecting this option updates QOD to match the NDRProfile element. If the user is not the owner of the NDRProfile element, the update option is not available. |
| Remove | This option appears when both of these conditions occur: <ul style="list-style-type: none">• The user uploads an NDRProfile whose identifier matches that of an existing QOD test profile (s)he already owns.• The QOD test profile is associated with guidance rules or test cases not included in the uploaded NDRProfile. The option appears for each item associated with the QOD test profile but not in the uploaded NDRProfile. Clicking "Remove" removes the connection between the guidance rule or test case from the test profile. |

Note

This will *not* remove the rule or test case completely from the QOD database.

4.2. NDRProfile Identifiers

The existence of items in the QOD database is determined by the ID assigned to the item, either as the `NDRProfileID`, the `guidanceID`, or the `testCaseID`. To ensure QOD consistency when creating the NDRProfile outside of the QOD environment, the user is free to assign any ID to the `NDRProfileID`, while the `guidanceID` and `testCaseID` must be a concatenation of the Guidance's `organizationPrefix` and `SourceVersion` elements, and the `prefixToken` and `prefixNumber` attributes from the `NDRProfile`. However, when creating test requirements and test cases within the QOD, these IDs are automatically structured and generated based on user input. The composition of the `guidanceID` and `testCaseID` are as follows:

guidanceID: `organizationPrefix-SourceVersion-[prefixToken]-prefixNumber`

Where:

- `organizationPrefix` is the prefix related to the name of the organization that created the NDR
- `SourceVersion` is the NDR version
- `prefixToken` (optional) and `prefixNumber` create the unique identifier for a rule in the NDR.

Example of a `guidanceID`: OAGI-9.0-R-16

testCaseID: `guidanceID_implementationNumber`

Where:

- `ImplementationNumber` is a number that should be unique among test cases implementing the same test requirement. For example, if test case A and test case B both implement test requirement C, suggested implementation numbers for test case A and test case B would be 1 and 2 respectively. Note `ImplementationNumber` is not an element in the `NDRProfile`.

Example of a `testCaseID`: OAGI-9.0-R-16-1

5. Lessons Learned and the Future of NDRProfile

QOD informed NDRProfile's design, and our implementation experience provided important and beneficial insight toward specifying the schema. On the other hand, the NDRProfile schema may suffer from too much QOD influence in its identifier constructs. For example, the `OrganizationPrefix` element and `QODUniqueIdentifier` attribute both assume QOD-specific implementation details that might not be relevant for other NDRProfile use cases. We hope that others will develop XML schema design quality tools supporting NDRProfile. Only through multiple independent implementations can we determine whether the current NDRProfile identifier representations are helpful for other tools besides QOD.

NDRProfile's `DerivedFrom` element provides a rudimentary way to say that one guidance rule is a modification of another rule. It would be useful if NDRProfile could represent additional information about the modification. For example, two rules may be identical in all respects except that they refer to different

namespaces. Or one rule may be the same as another rule, but with an additional restriction added. We are currently studying NDRs from multiple sources with the ultimate goal of incorporating a taxonomy of reuse scenarios into the NDRProfile schema to better support management of rule sets.

The focus of this document has been on the content of the NDRProfile schema, use of the schema for creating new NDRProfile instances, and NDRProfile's relationship with the QOD application. In Section 1, "Introduction" we enumerated four barriers to NDR effectiveness: proliferation of rule sets, lack of NDR document structure, lack of automation, and poor versioning and traceability. The current NDRProfile schema addresses the first three barriers by specifying an XML language for representing sets of guidance rules and associating guidance rules with computer-interpretable code to determine compliance. Our vision is for NDRProfile to continue to evolve through results from further analysis of NDRs and of inter-rule relationships, and from additional implementation experience.

Acknowledgment

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A. NDRProfile Resources

This appendix lists the stylesheets and templates available for working with the NDRProfile schema. The resources were discussed in Section 3, “Developing an NDRProfile Instance” and are included with the NDRProfile Schema package, available from the QOD Sourceforge website (<http://qod.sourceforge.net/>).

<code>NDRProfile-to-HTML.xsl</code>	XSLT stylesheet that can be used to either display an NDRProfile instance within a browser supporting XSLT or to convert the NDRProfile instance to HTML.
<code>NDRProfile_v-1.css</code>	CSS stylesheet for formatting an NDRProfile document for viewing in an XML editor or browser.
<code>NDRDocumentDocbook-to-NDRProfile.xsl</code>	XSLT stylesheet to convert an NDR DocBook instance to an instance of NDRProfile. The DocBook instance must use <code>role</code> and <code>id</code> attributes as explained in Section 3.1.
<code>CheckDocbookNDRRules.sch</code>	Schematron schema for ensuring that NDR documentation marked up using Docbook contains attributes needed for conversion to NDRProfile.
<code>NDRProfile-Template.xls</code>	Excel template for authoring an NDRProfile document.
<code>Excel-to-NDRProfile.xsl</code>	XSLT stylesheet for converting an NDRProfile spreadsheet exported as XML into a document conforming to the NDRProfile schema.
<code>NDRProfile-Form.xhtml</code>	XForms form for creating an NDRProfile instance.
<code>NDRProfile.xml</code>	Template for initial population of the fields of <code>NDRProfile-Form.xhtml</code> .