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Standard Practice

XML NAMESPACES

FOREWORD

This standard is approved for use by all Departments of the Federal Aviation Administration (FAA).

This Standard sets forth requirements for creating and establishing FAA namespaces used in Extensible Markup Language (XML) documents, such as, but not limited to XML schemas, XML instances, Web Service Description Language (WSDL) documents, and Business Process Expression Language (BPEL) documents.

This standard is one of several related standards that together define FAA's requirements for describing and registering services. A future Handbook will provide guidance for using these standards in concert with the FAA Enterprise Architecture, FAA Order 1375.1 Information/Data Management, and other relevant FAA initiatives.

This standard has been prepared in accordance with FAA-STD-005F.

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1 SCOPE

This standard describes the detailed specifications for constructing and registering FAA namespaces.

1.1 Purpose

The purpose of this standard is to establish and communicate namespace requirements to developers, architects, and business users.

1.2 Applicability

This standard is applicable to all FAA programs responsible for developing applications that employ XML for data exchange or publication.

1.3 Background

The Extensible Markup Language (XML) is rapidly becoming the language of choice for information technology (IT) and internet-based data exchange solutions. A key aspect in the development and deployment of XML is the use of namespace. In general, a namespace uniquely identifies, and provides a context for, a set of names so that there is no ambiguity when objects having different origins but the same names are mixed together. The purpose of XML namespaces is to provide a simple method for qualifying element and attribute names used in XML documents by associating them with namespaces identified by URI references. Namespace associations allow XML implementers to use diverse XML vocabularies without fear of name collisions resulting in invalid XML.

The following example illustrating the use of namespaces in an XML schema is provided to help explain the concepts involved. Namespaces allow constructs with the same name but from different markup vocabularies in different environments to be used in the same schema with no adverse effects.

In Application A below, the value of longitude and latitude is defined as a string where degrees, minutes, and seconds are all represented by two or three characters separated by dashes and concluded by one upper-case letter that indicates a hemisphere, e.g. <longitude>122-21-53W</longitude>. We would like to add to Application A the ability to show the weather information for the given airport using an XML information set provided by Application B, which is a national weather service implemented by the National Oceanic and Atmospheric Administration (NOAA). In this information set, latitude and longitude are defined as decimals.

Application A

```
<Airport>
  <icao>KSFO</icao>
  <name>San Francisco International Airport</name>
  <iata>SFO</iata>
  <latitude>37-37-11N</latitude>
  <longitude>122-21-53W</longitude>
  <elevation>26M</elevation>
</Airport>
```

Application B

```

<current_observation>
...
<location>Francisco, CA, San Francisco International Airport</location>
<station_id>KSFO</station_id>
<latitude>37.61966</latitude>
<longitude>-122.36472</longitude>
<observation_time_rfc822>Mon, 11 Feb 2008 06:51:00 -0500 EST
</observation_time_rfc822>
...
</current_observation>

```

If we attempted to combine those two information sets, an XML parser would not know how to handle those elements, which will result in an application error, i.e., a “name collision” will occur. The solution is to use namespace to distinguish elements with the same name. The XML information set for the new application should look like following:

Application C

```

< app-c:Airport ... xmlns:app-c="urn:us:gov:dot:faa:example:ApplicationC"
xmlns:noaa="urn:us:gov:dot:faa:noaa:weather:example">
  < app-c:icao>KSFO</ app-c:icao>
  < app-c:name>San Francisco International Airport</ app-c:name>
  < app-c:iata>SFO</ app-c:iata>
  < app-c:latitude>37-37-11N</ app-c:latitude>
  < app-c:longitude>122-21-53W</ app-c:longitude>
  < app-c:elevation>26M</ app-c:elevation>
  < noaa:current_observation>
...
  < noaa:latitude>37.61966</ noaa:latitude>
  < noaa:longitude>-122.36472</ noaa:longitude>
  < noaa:observation_time_rfc822>
Mon, 11 Feb 2008 06:51:00 -0500 EST
  </ noaa:observation_time_rfc822>
...
</ app-c:Airport>

```

The FAA is actively engaged in developing and deploying XML based systems. It is critical that the FAA establish a cohesive, coordinated namespace strategy and naming convention to support its various XML efforts. Without a coordinated approach, individual FAA organizations will create a proliferation of disparate XML namespace structures and names resulting in chaotic management of XML components.

2 APPLICABLE DOCUMENTS

2.1 Government Documents

The following form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FAA Order 1375.1D, Information/Data Management, June 26, 2006

http://www.faa.gov/about/office_org/headquarters_offices/aio/library/

FAA Enterprise Architecture, December 2007

http://www.faa.gov/about/office_org/headquarters_offices/aio/programs/itrd/enterprise_architecture/

2.2 Non-Government Standards and Other Publications

Namespaces in XML 1.0 (Second Edition):W3C Recommendation 16 August 2006

<http://www.w3.org/TR//2006/REC-xml-names20060816>

URIs, URLs, and URNs: Clarifications and Recommendations 1.0, W3C Note 21 September 2001

<http://www.w3.org/TR/2001/NOTE-uri-clarification-20010921/>

RFC 2141 URN Syntax, Network Working Group, May 1997

<http://www.rfc-editor.org/rfc/rfc2141.txt>

ISO/IEC 11179, Information Technology – Metadata Registries (MDR), Parts 1 - 6, Published Edition 2, 2004/2005

<http://metadata-standards.org/11179/>

LMI, Recommended XML Namespace for Government Organizations, GS301L1, Jessica L. Glace and Mark R. Crawford, August 2003

http://xml.gov/documents/completed/lmi/GS301L1_namespace.pdf

2.3 Order of Precedence

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3 DEFINITIONS

3.1 Terms

Business Information Steward – A business subject matter expert accountable for a set of information within an information subject area for the FAA. As a group, they ensure overall interoperability across FAA lines of business. These stewards are subject matter experts from the actual business areas who are responsible for the clear, concise definition and representation of business data produced and used within their functional area and across lines of business. They must have knowledge about the processes performed in the production and use of data within their information subject area. [FAA Order 1375.1D] The Business Information Steward understands the rules, regulations and other requirements associated with namespace identification and management within his or her FAA Business Context and is responsible for the integrity and accuracy of the attribute values of his or her registered namespaces.

Designated Data Authority (DDA) - A senior FAA management official, appointed in writing by a Management Team member, who is responsible for the Data Management Program within their organization. Each DDA is a permanent member of the FAA Data Governance Board. [FAA Order 1375.1D]

FAA Business Context Identifier (FBCI) – A string of characters that uniquely identifies an FAA Business Context.

FAA Business Context (FBC) – A designation of the FAA business function or information subject area that the XML artifact supports and that is consistent with the FAA Enterprise Architecture.

FAA Data Governance Board (FDGB) – The body responsible for creating and administering the agency-level processes needed to promote and sustain successful data management practices in the FAA’s emerging net-centric environment, developing and coordinating data exchange standards, and maintaining the corporate data management tools and services. [FAA Order 1375.1D]

FAA Data Registry (FDR) – The official source of the FAA’s data standards. The FDR is a web-enabled system that provides ready access to the agency’s standards and is compliant with the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC) Standard 11179. [FAA Order 1375.1D]

Enterprise Architecture – The operational and technical framework for all capital assets of the FAA. It describes the agency’s current and target architectures, as well as the transition strategy for moving from the current to the target architecture. The enterprise architecture is approved annually by the Joint Resources Council in support of FAA budget and strategic management processes. The enterprise architecture has three segments: the NAS architecture, the NAS regulatory architecture, and the non-NAS architecture. The Chief Information Officer has responsibility for maintaining the enterprise architecture. The Chief Operating Officer of the Air Traffic Organization (ATO) is delegated responsibility to develop and implement the NAS architecture. [FAA AMS section 1.2.2]

Metadata – Data that defines or describes other data. [ISO 11179-1:2004]

Namespace – A collection of names, identified by a URI reference, that are used in XML documents as element types and attribute names. The use of XML namespaces to uniquely identify metadata terms allows those terms to be unambiguously used across applications, promoting the possibility of shared semantics. [DCMI Glossary, Dublin Core Metadata Initiative, User Guide Committee, 23 April 2004]

Registrar – A person or group who administers the FAA Data Registry. The registrar provides advice to Business Information Stewards on namespace registration procedures and is responsible for namespace registration functions.

Uniform Resource Identifier (URI) – A compact string of characters for identifying an abstract or physical resource. [W3C Note 21]

Uniform Resource Name (URN) – A name that is intended to serve as a persistent, location-independent, resource identifier. [RFC 2141]

3.2 Abbreviations

BPEL Business Process Expression Language

DDA Designated Data Authority

<i>DOT</i>	Department of Transportation
<i>FBCI</i>	FAA Business Context Identifier
<i>FDGB</i>	FAA Data Governance Board
<i>FDR</i>	FAA Data Registry
<i>IETF</i>	Internet Engineering Task Force
<i>IRDI</i>	International Registration Data Identifier
<i>ISO/IEC</i>	International Organization for Standardization/International Electrotechnical Commission
<i>IT</i>	Information Technology
<i>RFC</i>	Request for Comment
<i>URI</i>	Uniform Resource Identifier
<i>URN</i>	Uniform Resource Name
<i>WSDL</i>	Web Service Description Language
<i>XML</i>	eXtensible Mark-up Language

4 GENERAL REQUIREMENTS

A namespace SHALL take the form of a Uniform Resource Name (URN), which is a type of Uniform Resource Identifier (URI) that conforms to Internet Engineering Task Force (IETF) request for comment (RFC) 2141, *URN Syntax*. A URN provides a convention and structure for creating and managing globally unique, persistent, location-independent identifiers for FAA XML namespaces. URNs are designed as persistent names that, once published, will not change. This is required for an effective schema namespace.

5 DETAILED REQUIREMENTS

This section describes the detailed requirements for FAA namespaces.

5.1 FAA URN Syntax

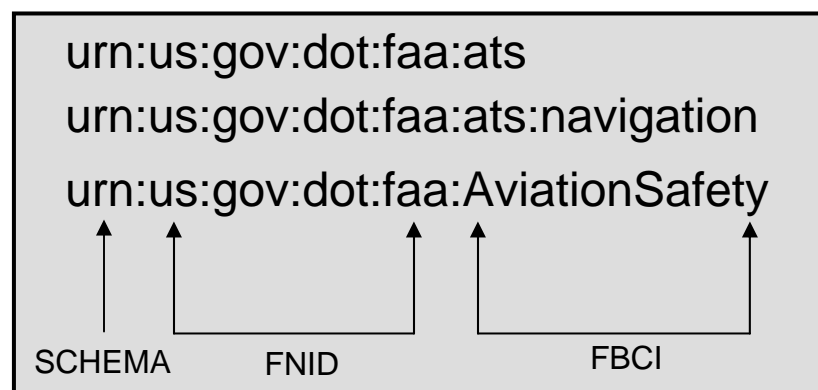
- a. Every FAA namespace SHALL be identified by a URN.
- b. All URNs that are used to identify namespaces in FAA SHALL have the following syntax.

<URN> ::= "urn:"<FNID>[":"<FBCI>]+

Where:

"urn:"	URN schema identifier, rendered literally, always REQUIRED
<FNID>	FAA Namespace Identifier, always REQUIRED
<FBCI>	FAA Business Context Identifier (the "+" denotes one or more occurrences of Business Context Identifiers, all delimited by a colon ":")

Following are several illustrative examples of valid FAA namespace URNs:



5.1.1 FAA Namespace Identifier

The FAA Namespace Identifier SHALL be

us:gov:dot:faa

5.1.2 FAA Business Context Identifier Syntax

- a. In accordance with RFC 2141, the FAA Business Context Identifier SHALL be comprised of any UTF-8 characters compliant with URI syntax. Characters include uppercase letters, lowercase letters, digits 0 through 9, and the dash “-”.
- b. The colon ":" character SHALL be used only as a delimiter between Business Context Identifiers.
- c. The FAA Business Context Identifier SHALL have the following syntax (vertical bar denotes alternatives):

<FBCI>	::= <upper > <lower > <number> <dash>
<upper >	::= "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
<lower >	::= "a" "b" "c" "d" "e" "f" "g" "h" "i" "j" "k" "l" "m" "n" "o" "p" "q" "r" "s" "t" "u" "v" "w" "x" "y" "z"
<number>	::= "0" "1" "2" "3" "4" "5" "6" "7" "8" "9"
<dash>	::= "-"

5.2 FAA Business Context Identifier

The creation of an FAA Business Context Identifier (FBCI) (e.g., “ats” to represent air traffic services, or “weather” to represent weather information systems) is an important part of namespace identification since the URI syntax is organized hierarchically, with components listed in order of decreasing significance from left to right per RFC 2141 rules. Therefore, part of the namespace validation process entails making sure the requested FBCI is unique and appropriate within the overall FAA environment. This is accomplished by registering the namespace in the FAA Data Registry (FDR). FAA Order 1375.1 establishes FDR usage within FAA.

- a. The FBCI SHALL be approved by the FAA Data Governance Board (FDGB) and its permanent members, which consist of Designated Data Authorities (DDA), in accordance with FAA Order 1375.1.
- b. The DDAs SHALL be responsible for coordinating extensions to the FBCIs within their respective organizations and with the FDGB.

5.3 Namespace Registration

- a. To ensure uniqueness of namespaces, each namespace SHALL be registered in the FDR by the namespace's Business Information Steward. An overview of the registration process is shown in Section 6, Notes.
- b. Within FDR, namespace metadata (i.e. information about namespace) is maintained in a uniform and prescribed manner. Identifiers, quality measures, responsible organizations, names, and definitions are all part of the general metadata that describes the environment covered by the namespace. Metadata quality is monitored through the use of a registration status. The status records the level of quality. Every namespace is assigned a registration status, and this status may change over time. Each namespace is also assigned a unique identifier. The required namespace metadata SHALL be provided as listed in the following table.

Metadata Requirements	Metadata Definition
The following metadata SHALL be provided by the Business Information Steward as part of the namespace registration process:	
URI (called "Preferred Name" in FDR)	The URI of the namespace.
Description	A brief summary of the namespace's contents. A natural language textual statement that expresses the essential nature of the namespace and permits its differentiation from all other namespaces.
Sensitivity Classification	The nature of the sensitivity of the namespace with respect to access.
Steward	The contact information associated with the person or group responsible for the integrity and accuracy of the namespace metadata.
Steward Organization	The organization to which the steward reports or belongs.
Submitter	The contact information associated with the person or group responsible for entering the namespace metadata in FDR.
Submitter Organization	The organization to which the submitter reports or belongs.
Related Namespace(s)	The URIs of related namespaces registered in FDR, together with the nature of the association between the subject namespace and the related namespaces, e.g., parent of, child of, similar to. NOTE: every subject namespace SHALL have at least one but no more than one parent namespace. The default parent namespace's URI is "urn:us:gov:dot:faa".
The following metadata are optional and MAY be provided by the Business Information Steward as part of the namespace registration process:	
Reference Documents	The titles and locations of documents or other resources which provide pertinent details for consultation about the namespace.
Comments	Additional explanatory information.

Metadata Requirements	Metadata Definition
The following metadata SHALL be provided by the FDR registrar as part of the namespace registration process:	
International Registration Data Identifier (IRDI)	An internationally unique identifier for the namespace. An IRDI is required for an administered item in any ISO 11179-compliant registry and is automatically assigned by FDR.
Context	The universe of discourse in which the name (of the namespace, i.e., the URI) has meaning. The default context value is "FAA".
Registration Status	<p>A designation of the status in the registration life-cycle of the subject namespace. A registration status is required for an administered item in any ISO 11179-compliant registry. Status levels are:</p> <p>INCOMPLETE - A submitter wishes to make the community that uses this registry aware of the existence of a namespace in his or her Business Context. The namespace may not contain all mandatory metadata.</p> <p>RECORDED - The namespace has been proposed for progression through the registration process. All mandatory metadata has been provided but may not meet specified quality requirements.</p> <p>QUALIFIED - It has been confirmed that the mandatory metadata is complete and conforms to applicable quality requirements.</p> <p>STANDARDIZED – It has been confirmed by the FAA Data Governance Board that the namespace is of broad interest in the registry user community and is approved for use.</p> <p>RETIRED - It has been determined that the namespace is no longer recommended for use by the registry user community, and the namespace should no longer be used.</p> <p>SUPERSEDED - It has been determined that the namespace is no longer recommended for use by the registry user community, and a successor namespace is now preferred for use.</p>
Version Identifier	The unique version identifier of the namespace. An identification of the latest or previous update in a series of evolving namespace descriptions within FDR.
Date Created	The date the namespace was first entered into FDR.
Effective Date	The effective date the namespace is approved by the FAA Data Governance Board for use. (Registration Status = Standardized).
Expiration Date	The date that a namespace is no longer approved for use.

5.4 Legacy Namespaces

If a namespace has already been identified using a format different from the URN format required by this Standard, the namespace SHALL still be registered. An overview of the registration process is shown in Section 6, Notes.

6 NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 XML Namespace Registration Process Overview

6.1.1 Introduction

The process for registering namespaces in FDR is composed of two parts:

- a. *Namespace Development* is characterized by research and analysis of candidate namespaces.
- b. *Namespace Registration* consists largely of vetting the proposed namespace and ensuring that it is correct and consistent for the environment to which it applies.

6.1.2 Roles and Responsibilities

- a. The *Submitter* is responsible for entering the namespace metadata into FDR.
- b. The *Designated Data Authority (DDA)* is responsible for ensuring that his or her organization's namespaces are compatible with the FAA Enterprise Architecture and goals.
- c. The *Business Information Steward* is responsible for integrity and accuracy of the metadata that describes his or her registered namespace.
- d. The *FDR Registrar* provides advice to Business Information Stewards and submitters on namespace registration and features and is responsible for namespace registration function. The FDR registrar is also the de facto steward of the FAA namespace identified by "urn:us:gov:dot:faa".

6.1.3 Registering Namespaces

Step 1 – The submitter coordinates the need for a new namespace with his or her DDA.

Step 2 – The submitter searches FDR for the proposed new namespace to determine if this namespace has already been registered.

Step 3 – If the namespace already exists, it cannot be duplicated. The submitter must develop another.

Step 4 – The submitter searches FDR to find the lowest level registered namespace that is appropriate to his or her Business Context and that can hold a "parent" relationship to the new namespace.

Step 5 – If there is no registered parent namespace at a lower level than the default parent namespace identified by "urn:us:gov:dot:faa", the submitter must coordinate with the DDA and the FDR registrar to determine an appropriate FBCI and appropriate Business Information Steward for the new namespace. Note: FDGB approves FAA Business Context Identifiers; see section 5.2.

Step 6 – The submitter enters the new namespace's metadata into FDR to the best of his or her knowledge. The metadata includes the URN of the parent namespace, and the new namespace's

URN is formulated such that the parent namespace's URN is the first part of the new namespace's URN, e.g.:

Parent namespace URN – urn:us:gov:dot:faa:ats

New namespace URN – urn:us:gov:dot:faa:ats:newExample

The metadata must also include the name and organization of the Business Information Steward of the new namespace. Note: this role is ordinarily filled by the Business Information Steward of the parent namespace, but the parent namespace's Business Information Steward may delegate stewardship to another party.

Step 7 – When the submitter is satisfied that the new namespace's metadata is correct and complete, he or she notifies the Business Information Steward that the new namespace is ready for progression through the approval process. With this notification, the namespace's default "Incomplete" status is changed to "Recorded".

Step 8 – The Business Information Steward verifies that metadata is correct, complete, and conforms to applicable quality requirements expressed in this Standard.

Step 9 – When the Business Information Steward is satisfied that the new namespace's metadata meets all quality requirements, he or she notifies the FDR registrar that the namespace is approved for limited use. With this notification the new namespace's registration status is upgraded to "Qualified".

Step 10 – At such point as the Business Information Steward decides that the namespace should be approved for use throughout the registry community, the Business Information Steward of the namespace requests the FDR registrar to change its registration status to "Standardized".

6.1.4 Retiring or Superseding Namespaces

The decision to retire or supersede a registered namespace is made by the Business Information Steward, who asks the FDR registrar to submit a change request to the FDGB. Upon approval of the request, the FDR registrar changes the namespace's status accordingly.