Technical Track Session

XML: Advanced Concepts and Long Term Vision

Tim Bornholtz

Holly Hyland

START HERE
GO FURTHER
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FSA XML Overview

- Discuss the background of FSA's XML Initiative.
- Present a brief Overview of the XML Registry and Repository for the Education Community.
- Outline next steps for bridging the gap for Systems Developers and Data Base Designers.

START HERE
GO FURTHER
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FSA XML Framework Business Drivers

- Simplify and standardize data exchange with internal and external trading partners.
- Deliver consistent and accurate data across the enterprise-level systems at FSA.

START HERE
GO FURTHER
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FSA XML Framework Business Drivers

- Achieve enterprise-wide efficiencies related to better data exchange standards and policies.
- Strengthen FSA's relationship with the government and financial aid community data standards bodies, to support industry-wide data exchange standards.

START HERE
GO FURTHER
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FSA XML Vision

- *FSA will use XML, via a single set of enterprise and community standards, to simplify and streamline data exchange across postsecondary education.*

START HERE
GO FURTHER
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FSA XML Goals

- Data Exchange Standard – Standardize FSA's data exchange using XML as the data exchange technology standard.
- Consistent and Accurate Data – Achieve consistent and accurate data. The framework will define data standards, as XML entities, for data exchange to achieve consistent and accurate data.

START HERE
GO FURTHER
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FSA XML Goals

- Data Cleanup and Maintenance – Enable data cleanup and maintenance activities. The framework will utilize commonly-defined XML Core Components and XML-based tools to enable the data cleanup and data maintenance activities, as part of the larger Data Strategy Enterprise-Wide initiative.

START HERE
GO FURTHER
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FSA XML Goals

- Standard Data Tools and Processes – Establish standard data tools and processes, to support consistently performed data/XML modeling through standard tools and processes. These standards will be aligned with community and government standards initiatives.

START HERE
GO FURTHER
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FSA XML Goals

- System Flexibility – Provide system flexibility to simplify future interface changes and support new application and data exchange requirements, through XML-based data modeling for system interfaces.
- Data Modeling Best Practices – Use XML and Data Modeling best practices in order to model key business data for exchange and storage.

START HERE
GO FURTHER
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FSA XML Goals

- Governance – Establish an XML governance process to maintain and refresh FSA's XML capabilities.
- Communication – Define processes to ensure timely and accurate communications with FSA's business partners (e.g., Schools, Guaranty Agencies, Third Party Servicers, Software Providers, etc.) regarding XML implementations and changes.

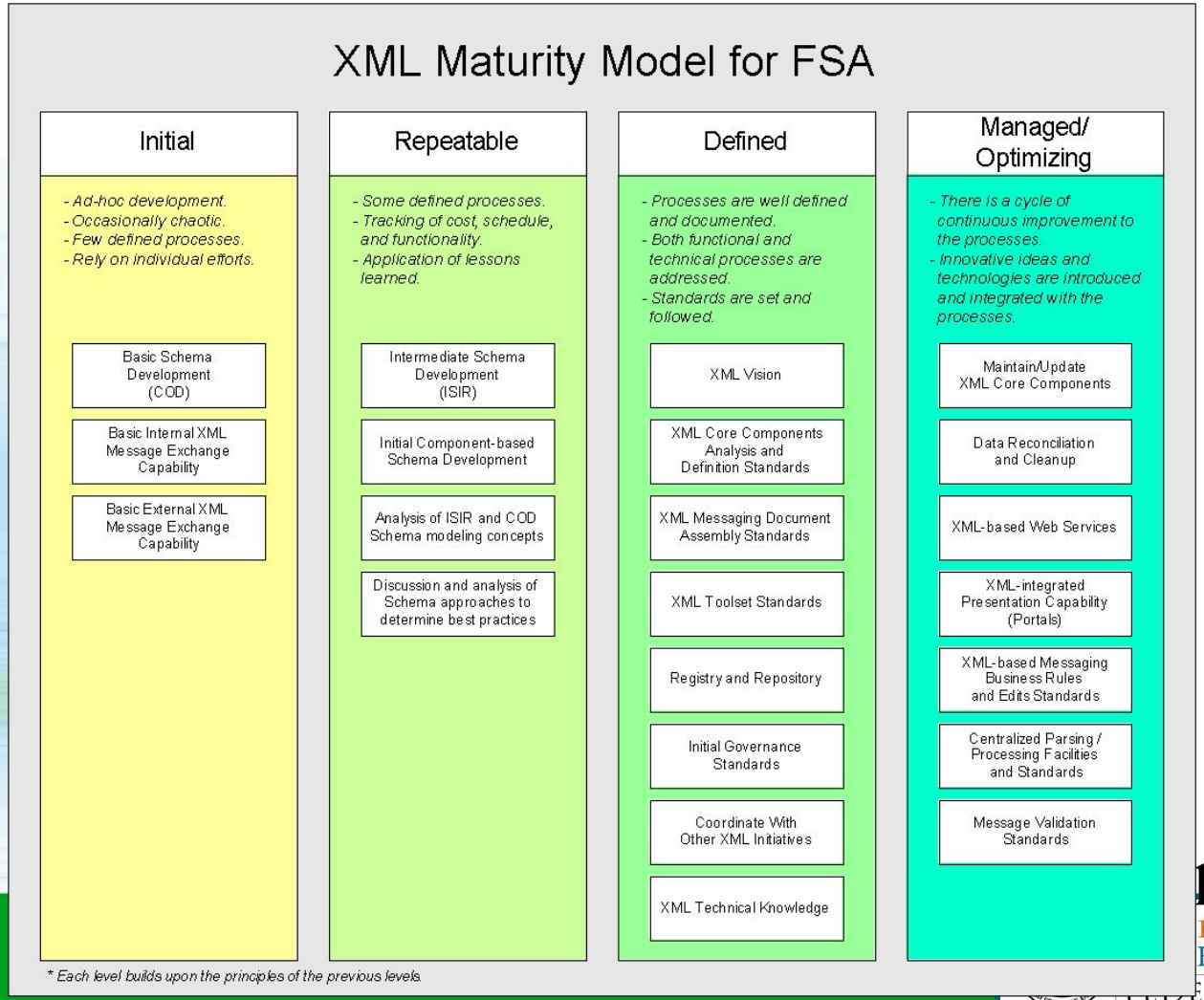
FSA XML Goals

- Service-Oriented Architectures – Develop an XML infrastructure that supports usage of advanced capability, such as Service Oriented Architectures (SOA) and real-time transactions.

FSA XML Approach

- FSA's Enterprise XML Framework approach is called the XML Maturity Model.
- The XML Maturity Model is based on previous XML development at FSA, XML case studies, general industry trends, and key principles from Carnegie Melon's Software Engineering Institute (SEI) Capability Maturity Model (CMM).

XML Maturity Model for FSA



Last Updated: June 25, 2003

RT HERE
FURTHER
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FSA XML Background

- The COD implementation has led FSA into the XML world.
- The successful implementation of XML in COD has made XML well positioned to become an enterprise data exchange standard at FSA.

START HERE
GO FURTHER
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FSA XML Background

- COD chose XML for the Common Record, which consolidates sixteen flat files into one new file. The use of XML in COD has provided the following benefits:
  - Simplified files and documentation.
  - Simplified processes.
  - Increased business capabilities.

START HERE
GO FURTHER
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FSA ebXML Compliant

- The Registry FSA implemention is compliant with the ebXML Registry and Repository specification v2.5.
- The Registry/Repository stores XML schema and documents approximately 1,000 XML Core Components.

START HERE
GO FURTHER
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XML Registry and Repository for the Education Communtiy

- This section provides an overview of the XML Registry and Repository for the Education Community:
- http://www.fsaxmlregistry.ed.gov
- Additional documentation located at:
- http://www.PESC.org

START HERE
GO FURTHER
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Governance Steps

- Review to ensure compatible elements.
- Identify new elements.
- Submit to PESC Submission Advisory Board for review.
- Develop schema according to business rules and XML Technical Specification.
- Submit to PESC Change Control Board for final review.

START HERE
GO FURTHER
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XML REGISTRY AND REPOSITORY FOR THE EDUCATION COMMUNITY

WELCOME TO THE XML REGISTRY AND REPOSITORY.

Administrative Users Click Here

Community/Guest Users Click Here

Welcome to the XML Registry and Repository for the Education Community. The Registry is a central access point for XML Core Components, XML Schemas, and supporting documentation for the Education Standards Community.

These documents have been created and reviewed through a collaborative effort between the Department of Education's Office of Federal Student Aid (FSA), the Postsecondary Electronics Standards Council (PESC), and the education standards community.

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POSTSECONDARY Electronic Standards Council

XML REGISTRY AND REPOSITORY FOR THE EDUCATION COMMUNITY

WELCOME

Welcome to the XML Registry and Repository for the Education Community. The Registry is a central access point for XML Core Components, XML Schemas, and supporting documentation for the Education Standards Community.

The Core Components stored in the XML Registry and Repository have been created and reviewed through a collaborative effort between the Office of Federal Student Aid (FSA), Postsecondary Electronics Standards Council (PESC), and the Education Standards Community.

To navigate through the Registry, use the menu on the left hand side of the browser. Choose the link corresponding to the area you are interested in (i.e., Classifications, Core Components, Sector Libraries, Message Specifications, or Search).

NOTE: For navigation of this site, the 'Back' button and 'Refresh' button on your browser should not be used. Navigation through the XML Registry and Repository is best accomplished using with the menus and buttons that are displayed on the web

CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

HIGHER EDUCATION
CORE COMPONENTS
- MESSAGE SPECIFICATION
- GENERAL PERSON/ORGANIZATION
  - ADDRESS AND CONTACT
- PERSON
  - IDENTIFICATION
  - DEMOGRAPHICS
  - FINANCIAL
  - TYPES
- STUDENT
  - APPLICATIONS
    - APPLICATION-AID
    - APPLICATION-ADMISSIONS
    - HOUSING

Registry | Info

CLASSIFICATIONS

Classifications group Core Components, Sector Libraries, and Message Specifications into manageable sets.

- To view the Classification, select the appropriate link on the left hand menu.
- To view Core Components and Enumerated Lists organized by Classification, select the Core Components.
- To view Sector Libraries organized by Classification, select the Sector Libraries.
- To view Message Specifications organized by Classification, select the Message Specifications.

HIGHER EDUCATION
CORE COMPONENTS
--- CORE COMPONENT LIBRARY FILES
MESSAGE SPECIFICATION
CORE COMPONENTS
ENUMERATED LISTS
GENERAL PERSON/ORGANIZATION
ADDRESS AND CONTACT
CORE COMPONENTS
ENUMERATED LISTS
PERSON
IDENTIFICATION
CORE COMPONENTS
ENUMERATED LISTS
DEMOGRAPHICS
CORE COMPONENTS

CORE COMPONENTS

Core Components and **Enumerated Lists** are accessible from this section of the Registry. These items are organized by Classification scheme.

Core Components

- To Browse the Core Components, select the Core Components Link under the Classification on the menu.
- To View the Core Component's base properties, select Base.
- To View the Core Component's schema representation, select Details.
- To View other associated Core Components, select Associations.
- To Search for a specific Core Component using keywords, select Search.

Enumerated Lists

- To Browse the Enumerated Lists, select the Enumerated Lists Link under the Classification on the menu.
- To search for a specific Enumerated List using keywords, select Search.

CORE COMPONENT: EMAIL ADDRESS

| SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS | RELATED MESSAGE SPECIFICATIONS | NOTES |

XML Tag Name	EmailAddress
Business Term	Email Address
Definition	This basic component specifies the numbers, letters, and symbols used to identify an electronic mail (e-mail) user within the network to which the person or organization belongs. Follows the format of username@domain.
Related Terms	E-Mail, Electronic Mail
Version	1.0.0
Minimum Length	1
Maximum	128

CORE COMPONENT: EMAIL ADDRESS

HIGHER EDUCATION
CORE COMPONENTS
--- CORE COMPONENT LIBRARY FILES
MESSAGE SPECIFICATION
CORE COMPONENTS
ENUMERATED LISTS
GENERAL PERSON/ORGANIZATION
ADDRESS AND CONTACT
CORE COMPONENTS
ENUMERATED LISTS
PERSON
IDENTIFICATION
CORE COMPONENTS
ENUMERATED LISTS
DEMOGRAPHICS
CORE COMPONENTS

| SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS |
RELATED MESSAGE SPECIFICATIONS | NOTES |

Business Term	Email Address
Definition	This basic component specifies the numbers, letters, and symbols used to identify an electronic mail (e-mail) user within the network to which the person or organization belongs. Follows the format of username@domain.
Related Terms	E-Mail, Electronic Mail
Classification	/ General Person/Organization / Address and Contact /
Namespace Identifier	urn:us:gov:ed:fsa:personOrganization:contact:
Version	1.0.0
Object	Qualifier: Object Class Global
Property	Qualifier: Property Term

CLASSIFICATIONS
CORE COMPONENTS
SECTOR
LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

HIGHER EDUCATION
CORE COMPONENTS
--- CORE COMPONENT LIBRARY FILES
MESSAGE SPECIFICATION
CORE COMPONENTS
ENUMERATED LISTS
GENERAL PERSON/ORGANIZATION

CORE COMPONENT: EMAIL ADDRESS

| SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS |
RELATED MESSAGE SPECIFICATIONS | NOTES |

Facets

Facet Type	Facet Value
length	
minLength	1
maxLength	128
pattern	
enumeration	

Supplementary Fields

Core Components
Enumerated Lists
General Person/Organization
Address and Contact
Core Components
Enumerated Lists
Person
Identification
Core Components
Enumerated Lists
Demographics
Core Components
Enumerated Lists
Financial
Core Components

pattern	
enumeration	

Supplementary Fields

Field Name	Field Value
xml:lang	
languageLocaleID	

XML Schema Definition

```
<!-- ===== CORE COMPONENT: EmailAddressType ===== -->
<xs:simpleType name="EmailAddressContent">
        <xs:restriction base="xs:string">
                <xs:minLength value="1"/>
                <xs:maxLength value="128"/>
        </xs:restriction>
</xs:simpleType>
<xs:complexType name="EmailAddressType">
        <xs:annotation>
                <xs:documentation>This basic component specifies the numbers, letters, and symbols us
        </xs:annotation>
        <xs:complexContent>
                <xs:extension base="EmailAddressContent">
                </xs:extension>
        </xs:complexContent>
</xs:complexType>
```

HIGHER EDUCATION
CORE COMPONENTS
--- CORE COMPONENT LIBRARY FILES
MESSAGE SPECIFICATION
CORE COMPONENTS
ENUMERATED LISTS
GENERAL PERSON/ORGANIZATION
ADDRESS AND CONTACT
CORE COMPONENTS
ENUMERATED LISTS
PERSON
IDENTIFICATION
CORE COMPONENTS
ENUMERATED LISTS
DEMOGRAPHICS
CORE COMPONENTS
ENUMERATED LISTS
FINANCIAL
CORE COMPONENTS
ENUMERATED LISTS
TYPES
CORE COMPONENTS
ENUMERATED LISTS

CORE COMPONENT: EMAIL ADDRESS

| SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS |
RELATED MESSAGE SPECIFICATIONS | NOTES |

Child Associations

These are the child elements of this Core Component.

Associated Object	Business Term	Min. Occurs	Max. Occurs	Association Type
There are no child associations for this Core Component.				

(note: if Max. Occurs = -1 then the cardinality for that element is unbounded)

Parent Associations

These are other Core Components that have this Core Component as a child element.

Associated Object	Business Term	Min. Occurs	Max. Occurs	Association Type
Email	Email Address	0	0	ContainsCCObject
		0	0	ContainsCCObject
		0	0	ContainsCCObject
		0	0	ContainsCCObject
Email	Email Address	0	0	ContainsCCObject

(note: if Max. Occurs = -1 then the cardinality for that element is unbounded)

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Electronic Standards Council

XML REGISTRY AND REPOSITORY FOR THE EDUCATION COMMUNITY

HIGHER EDUCATION
CORE COMPONENTS
AID
DISBURSEMENTS
CORE COMPONENTS
ENUMERATED LISTS
ELIGIBILITY
CORE COMPONENTS
ENUMERATED LISTS

CORE COMPONENT: EMAIL ADDRESS

| SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS |
RELATED MESSAGE SPECIFICATIONS | NOTES |

These are the Message Specifications that contain this Core Component

Schema Name	Namespace	Version	Status
COD common record	urn:us:gov:ed:fsa:awareness:cod	1.0	Submitted

HIGHER EDUCATION CORE COMPONENTS
- AID
  - DISBURSEMENTS
    - CORE COMPONENTS
    - ENUMERATED LISTS
  - ELIGIBILITY
    - CORE COMPONENTS
    - ENUMERATED LISTS
  - HISTORY
    - CORE COMPONENTS
    - ENUMERATED LISTS
  - LOANS AND GRANTS
    - CORE COMPONENTS

CORE COMPONENT: EMAIL ADDRESS

SUMMARY | BASE PROPERTIES | DETAILS | ASSOCIATIONS | RELATED MESSAGE SPECIFICATIONS | NOTES |

New Note

| Add Note |

Subject

Comment

SECTOR LIBRARIES

Sector Libraries are organized by Classification scheme (e.g. Aid Application and Aid Award).

- To Browse the Sector Libraries, select the corresponding Classification on the menu.
- To Download, Update, or Upload a New Version of an existing Sector Library, select the appropriate link from the Sector Library view page.
- To Search for a specific Sector Library using keywords, select Search.

CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

HIGHER EDUCATION
MESSAGE SPECIFICATIONS
- AID APPLICATION
- AID AWARD
- AID AWARENESS
- SCHOOL PARTICIPATION
- SERVICING

Registry | Users | Reports | Info | Log Out

MESSAGE SPECIFICATIONS IN THIS CLASSIFICATION

| Upload New Schema |

Current Versions

Schema Name	Namespace	Version	Status
COD common record	urn:us:gov:ed:fsa:awareness:cod	1.0	Submitted

Previous Versions

There are no previous versions of Message Specifications under this Classification.

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XML REGISTRY AND REPOSITORY
FOR THE EDUCATION COMMUNITY
CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH
Registry
Info
SEARCH
Please enter keyword(s) and select search criteria.
| Search |
Search Text:
Search For:
| Select All |
Core Components
Search Core Components for:
| Select All |
Name
Description
Tag Name
Related Term
Business Term
Qualifier Representation Term
Object Class Term
Qualifier Object Class
Property Term
Qualifier Property Term
Enumerated Lists
Search Enumerated Lists for:
| Select All |
Name

CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

Registry | Info

SEARCH RESULTS FOR "EMAIL"

Core Components

Tag Name	Business Term
BusinessEmail	Business Email
Email	Email Address
EmailAddress	Email Address
EmailAddressUpdateDate	Email Address Update Date
EmailAddressValidityIndicator	Email Address Validity Indicator
EndEmailEffectiveDate	Stop Payment Monitoring Removal Email End Date
HomeEmail	Home Email
ReceiverEmail	Receiver Email
SchoolAssignedEmail	School Assigned Email
SenderEmail	Sender Email
StartEmailEffectiveDate	Stop Payment Monitoring Effective Email Date

Additional Information

The FSA XML Registry and Repository has been developed based on the standards outlined in the ebXML Registry Information Model v2.5. The detailed specifications can be found at:

http://www.oasis-open.org/committees/documents.php

In addition the Core Components housed in this repository have been modeled according to the standards defined by the United Nations Center for Trade Facilitation and Electronic Business (UN/CEFACT) in the ebXML Core Component Technical Specification v2.01 and the Core Component User's Guide. These documents can be found at:

http://www.unece.org/cefact/ebxml/CCTS_V2-01_Final.pdf

Definitions for the pre-defined Core Component Types used in this registry can be found at:

Core Component Types

For additional questions please contact the system administrator by email at XMLRegistrySupport@ed.gov.

REGISTRY STATISTICS REPORT
SITE USAGE - SUMMARY REPORT
SITE USAGE - DETAIL REPORT

Registry | Users | Reports | Info | Log Out

SITE USAGE SUMMARY
MONTHLY REPORT

MONTHLY | YEARLY

October, 2004 — October 2004 Go

	Core Components	Sector Libraries	Message Specifications	Totals
Views/ Downloads	703	0	0	**703**
Updates	4	0	0	**4**
Searches	432	433	433	**1298**
Totals	**1139**	**433**	**433**	**2005**

START HERE
GO FURTHER
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Creating a Schema from the Registry

- Create an empty schema.
- Search for the core components.
- Paste the core components into the schema.

START HERE GO FURTHER FEDERAL STUDENT AID

XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
   targetNamespace="urn:edu:myschool:myschema:v1.0.0"
    xmlns="urn:edu:myschool:myschema:v1.0.0"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
   attributeFormDefault="unqualified">

   <xs:element name=“RootElement">
   </xs:element>
</xs:schema>
```


START HERE
GO FURTHER
FEDERAL STUDENT AID

CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

Registry Info

SEARCH

Please enter keyword(s) and select search criteria.

| Search |

Search Text: Last Name

Search For: | Select All |

- [x] Core Components

Search Core Components for: | Select All |

- [x] Name
- [x] Description
- [x] Tag Name
- [x] Related Term
- [x] Business Term
- [x] Qualifier Representation Term
- [x] Object Class Term
- [x] Qualifier Object Class
- [x] Property Term
- [x] Qualifier Property Term

CLASSIFICATIONS
CORE COMPONENTS
SECTOR LIBRARIES
MESSAGE SPECIFICATIONS
SEARCH

Registry | Info

SEARCH RESULTS FOR "LAST NAME"

Core Components

Tag Name	Business Term
LastName	Last Name

Enumerated Lists

No Enumerated Lists were found.

Sector Libraries

No Sector Libraries were found.

Core Components
Enumerated Lists
History
Core Components
Enumerated Lists
Loans and Grants
Core Components
Enumerated Lists
Types
Core Components
Enumerated Lists
Financial Partner
Demographics
Core Components
Enum

Field Name	Field Value
xml:lang	
languageLocaleID	

XML Schema Definition

```
<!-- ===== CORE COMPONENT: LastNameType ===== -->
<xs:simpleType name="LastNameContent">
	<xs:restriction base="xs:string">
		<xs:minLength value="1"/>
		<xs:maxLength value="35"/>
	</xs:restriction>
</xs:simpleType>
<xs:complexType name="LastNameType">
	<xs:annotation>
		<xs:documentation>This basic component specifies the last name or surname by which
a person is legally known. </xs:documentation>
	</xs:annotation>
	<xs:complexContent>
		<xs:extension base="LastNameContent">
		</xs:extension>
	</xs:complexContent>
</xs:complexType>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema>
<xs:element name="RootElement">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="LastName" type="LastNameType"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<!-- ===== CORE COMPONENT: LastNameType ===== -->
<xs:simpleType name="LastNameContent">
        <xs:restriction base="xs:string">
                <xs:minLength value="1"/>
                <xs:maxLength value="35"/>
        </xs:restriction>
</xs:simpleType>
<xs:complexType name="LastNameType">
        <xs:annotation>
                <xs:documentation>This basic component specifies the last name or surname by which
a person is legally known. </xs:documentation>
        </xs:annotation>
        <xs:complexContent>
                <xs:extension base="LastNameContent">
                </xs:extension>
        </xs:complexContent>
</xs:complexType>
</xs:schema>
```


START HERE
GO FURTHER
FEDERAL STUDENT AID

SEARCH

Please enter keyword(s) and select search criteria.

| Search |

Search Text: Phone

Search For: | Select All |

- [x] Core Components

Search Core Components for: | Select All |

- [x] Name
- [x] Description
- [x] Tag Name
- [x] Related Term
- [x] Business Term
- [x] Qualifier Representation Term
- [x] Object Class Term
- [x] Qualifier Object Class
- [x] Property Term
- [x] Qualifier Property Term

START HERE
GO FURTHER
FEDERAL STUDENT AID

SEARCH RESULTS FOR "PHONE"

Core Components

Tag Name	Business Term
AreaCityCode	Phone Number Area City Code
BusinessPhone	Business Phone
CountryPrefixCode	Phone Number Country Prefix Code
Extension	Phone Number Extension
FaxPhone	Fax Phone
HomePhone	Home Phone
LocalHomePhone	Local Home Phone
MobilePhone	Mobile Phone
PagerPhone	Pager Phone
PermanentHomePhone	Permanent Home Phone
PermanentPhone	Permanent Phone
Phone	Phone
PhoneNumber	Phone Number
PhoneNumberUpdateDate	Phone Number Update Date
TemporaryPhone	Temporary Phone

Enumerated Lists
Loans and Grants
Core Components
Enumerated Lists
Types
Core Components
Enumerated Lists
Financial Partner
Demographics
Core Components
Enumerated Lists
Identification
Core Components
Enumerated Lists
Participation
Core Components
Enumerated Lists
General Person/Organization
Address and Contact
Core Components
Enumerated Lists
Message Specification
Core Components
Enumerated Lists

XML Schema Definition

```
<!-- ===== CORE COMPONENT: PhoneType ===== -->
<xs:complexType name="PhoneType">
        <xs:annotation>
                <xs:documentation>This complex component provides a logica
l grouping of components related to phon</xs:documentation>
        </xs:annotation>
        <xs:sequence>
                <xs:element name="CountryPrefixCode" type="CountryPrefixCodeType"
                                minOccurs="0"
                                maxOccurs="1"
/>
                <xs:element name="AreaCityCode" type="AreaCityCodeType"
                                minOccurs="0"
                                maxOccurs="1"
/>
                <xs:element name="PhoneNumber" type="PhoneNumberType"
                                minOccurs="1"
                                maxOccurs="1"
/>
                <xs:element name="Extension" type="ExtensionType"
                                minOccurs="0"
                                maxOccurs="1"
/>
                <xs:element name="UpdateDate" type="UpdateDateType"
                                minOccurs="0"
                                maxOccurs="1"
/>
        </xs:sequence>
</xs:complexType>
```

Bridging the Gap

- The XML Community and the Data Modeling Community have different vernaculars and taxonomies for dealing with Data Standardization.
- Both should adhere to naming standards (e.g. ISO 11179).

START HERE
GO FURTHER
FEDERAL STUDENT AID

FSA XML Goals

- Standard Data Tools and Processes – Establish standard data tools and processes, to support consistently performed data/XML modeling through standard tools and processes. These standards will be aligned with community and government standards initiatives.
- Data Modeling Best Practices – Use XML and Data Modeling best practices in order to model key business data for exchange and storage.

START HERE
GO FURTHER
FEDERAL STUDENT AID

Compare and Contrast

- Both deal with Data Standardization.
- Data Types are Different DBA and Data Modeling tools can not deal with Tokens, etc.
- XML: While addressing Logical Groupings similar to Data Modeling, XML does not account for Relationships between Groupings (Foreign Keys).
- Registries and Data modeling: Tools should adhere to the same standards to ensure interoperability.

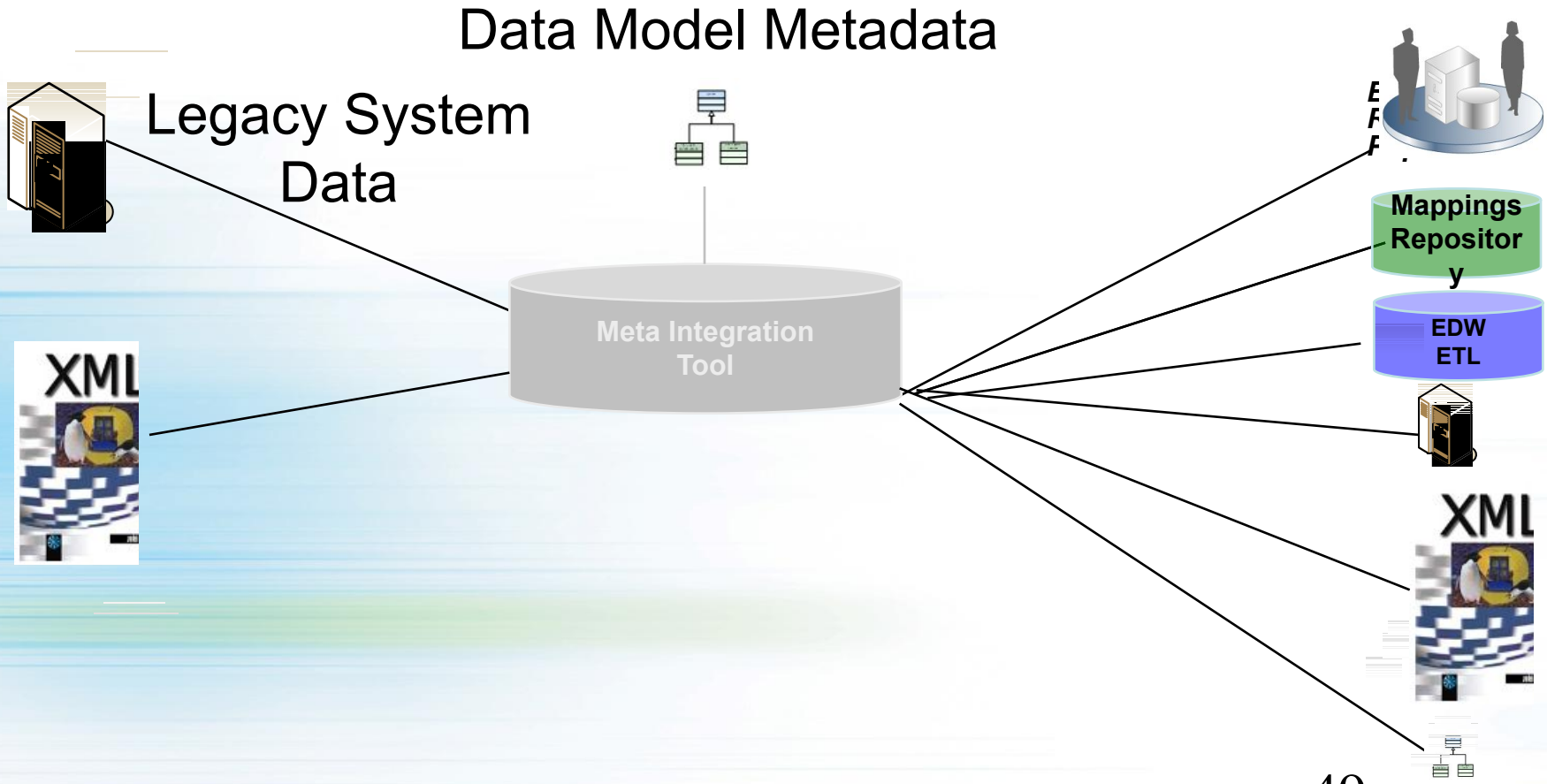
START HERE
GO FURTHER
FEDERAL STUDENT AID

FSA Benefits in real numbers

- 950 Attributes at 20 hours per attribute represents nine man years worth of effort.
  - Reduces Risk
  - Promotes Reuse
  - Saves Time

FSA treats Data as an Asset

Extract from FSA Metadata Landscape



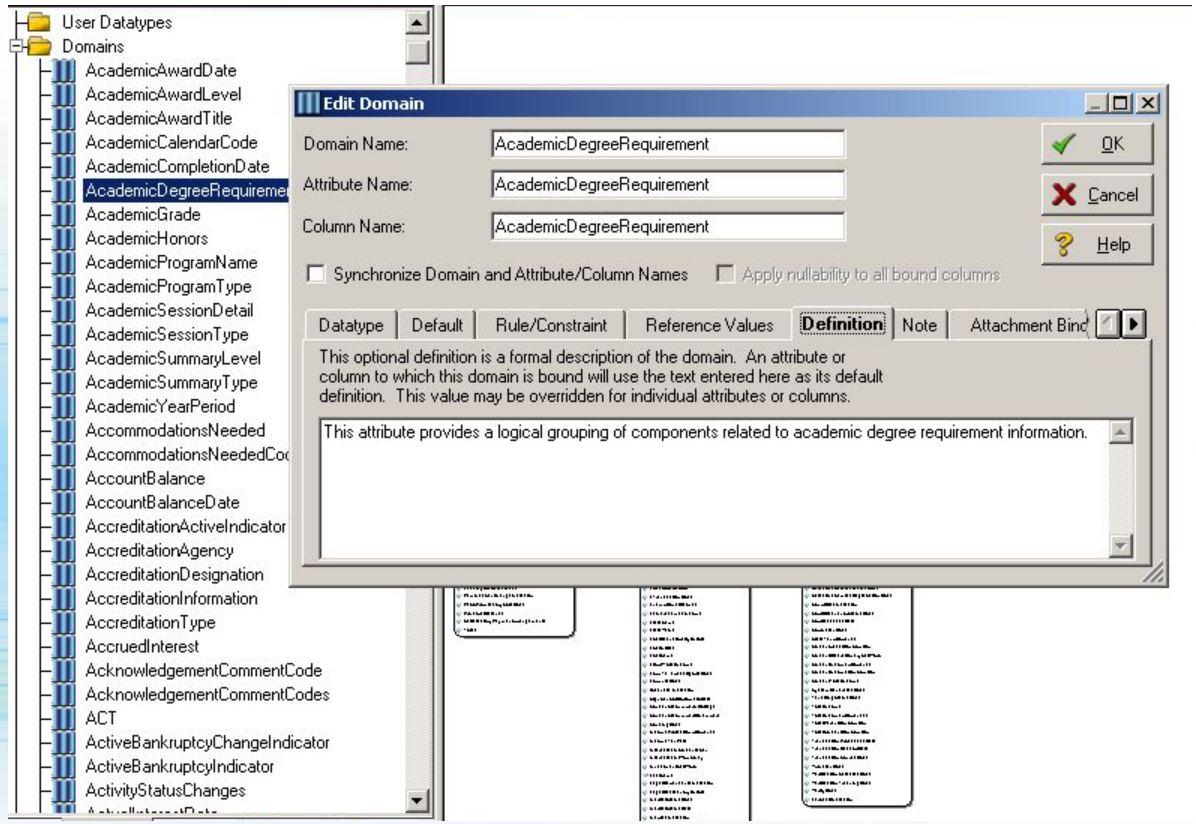
START HERE GO FURTHER FEDERAL STUDENT AID

FSA has Developed Process to Bridge the Gap

- Through the Adoption of Standards
  - FSA has been able to design and develop an XML Registry and Repository.
  - Develop a bridge between the XML Registry and Repository and data modeling tools to:
    - Share Tags with their Definitions, Data Types and Related Schemas.
    - Develop Data Models from Logical to Physical to include related scripts to build Table Structures.

START HERE
GO FURTHER
FEDERAL STUDENT AID

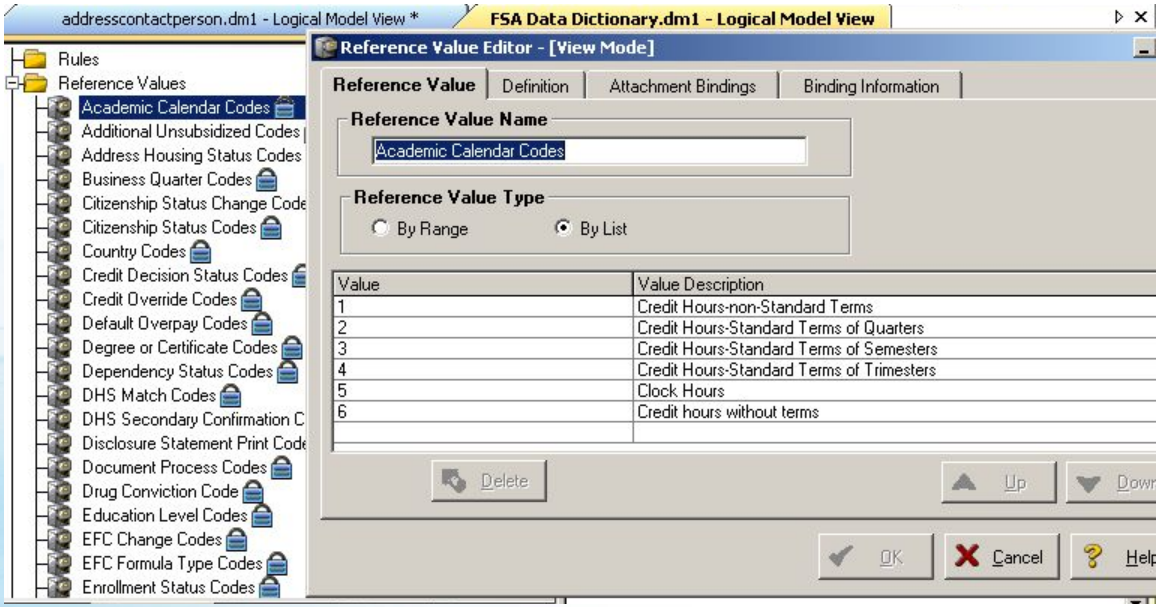
XML Tags as Data Attributes



- Over 950 Tags Converted to Data Attributes and Loaded into Modeling Tool

START HERE
GO FURTHER
FEDERAL STUDENT AID

Centrally Managed Data Element Dictionary and Reference Values in Sync with XML Repository



- 664 Reference Values ranging from Country Codes to Academic Calendar Codes available to FSA developers

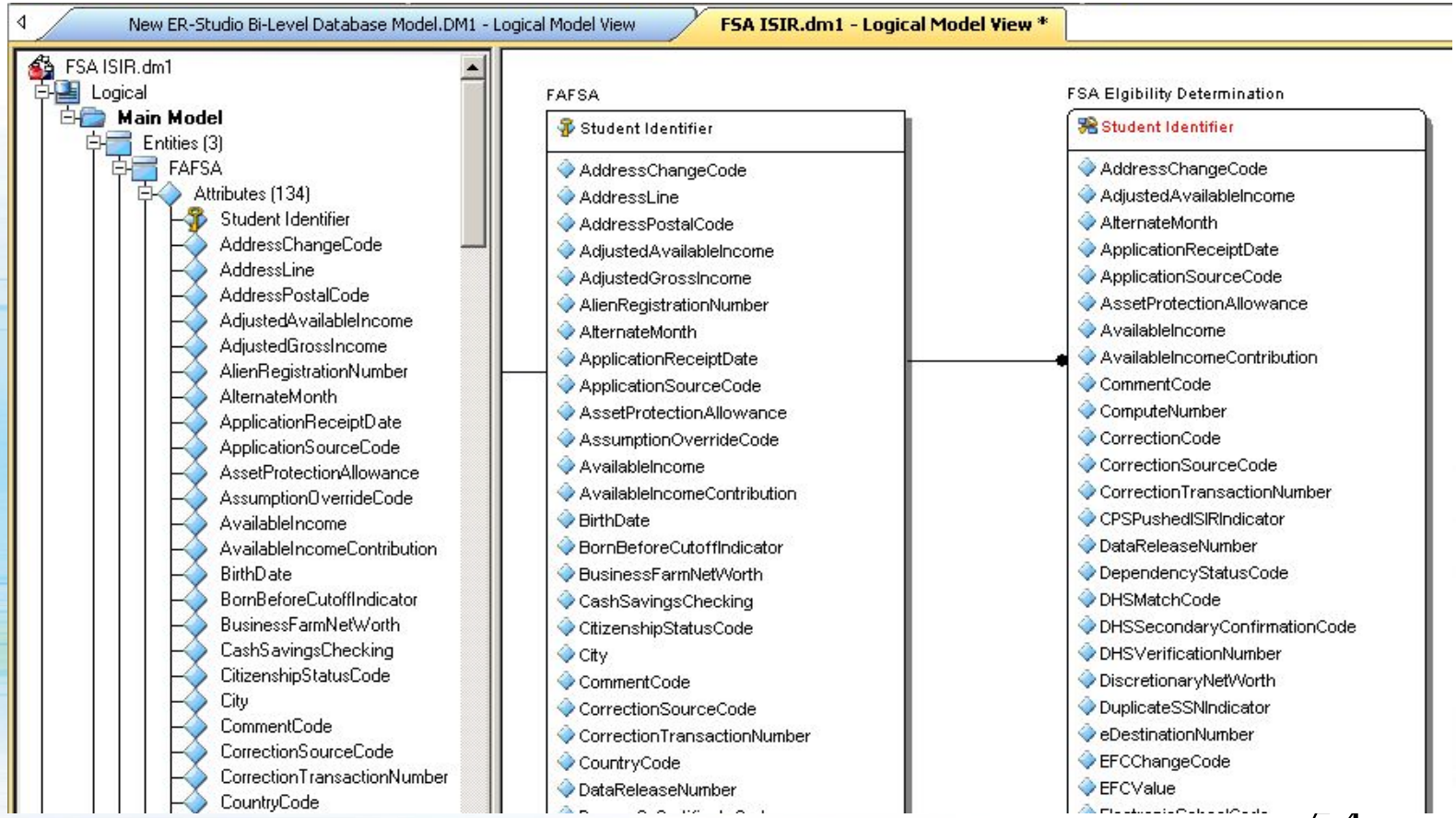
START HERE
GO FURTHER
FEDERAL STUDENT AID

Institutional Student Information Record (ISIR) XML Schema

```
    </xs:complexType>
    <!--=========================================-->
    <!--Address Types-->
    <!--=========================================-->
    <xs:simpleType name="AddressLineType">
        <xs:annotation>
            <xs:documentation>Local delivery information such as street,
building number, box, or apartment  portion of a postal address.
</xs:documentation>
        </xs:annotation>
        <xs:restriction base="xs:string">
            <xs:minLength value="4"/>
            <xs:maxLength value="50"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="CityType">
        <xs:annotation>
            <xs:documentation>The city portion of the
Address.</xs:documentation>
        </xs:annotation>
        <xs:restriction base="xs:string">
            <xs:minLength value="2"/>
            <xs:maxLength value="30"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="CountryCodeType">
        <xs:annotation>
            <xs:documentation>Code indicaticating Country. Use ISO
standard</xs:documentation>
        </xs:annotation>
        <xs:restriction base="xs:string">
            <xs:minLength value="2"/>
            <xs:maxLength value="3"/>
        </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="AddressPostalCodeType">
        <xs:annotation>
```


START HERE
GO FURTHER
FEDERAL STUDENT AID

ISIR Data Model



START HERE
GO FURTHER
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Create Physical Table Scripts

```
--
--ER/Studio 6.6 SQL Code Generation
-- Project :      FSA ISIR.dml
-- Author :       ""
--
-- Date Created : Tuesday, July 19, 2005 06:40:40
-- Target DBMS : IBM DB2 UDB for OS/390 7.x
--


--
-- TABLE: FAFSA
--

CREATE TABLE FAFSA(
    "Student Identifier"            CHAR(10)       NOT NULL,
    AddressChangeCode               VARCHAR(20),
    AddressLine                     VARCHAR(50),
    AddressPostalCode               VARCHAR(14),
    AdjustedAvailableIncome         VARCHAR(20),
    AdjustedGrossIncome             DECIMAL,
    AlienRegistrationNumber         DECIMAL,
    AlternateMonth                  VARCHAR(20),
    ApplicationReceiptDate          DATE,
    ApplicationSourceCode           VARCHAR(20),
    AssetProtectionAllowance        VARCHAR(20),
    AssumptionOverrideCode          VARCHAR(20),
    AvailableIncome                 VARCHAR(20),
    AvailableIncomeContribution     VARCHAR(20),
    BirthDate                       DATE,
    BornBeforeCutoffIndicator       SMALLINT,
    BusinessFarmNetWorth            DECIMAL,
```


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Export to XSD W3C Schema Format

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<xsd:element name="ISIR" id="m.3">
<xsd:complexType>
<xsd:choice minOccurs="0" maxOccurs="unbounded">
<xsd:element name="FSA-Elgibility-Determination" type="FSA-Elgibility-
DeterminationTYPE" id="e.7"/>
<xsd:element name="FSA-Financial-Aid-History" type="FSA-Financial-Aid-
HistoryTYPE" id="e.8"/>
<xsd:element name="FAFSA" type="FAFSATYPE"
id="e.9"/></xsd:choice></xsd:complexType>
<!-- Foreign Key Relationships -->
<xsd:key name="FAFSA_PK" id="pk.9"><xsd:selector xpath="//FAFSA"/><xsd:field
xpath="@Student-Identifier"/></xsd:key>
<xsd:keyref name="FSA-Elgibility-Determination_FK4" id="fk.4"
refer="FAFSA_PK"><xsd:selector xpath="//FSA-Elgibility-
Determination"/><xsd:field xpath="@Student-Identifier"/></xsd:keyref>
<xsd:keyref name="FSA-Financial-Aid-History_FK5" id="fk.5"
refer="FAFSA_PK"><xsd:selector xpath="//FSA-Financial-Aid-History"/><xsd:field
xpath="@Student-Identifier"/></xsd:keyref>
<!-- Unique Keys --><xsd:key name="FSA-Elgibility-Determination_PK"
id="pk.7"><xsd:selector xpath="//FSA-Elgibility-Determination"/><xsd:field
xpath="@Student-Identifier"/></xsd:key><xsd:key name="Ref62"
id="pk.7"><xsd:selector xpath="//FSA-Elgibility-Determination"/><xsd:field
xpath="@Student-Identifier"/></xsd:key><xsd:key name="FSA-Financial-Aid-
History_PK" id="pk.8"><xsd:selector xpath="//FSA-Financial-Aid-
History"/><xsd:field xpath="@Student-Identifier"/><xsd:field xpath="@Loan-
Identifier"/></xsd:key><xsd:key name="Ref63" id="pk.8"><xsd:selector
xpath="//FSA-Financial-Aid-History"/><xsd:field xpath="@Student-
```


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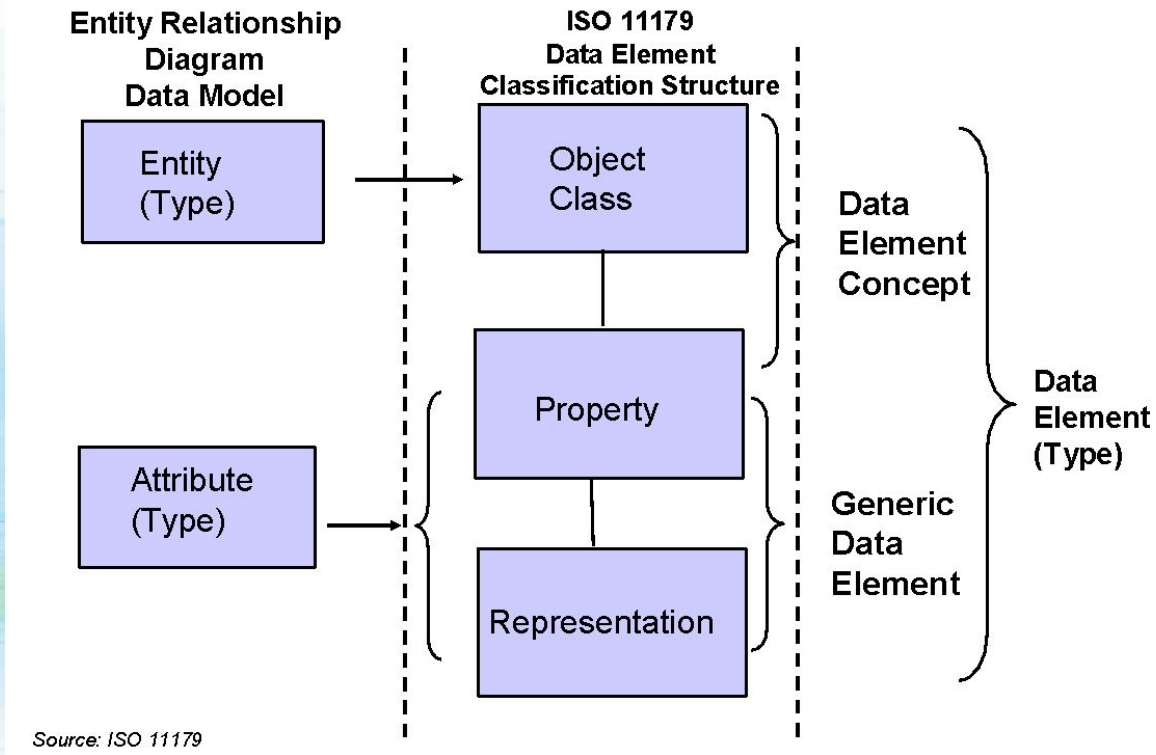
Schema is All About Data

Data Concept



Source: ISO 11179

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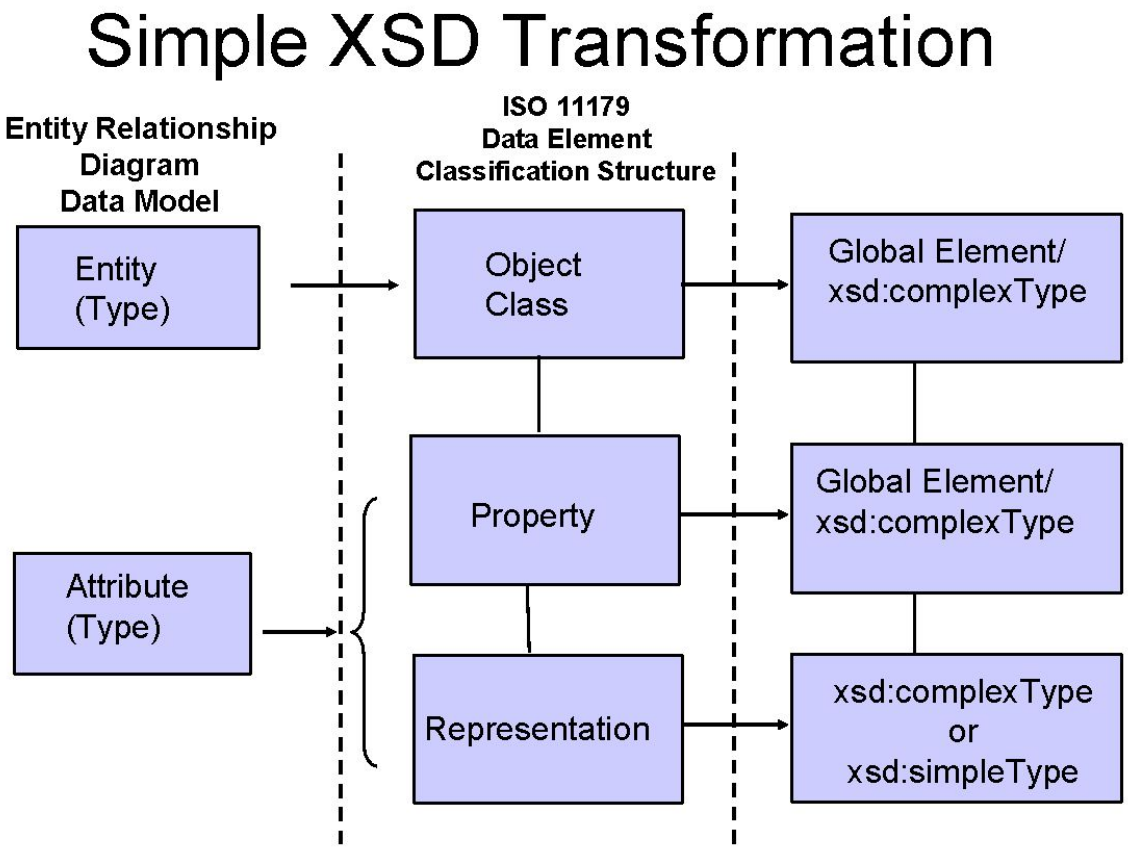
Transforming Data to XML



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Process Review

- Started with:
  - Tags Registered in XML Repository and Repository (ebXML 2.5 Standard).
  - ISIR XML Schema.
- Transitioned to:
  - Data Modeling tool which
    - Created Data Model & Preserved definitions, naming conventions,
    - Created Script for DBA, and
    - Exported to XML (W3C Schema Standard).

START HERE
GO FURTHER
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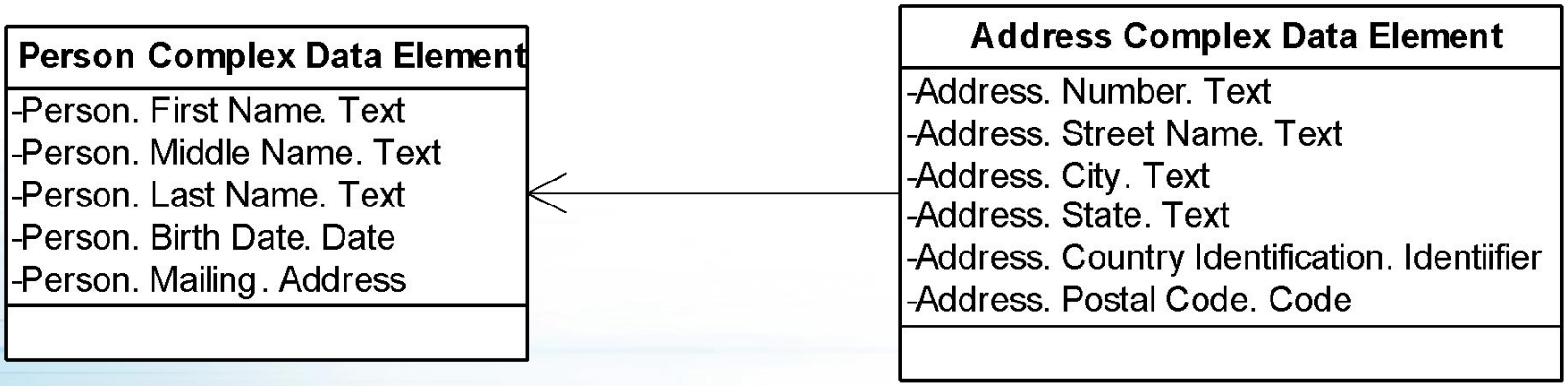
Handling Class Associations



- An associated class is treated as a simple data element with a global element declaration and complex type definition.

START HERE
GO FURTHER
FEDERAL STUDENT AID

Contact Information

- We appreciate your feedback and comments. We can be reached at:

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