Overview of Draft Street Address Standard

Address Standards Working Group

Co-Chairs:

Martha Lombard
Spatial Focus, Inc.

Ed Wells
DC OCTO

Hilary Perkins
Jacobs Civil, Inc.

Sara Yurman
Spatial Focus, Inc.

Carl Anderson
Fulton County, GA

Sponsoring Organizations

- **URISA** – Submitting organization
- **NENA** – Supporting organization
- **U.S. Census Bureau** – Sponsoring organization, on-going maintenance

Urban & Regional Information Systems Association

- URISA is a non-profit educational and professional association
- Mission: "To promote the effective and ethical use of spatial information and information technologies for the understanding and management of urban and regional systems."
- 7,000 national and chapter members in the US and Canada
- Members from government, private, and academic sectors
- Slightly more than half are state and local government employees

National Emergency Number Association

- NENA is a professional association of 7,000 members and 46 chapters dedicated to providing effective and accessible 9-1-1 service for North America
- NENA fosters the technological advancement, availability, and implementation of a universal emergency telephone number
- NENA promotes research, planning, training, and education
- NENA's objectives include the protection of human life, the preservation of property, and the maintenance of general community security

Other Organizations Represented

- Local, regional, and state government
- 911/Emergency management associations
- Federal agencies
- GIS software vendors and consultants
- Universities
- Other standards organizations

Authority

- In April 2005, the Federal Geographic Data Committee (FGDC) approved URISA's proposal to create a street address data standard
- The standard is being prepared under the auspices of the FGDC Subcommittee on Cultural and Demographic Data, chaired by the Census Bureau
- If the standard is adopted, the Census Bureau will be the maintenance authority

Work Plan

- Created four core committees
  - Policy and Coordination
  - Data Content and Classification
  - Data Quality
  - Data Exchange
- Worked primarily by collaborative website
- Teleconferenced as needed
- Posted two drafts for public comment
- Presented at Street Smart and URISA Conferences
- Submit to FGDC for formal review and approval

Participant Roles

- **Participants** (Core Committees): writers/editors/provocateurs for draft sections and responding to comments
- **Reviewers**: review and work with the committee to create the drafts
- **Observers**: review drafts and provide comments or recommendations on behalf of themselves and/or their organization

Schedule

1. Present first draft at Street Smart and Address Savvy Conference (Austin, August 15, 2005) – Complete
2. Post to URISA website for review and comment – Complete
3. Synthesize comments and revise draft – Complete
4. Present revised draft at the URISA annual conference in Kansas City (October 11, 2005) – Complete
5. Second review period – Complete
6. Synthesize comments and revise draft – Complete
7. Submit revised standard to FGDC for full public review, comment adjudication, and approval as a draft standard – November 2006

The Address Standard

- Introduction
- Part 1: Street Address Data Content
- Part 2: Street Address Data Classification
- Part 3: Street Address Data Quality
- Part 4: Street Address Data Exchange

Introduction

- Provides background information
- States the objectives and benefits
- Defines address
- States the scope of the standard
- Outlines the standards development process
- Identifies the maintenance authority

Street Address Definition

- A street address specifies a location by reference to a thoroughfare, or a landmark; or it specifies a point of postal delivery

- Four basic classes of street address:
  - Thoroughfare addresses
  - Landmark addresses
  - Postal addresses
  - General addresses (can be any of these three)

Why A Street Address Standard?

- Street addresses are the location identifiers most widely-used by state and local government and the public.
- Street addresses are critical information for administrative, emergency response, research, marketing, mapping, GIS, routing and navigation, and many other purposes.
- Street addresses have evolved over many decades, under the control of thousands of local jurisdictions, in many different record and database formats, and to serve many purposes.
- The variety of different address formats and types pose a number of complex geoprocessing and modeling issues.
- As a consequence, government agencies struggle with these issues as they seek to integrate large, mission-critical files into master address repositories.

Goals

- Create a street address content and classification standard that provides the foundation for data exchange and data quality standards
  - Provide a statement of best practices for street address data content and classification
  - Define tests of street address data quality
  - Facilitate exchange of address information
  - Offer a migration path from legacy formats to standards-compliant ones
  - Provide for different levels of standardization
  - Build on previous FGDC address standard efforts

Objective

- Objective: Create a data standard for street addresses
  - Content
  - Classification
  - Quality
  - Exchange

One Standard – Four Parts

Part 1: Street Address Data Content

- Address Elements
  - Simple – defined independently of all other elements
  - *Complex – formed from two or more simple or complex elements*
- Address Attributes
  - Provide descriptive information about an address, including geospatial information

Address Elements

- Address Number
- Street Name
- Occupancy
- Landmark Name
- Larger-Area
- USPS Postal Address
- USPS Address Lines

Address Number Elements

- Prefix: **B**317 Main Street
- Number: **123** Main Street
- Suffix: 123 **1/2** Main Street
- Separator: 123**-**04 Main Street

- *Complete address number:* **123 1/2**
- *Address number range:* **405-411 Main Street**

Street Name Elements

- Pre-modifier: **Old** North B Street
- Pre-directional: **North** Main Street
- Pre-type: **Avenue** A
- Name: **Main** Street
- Post-type: Main **Street**
- Post-directional: Main Street **North**
- Post-modifier: B Street **Extended**

- *Complete Street Name:* **North Main Street**

Occupancy Elements

- Occupancy Type: Building B, Apartment 6
- Occupancy ID: Building B, Apartment 6

- *Occupancy Element:* *Building B*

- *Complete Occupancy Identifier:*

Building B, Apartment 6

Landmark Name Element

- Landmark Name
  - **Statue of Liberty**
  - **Galleria Mall**
  - **Winona Park Elementary School**
  - **University of Washington**

- ***Complete Landmark Name***
  - ***Suzallo Library, University of Washington***

Larger Area Elements: Place Name

Place Name Elements:

- Place **Name:** Ajo, AZ
  Pima County, AZ
- *Complete Place Name:* *Ajo, Pima County, AZ*

Place Name Attributes:

- Place Name Type: Community, Municipal, Post Office, County, Region
- GNIS Feature ID
- Element Sequence Number

Larger-Area Elements:
State, ZIP Codes and Country

- State: St. Louis, MO
- ZIP Code: Birmingham, AL 35242
- ZIP+4: Birmingham, AL 35242-3426
- Country: Ajo, AZ, United States

USPS Postal Address Elements

- USPS Postal Box Type, Postal Box ID
- USPS Postal Group Type, Postal Group ID
- USPS General Delivery Point

- **PO Box 6943**
- **RR 1, Box 27**
- **CMR 4, Box 2 (overseas military)**
- **General Delivery, Tampa, FL 33602**

USPS Address Lines

- *Complete Feature Address*
  1 Main Street Suite 204

- *Place State Zip*
  Ajo, AZ 85321

Address Attributes

- **Attribute Categories:**
  - Address ID
  - Address Coordinates
  - Descriptive Attributes
  - Attributes Describing Specific Elements
  - Spatial Organization Attributes
  - Address Lineage Attributes

Address ID

- Address ID: Unique address identifier assigned by local authority
- Address UUID: Universally unique identifier assigned to an address

Address Coordinates

- Address X Coordinate
- Address Y Coordinate
- Address XY Coordinate Reference System ID
- Address Latitude
- Address Longitude
- Address LatLong Coordinate Reference System ID
- US National Grid Coordinate
- Address Elevation
- Address Elevation Coordinate Reference System ID

Descriptive Attributes

- Address Classification
- Feature Type
- Address Lifecycle Status
- Address Official Status
- Address Anomaly Status
- Address Z Level
- Location Description
- Related Address ID

Attributes Describing Specific Elements

- Address Number Parity
- Address Range Parity
- Address Range Type
- Element Sequence Number
- Place Name Type
- GNIS Feature ID
- Complete Feature Address Type

Address Scheme Attributes

- Address Scheme Name
- Address Scheme Description
- Address Scheme Origin
- Address Scheme Axes
- Address Scheme Extent
- *Address Scheme*

Address Lineage Attributes

- Address Start Date
- Address End Date
- Dataset ID
- Address Authority

Part 2: Street Address Data Classification

- Classes Defined by Syntax
  - *Classes defined by their data elements and the order in which they are arranged*

- Four Classes
  - Thoroughfare Address
  - Landmark Address
  - Postal Address
  - General Address

Thoroughfare Classes

A thoroughfare address specifies a location by reference to a thoroughfare.

A thoroughfare in this context is a road or other access route (for example, a walkway, railroad or river) by which the addressed feature can be reached.

- **Site: 1230A North Main Street Extended**
- **Landmark-Site: City Hall, 410 Main Street**
- **Intersection: Seventh Street and D Street**
- **Two-number Range: 110-126 Main Street**
- **Four-number Range** (TIGER format):
  - **100-130, 101-135 Main Street**
- **Unnumbered Thoroughfare: Fagaima Road**

Landmark Classes

A landmark address specifies a location by reference to a named landmark.

A landmark is a relatively permanent feature of the natural or man-made landscape or seascape that has recognizable identity within a particular cultural context.

- **Landmark Address: Truth Hall, Howard University, Washington, DC 20059**
- **Community: 123 Urbanization Los Olmos, Ponce, PR 00731**

Postal Delivery Classes

A postal delivery address specifies a point of postal delivery which has no definite relation to the location of the recipient, such as a post office box, rural route box, overseas military address, or general delivery office.

- **USPS Postal Delivery Box: PO Box 6943**
- **USPS Postal Delivery Route: RR 1, Box 100**
- **USPS General Delivery Office: General Delivery, Tampa FL 33602-9999**

General Class

- Holds addresses of any class:

  Complete Feature Address,

  Place, State, ZIP, ZIP+4, Country
- For general mailing and contact lists
- Supports specialized profiles such as USPS Publication 28 standard
- A starting point for parsing and classification

Part 3: Street Address Data Quality

- Goal: Define quality control for addresses (not redefine principles of spatial quality)
- Existing standards and documents describing spatial data quality
  - Content Standard for Digital Geospatial Metadata (CSDGM)
  - Topic 11: OpenGIS Metadata (ISO/TC 211 DIS 19115)
  - Supporting ISO Geographic Information standards
    - 19113: Quality principles
    - 19114: Quality evaluation procedures
  - Spatial Data Transfer Standard (SDTS)
- All the standards describe spatial data quality in similar terms

Elements of Quality

- Dataset Purpose and Use
  - What is this stuff?
- Attribute (Thematic) Accuracy
  - What do we know about it, and with what degree of certainty?
- Logical Consistency
  - If (A = B), do A and B both exist? Are they equivalent?
  - If A implies B, is B consistent with A?
- Completeness
  - Are all the addressable objects within the schema or jurisdiction addressed? If not, do we know why?

Elements of Quality (continued)

- Positional Accuracy
  - Do we know where it is?
  - Does where we think it is align with anything else?
- Lineage
  - How did it happen? Who did this?
- Temporal Accuracy
  - How long has it been like that? Are we sure?

What's Different About Addresses?

- Uncertainty is common, especially as to:
  - Source, date, and conditions of assignment
  - Current status: lifecycle and official
  - Agreement with local address schema
  - Ground conditions: posting, street signs, etc.
  - Coordinate location information
- Addresses are interdependent
- Addresses are typically controlled by one or more local schemes
- Schemes have not always been applied systematically
- Anomalies are expected and must be accommodated

Testing Address Quality

- Tests grouped by Content and Classification:
  - Tests of Address Elements
  - Tests of Address Attributes
  - Tests of Address Classes
- Tests described by:
  - Measure Name
  - Measure Description
  - Report
  - Evaluation Procedure
  - Pseudocode Example (Pseudo SQL)

Address Element Tests

- **Tests for Simple Address Elements**
  - Does each value have the correct data type?
  - Does each value conform to its domain or range of values?
  - Conformance to spatial domain – does the address fall in the correct municipality, ZIP Code area, etc.?
- **Tests for Complex Address Elements**
  - Are the component elements assembled in the right order?
  - Does the street name in the address match to an authoritative street name list?

Address Attribute Tests

- **Tests of Address Coordinates**
  - Is each coordinate pair complete?
  - Is the address feature actually at the location indicated by the coordinates?
  - Do the XY, Lat-Long, and USNG coordinates equate to the same location?
- **Tests of Other Address Attributes**
  - Is every AddressID unique?
  - Is every Address Start Date <= its End Date?
  - Do the Address Start and End Dates conflict with the Address Official Status?
  - If the address status is "official", does the address have an Address Authority?
  - Has every Location Description been field-checked for accuracy?

Address Class Tests

- **General Tests for Address Classes**
  - Completeness: Does every addressable feature have an address?
  - In each class, is every address unique?
- **Address Range and Situs Address Tests**
  - Does every address range have a non-zero low and high value?
  - Is every address range low value <= its high value?
  - Do any ranges with the same complete street name (and parity, when relevant) overlap?
  - Are address ranges in the correct sequence along a thoroughfare?
  - Do address numbers increase with distance from the origin point or axes of the address schema?
  - Do the low and high numbers for each block-face range have the same parity?
  - Are the even and odd numbers in each block-face range on the correct side (right or left) side of the thoroughfare?
  - Does every intersection address name a pair of thoroughfares that actually intersect?
  - Does every situs address align spatially with the range that contains it?

Test Example

Testing Simple Elements with Tabular Domains of Values

Measure Name	Simple Element Agreement With Tabular Domain Measure
Measure Description	Test each value for a simple element for agreement with the corresponding tabular domain. The query produces a list of simple elements in the address collection that do not conform to a domain.
Report	Attribute (Thematic) Accuracy
Evaluation Procedure	Check the value of each simple element against the tabular domain by which it is constrained.
Pseudocode Example: Testing records	**Query** SELECT Simple Element As disagreeWithDomain FROM Address Collection LEFT OUTER JOIN Domain WHERE Domain isnull **Result Without Anomalies** disagreeWithDomain ---------- **Result With Anomalies** disagreeWithDomain ---------- simple element 1 simple element 2 simple element 3 ....
Pseudocode Example: Testing the Conformance of a Data Set	**Function** Perc Anomalies **Function Parameters** • count_of_nonconforming_records *SELECT COUNT(Simple Element)* *FROM Address Collection* *LEFT OUTER JOIN Domain ON Simple Element.Field = Domain.Field* *WHERE Domain.Field isnull* • count_of_total_records *SELECT COUNT(Simple Element) FROM Address Collection* **Result Without Anomalies** Percent Conforming ---------- 100.00 **Result With Anomalies** Percent Conforming ---------- 87.42

Spatial (SFSQL) Test Example

Testing Simple Elements with Spatial Domains of Values

Measure Name	Simple Element Agreement With Spatial Domains Of Values Measure
Measure Description	Test values of some simple elements constrained by domains based on spatial domains: ZIP codes, PLSS descriptions, etc. This is limited to domains that are identified by the simple element alone. Address numbers, for example, cannot be tested against centerline ranges because the street name is only identified in a complex element. The query produces a list of simple elements in the address collection that do not conform to a spatial domain.
Report	Positional Accuracy
Evaluation Procedure	Intersect the addressed spatial object with the corresponding location identified by the codeset.
Pseudocode Example: Testing records	**Query** SELECT Simple Element As notWithinSpatialDomain FROM Address Collection WHERE NOT(INTERSECTS(Simple Element.Geometry, Spatial Domain.Geometry)) **Result Without Anomalies** notWithinSpatialDomain ---------- **Anomalies** notWithinSpatialDomain ---------- simple element 1 simple element 2 simple element 3 ....

Spatial (SFSQL) Test Example

Pseudocode Example: Testing the Conformance of a Data Set	**Function** Perc Anomalies **Function Parameters** • count_of_nonconforming_records *SELECT COUNT(Simple Element)* *FROM Address Collection* *WHERE NOT(INTERSECTS(Simple Element.Geometry, Spatial Domain.Geometry))* • count_of_total_records *SELECT COUNT(Simple Element)* *FROM Address Collection* **Result Without Anomalies** Percent Conforming ---------- 100.00 **Result With Anomalies** Percent Conforming ---------- 87.42

Part 4: Street Address Data Exchange

Two basic forms:

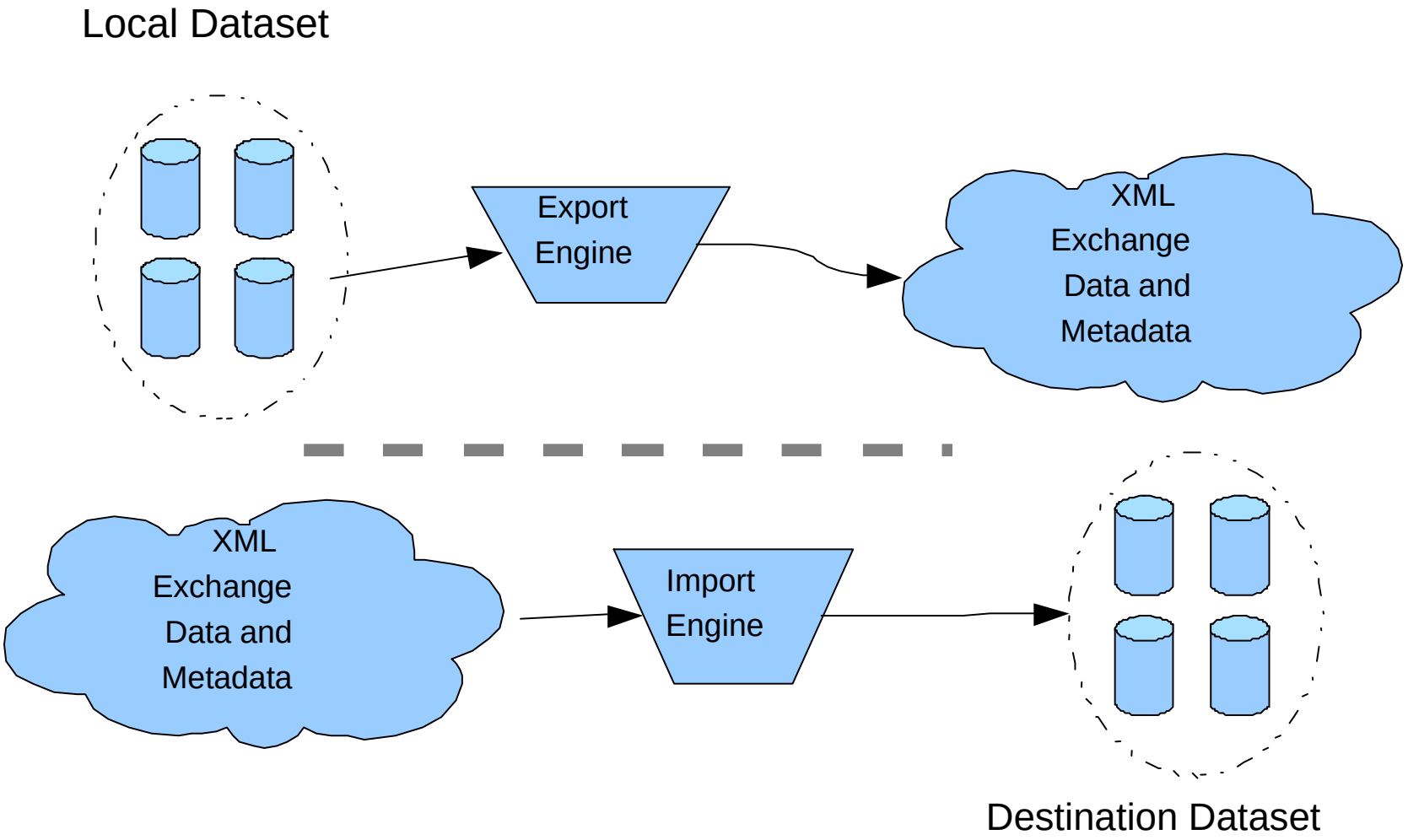
- Monolithic or Complete
- Transactional or Incremental

  The address data exchange standard supports both types using slightly different structures.

Required Elements:

- Address Data
- Metadata

Exchange (continued)



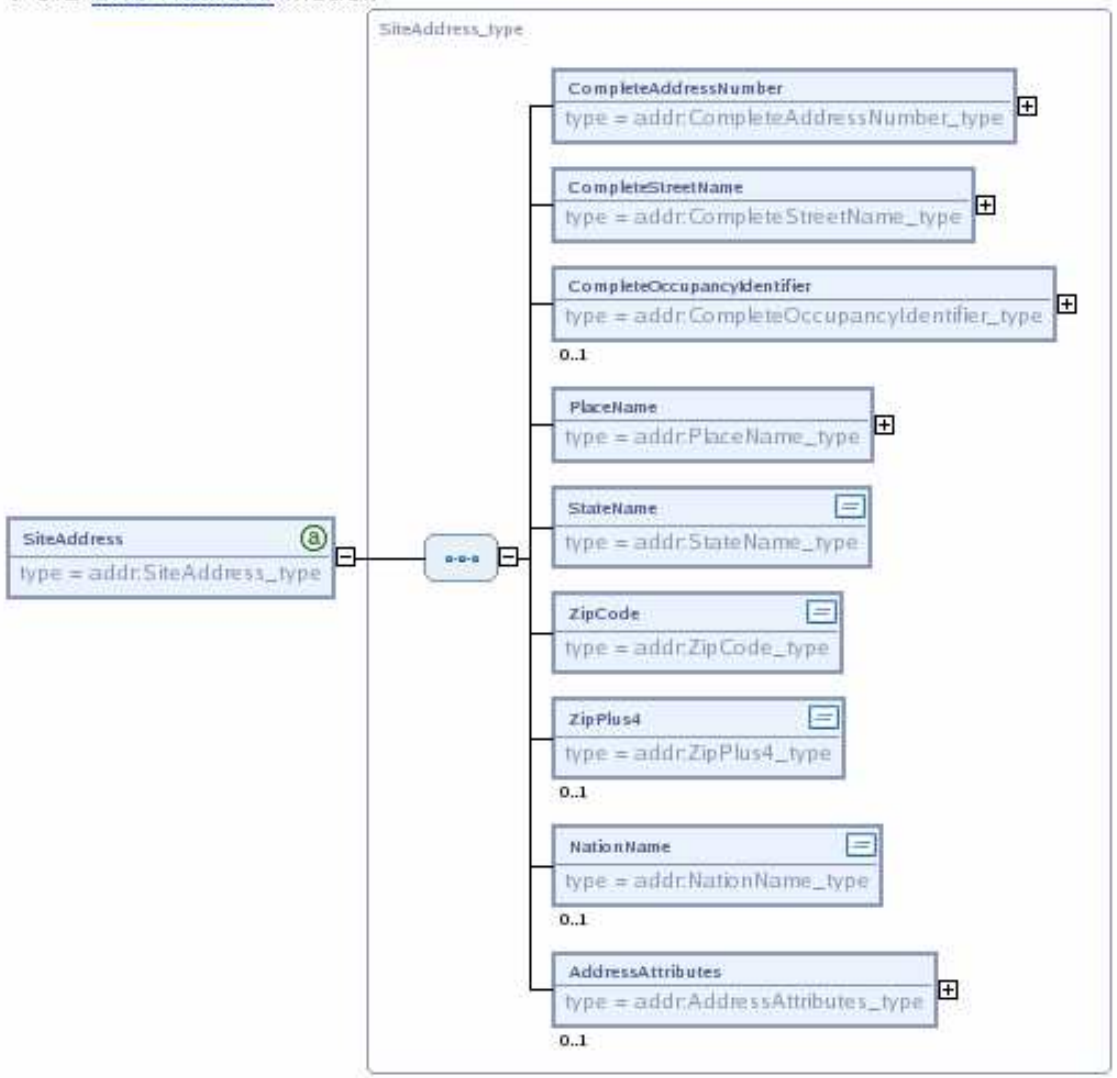
Reasons for XML

Business reasons for using XML as the exchange data language:

- FGDC standards require its use
- XML protects content producers and content consumers from changing data
  - Field order is unimportant
  - Missing fields don't prevent exchanges
  - Extra fields don't prevent exchanges
- XML is extensible

Sample Detail of Current Address Model

- v 0.2 Site Address model:



Preparing to Exchange Data

1) Undo localizations of data (normalize the data)
2) Reparse data into one of the address classes
3) Express data in the XML format of the Standard
4) Prepare metadata describing the data being exchanged

Preparing Data (sample)

125 | E 11th | St | Austin | TX | 78701

reparse local data into normal form

125 | East | 11th | Street | Austin | TX | 78701

express data in XML

```
<SiteAddress>
    <CompleteAddressNumber> <AddressNumber>125</AddressNumber> </CompleteAddressNumber>
    <CompleteStreetName> <StreetNamePreDirectional>East</StreetNamePreDirectional>
    <StreetName>11th</StreetName><StreetNamePostType>Street</StreetNamePostType></CompleteStreetName>
    <ZipCode>78701</ZipCode>
    <PlaceName>
        <USPSPlaceName>Austin</USPSPlaceName>
    </PlaceName>
    <StateName>TX</StateName>
    <AddressAttributes>
        <AddressAuthority>Austin Texas</AddressAuthority>”
    </AddressAttributes>
</SiteAddress>
```

Transactional Data (sample)

```
<SiteAddress action=”delete”>
        <CompleteAddressNumber> <AddressNumber>125</AddressNumber> </CompleteAddressNumber>
        <CompleteStreetName> <StreetNamePreDirectional>East</StreetNamePreDirectional>
        <StreetName>11th</StreetName><StreetNamePostType>Street</StreetNamePostType></CompleteStreetName>
        <ZipCode>78701</ZipCode>
        <PlaceName>
            <USPSPlaceName>Austin</USPSPlaceName>
        </PlaceName>
        <StateName>TX</StateName>
        <AddressAttributes>
              <AddressAuthority>Austin Texas</AddressAuthority>”
        </AddressAttributes>
</SiteAddress>
<SiteAddress action=”add”>>
        <CompleteAddressNumber> <AddressNumber>125</AddressNumber> </CompleteAddressNumber>
        <CompleteStreetName> <StreetNamePreDirectional>East</StreetNamePreDirectional>
        <StreetName>11th</StreetName><StreetNamePostType>Street</StreetNamePostType></CompleteStreetName>
        <ZipCode>78702</ZipCode>
        <PlaceName>
            <USPSPlaceName>Austin</USPSPlaceName>
        </PlaceName>
        <StateName>TX</StateName>
        <AddressAttributes>
              <AddressAuthority>Austin Texas</AddressAuthority>”
        </AddressAttributes>
</SiteAddress>
```

Next Steps

1. Synthesize comments – September 2006
2. Review by FGDC Standards Working Group – November 2006
3. (If approved) Full public review (90 days)
4. Comment adjudication
5. Review by FGDC Standards Working Group
6. (If approved) Review by FGDC Coordinating Committee
7. (If approved) Review by FGDC Steering Committee
8. (If approved) Final adoption