Connecticut Cadastral Standard

March 19, 2008

Geo Data Basics

- The Geodatabase
  - Feature Datasets/Feature Classes
  - Topology
  - Subtypes/Domains
  - Data Models
  - SDE/Replication (for Business Plan)
- RDBMS concepts
- Attribution
- Parcel Construction
- QA/QC
- Metadata

The Geodatabase

- Current ESRI data warehouse format
- Three Types – SDE, Personal, File
- Feature Datasets/Feature Classes/Tables
- Rasters/Surfaces/…
- Subtypes/Domains/Relationship Classes
- Topology/Geometric Networks/….

Three Types

SDE – Data Stored in enterprise RDBMS

Personal – Data Stored in MS Access DB

File – New file based format (like coverage/shapefile model)

Feature Classes/Feature Datasets

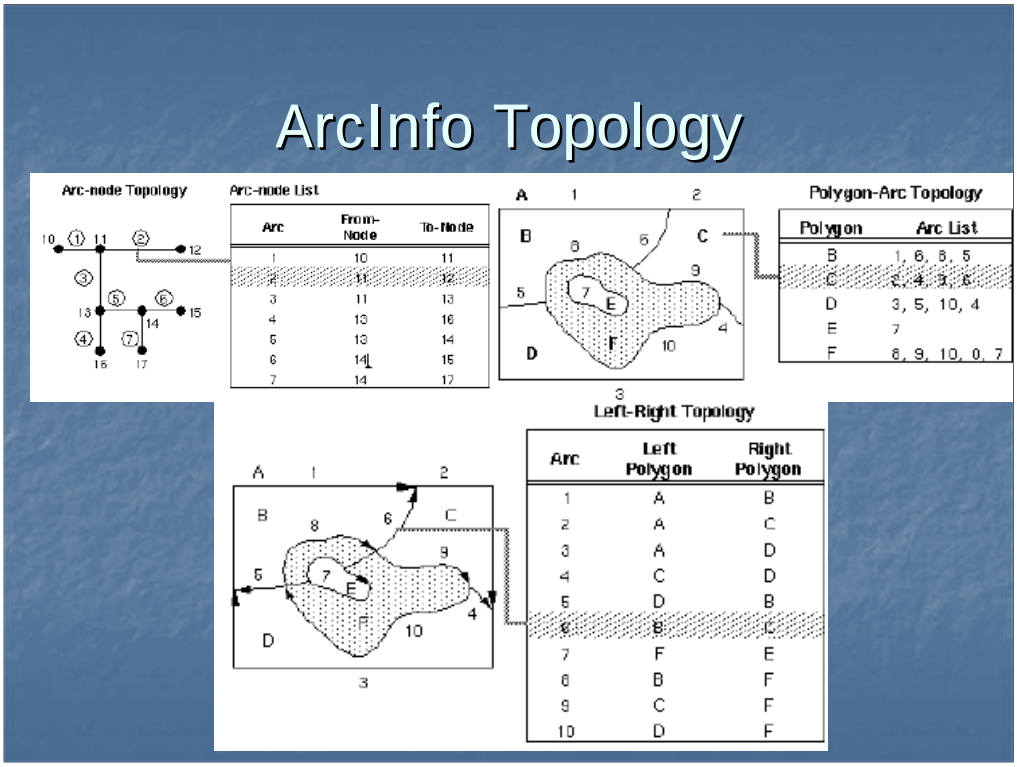
- Feature Classes ~ Coverages, Shapefiles, Grids, Rasters, TINs,…
- Feature Datasets = Feature Classes grouped for Topologies, Geometric Networks
- Feature Datasets are not for intended for organizational purposes

ArcInfo Topology

- Static
- Clean and Build
- Line and Polygons

Geodatabase Topology

- Dynamic and Not Static
- Topology “Feature Class”
- Any Feature Class and Subtype in Feature Dataset



Clean Command

- Creates New Coverage
- Splits lines at intersection
- Fuzzy Tolerance – “Node Creep”
- Topological Relationships written in Coverage – From/To Nodes, Right/Left Polygons…
- Labelerrors and Nodeerrors commands

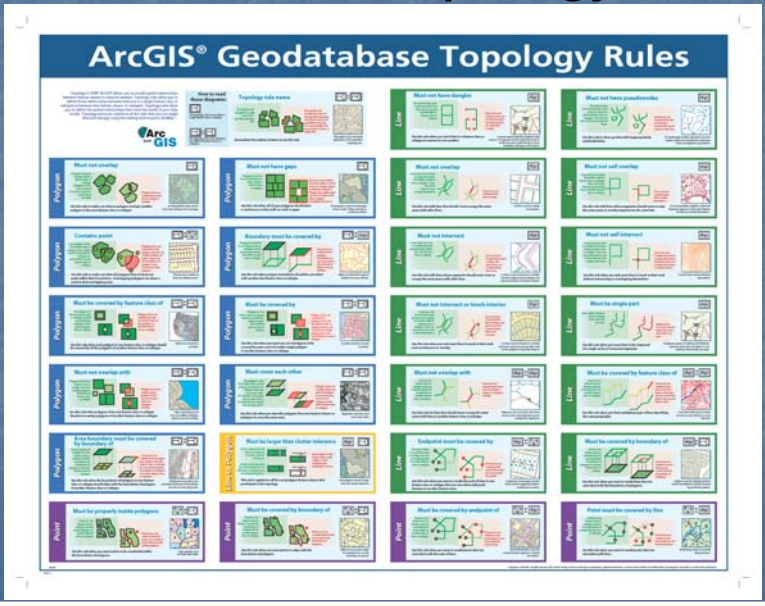
Build Command

- Updates existing coverage
- Will not work if line intersections exist
- No “Node Creep”
- Labelerrors and Nodeerrors commands

Geodatabase Topology

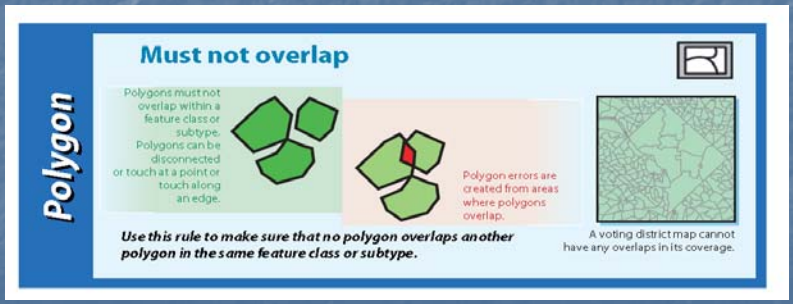
- Created on the fly
- Feature Classes must be in Feature Dataset
- Can be based on Feature Class or Subtypes
- Explicit rules chosen by Data Developer
- Tolerances need to be specified
- Ranks should be specified
- “Node” Creep may exist based on Ranks
- Exceptions can be allowed and tracked

Geodatabase Topology Rules

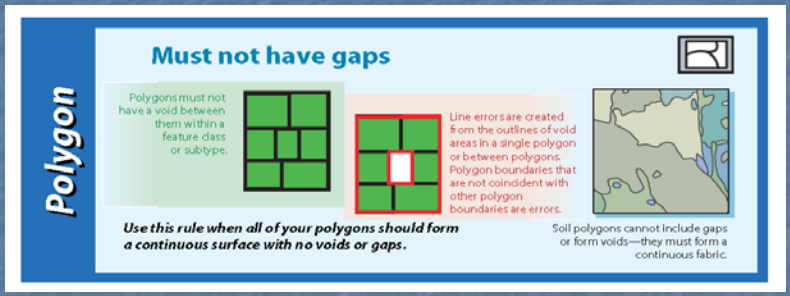


If ArcMap is installed on your PC, the poster will be found at:
C:\Program Files\ArcGIS\Documentation\Topology_rules_poster.pdf

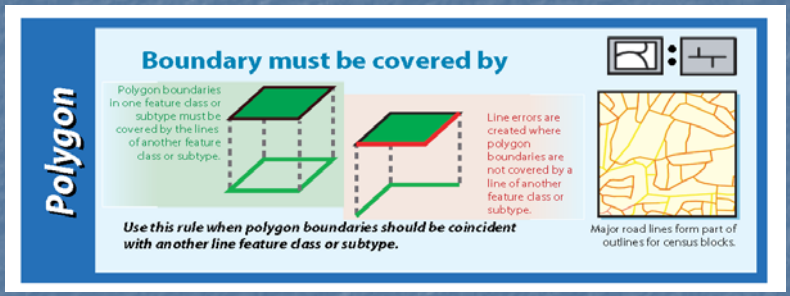
Polygons Must not Overlap



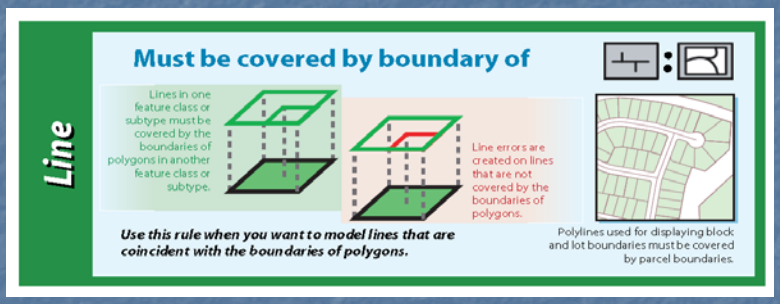
Polygon Must not have gaps



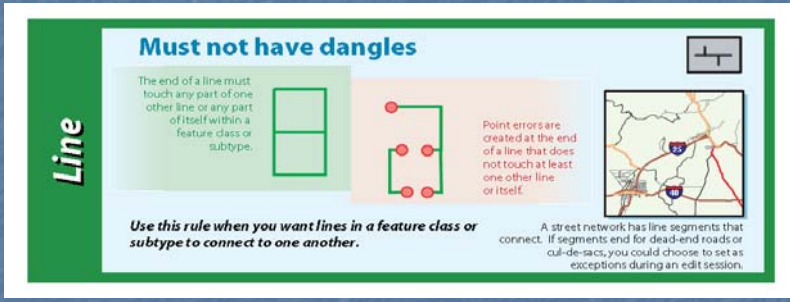
Polygon FC/Subtype Boundary must be covered by Line FC/Subtype



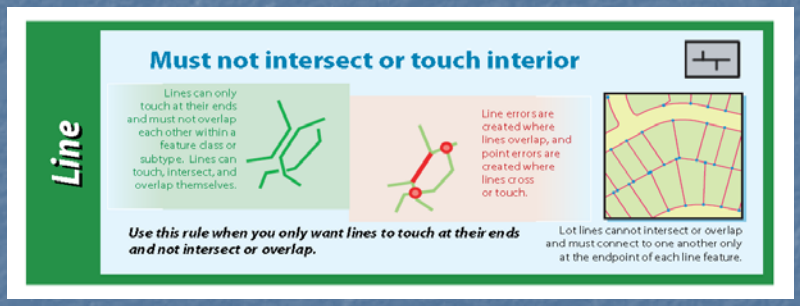
Line FC/Subtype must be covered by boundary of Polygon FC/Subtype



Line FC/Subtype must not have dangles



Lines Must not intersect or touch interior



Subtypes/Domains

- Both act as “pick” lists
- Reduce error potential
- Subtypes have special behaviors/abilities
  - Automatic symbolization
  - Automatic Default Attribution
  - Topology considerations
- Subtypes are Integers
- Domains can be Text or Integers

Data Models

- http://support.esri.com/index.cfm?fa=downloads.dataModels.matrix
- "With the ArcGIS platform, the ESRI vision is to build many industry-specific data models. Our basic goals are to simplify the process of implementing projects, and to promote and support standards that exist in our user communities."
- A Cadastral Data Model will allow a standard to be more readily implemented
- Builds Empty Feature Classes
- Can be created in a number of different ways – CASE/UML ie Visio, Geodatabase Designer, XML, ArcCatalog

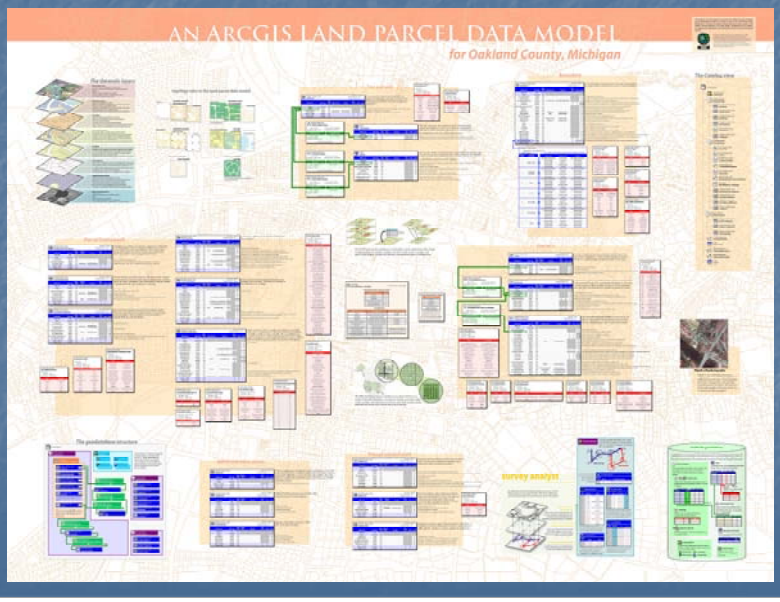
Case Tools documentation at ESRI:

http://support.esri.com/index.cfm?fa=knowledgebase.documentation.viewDoc&PID=43&MetaID=658

Designing Geodatabase webhelp:

http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?TopicName=An_overview_of_geodatabase_design

Land Parcel Data Standard Example



Download poster at:

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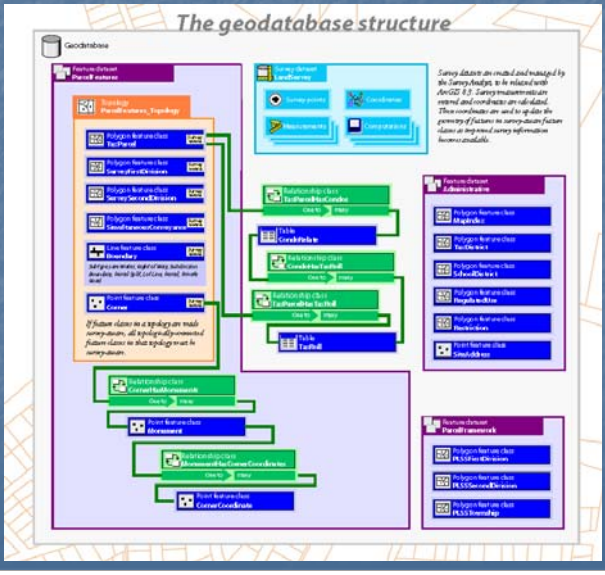
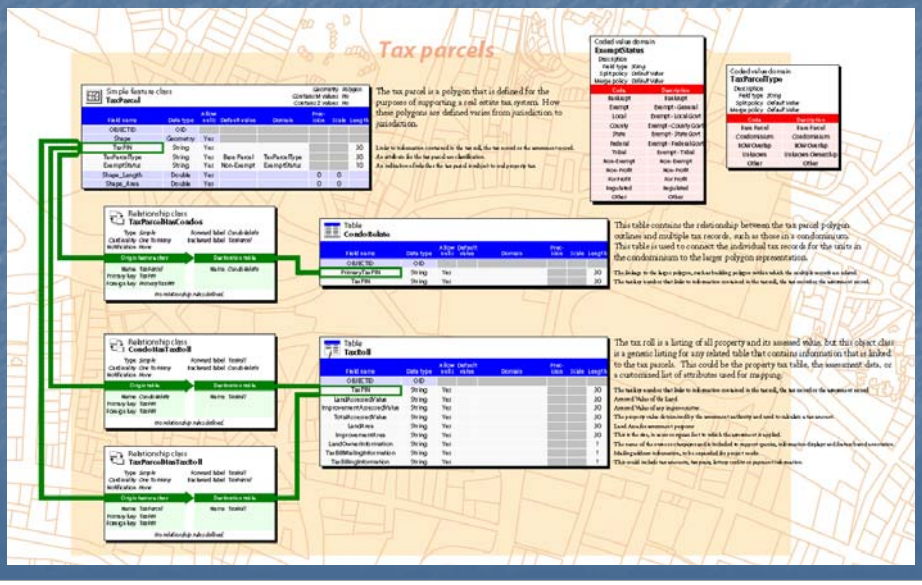
Look under Land Parcels

Land Parcel Data Standard – Features Datasets/Feature Classes



Land Parcel Data Standard – Parcels



Land Parcel Data Standard – Parcels Lines

Boundary

Simple feature class
Boundary

Geometry Polyline
Contains M values No
Contains Z values No

Field name	Data type	Allow nulls	Default value	Domain	Precision	Scale	Length	
OBJECTID	OID							
Shape	Geometry	Yes						
RecordBoundaryID	String	Yes					30	The primary key for the line entity.
RecordBounds	String	Yes					30	Describes a boundary location through a call to a legal location, a related document, or a known location.
RecordBoundaryStatus	String	Yes	Constructed	RecordBoundaryStatus			30	Identifies the record boundary's status from a legal perspective.
OffsetLeft	Double	Yes			0	0		The distance to the left of and perpendicular to a defined boundary line that defines the record boundary.
OffsetRight	Double	Yes			0	0		The distance to the right of and perpendicular to a defined boundary line that defines the record boundary.
RecordBoundaryComment	String	Yes					100	Contains additional information about the record boundary that may be in public record.
Direction	String	Yes					30	Direction is the angle between a line and an arbitrary chosen reference line.
Distance	String	Yes					30	The quantity for the distance of a boundary. Distance is the linear measure along a line.
DirectionType	String	Yes	Unknown	DirectionType			30	This attribute is the "basis of bearing" or "basis of azimuth" for the direction.
DirectionUnit	String	Yes	DMS	DirectionUnit			30	Indicates the units for a direction.
DirectionQuadrant	String	Yes					10	Directions can be measured as either bearings or azimuth.
DistanceUnit	String	Yes	US Survey Feet	DistanceUnit			30	Defines the units of measure and reference plane upon which distance measurements are taken.
DistanceType	String	Yes	Unknown	DistanceType			30	Describes the reference surface for the distance.
Radius	String	Yes					8	The radius is the distance from the center of the curve to any point on the circular curve.
Delta	String	Yes					10	The central angle of a circular curve.
Tangent	String	Yes					8	This is a term from the Arc Cogo processed the Cogo line type.
ArcLength	String	Yes					8	The arc length is the long chord length.
Side	String	Yes					1	This is a term from the Arc Cogo processed the Cogo line type.
RBSourceAgent	String	Yes					30	The source agent is the individual or organization, which determined the record boundary values.
RBSourceIndex	String	Yes					30	The value assigned to a record boundary document to file or identify the source from which the record boundary originated.
RBSourceType	String	Yes					30	Describes a family of documents, files, images, or other formats having some common unifying characteristic.
RBSourceDate	Date	Yes			0	0	8	The date of the record boundary document or other record.
RecordBoundaryType	Integer	Yes	1		0			An indication of the classification of the boundary line that is used to support the definition of subtypes.
Shape_Length	Double	Yes			0	0		

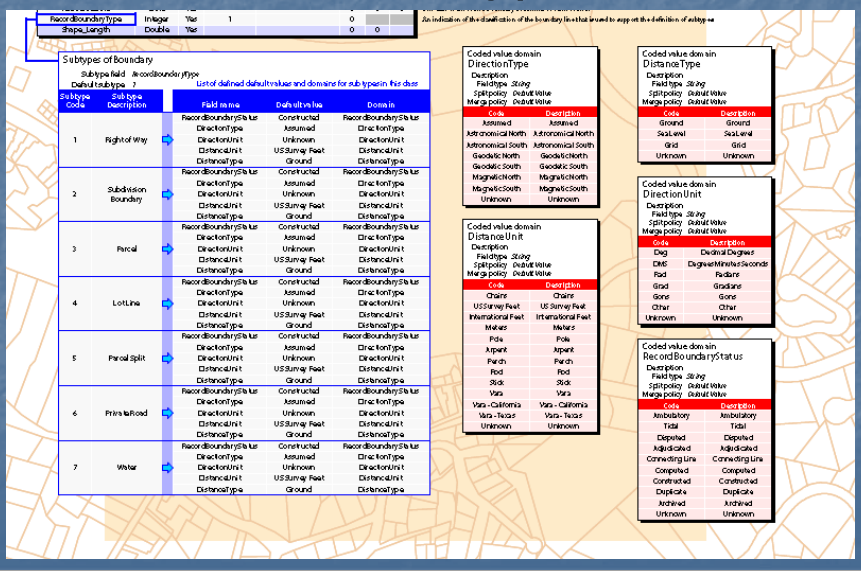
A record boundary is the linear feature that represents the edge of an polygon feature, which may be a parcel or a parcel framework.

Subtypes of Boundary

Coded value domain
DirectionType

Coded value domain
DistanceType

Land Parcel Data Standard – Parcels Lines Subtypes/Domains



RecordBoundaryType	Integer	Yes	1		0	
Shape_Length	Double	Yes			0	0

An indication of the classification of the boundary line that is used to support the definition of subtypes

Subtypes of Boundary

Subtype field: RecordBoundaryType

Default subtype: 7

List of defined default values and domains for subtypes in this class

Subtype Code	Subtype Description	Field name	Default value	Domain
1	Right of Way	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
2	Subdivision Boundary	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
3	Parcel	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
4	Lot Line	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
5	Parcel Split	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
6	Private Road	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType
7	Water	RecordBoundaryStatus	Constructed	RecordBoundaryStatus
		DirectionType	Assumed	DirectionType
		DirectionUnit	Unknown	DirectionUnit
		DistanceUnit	US Survey Feet	DistanceUnit
		DistanceType	Ground	DistanceType

Coded value domain
DirectionType
Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Assumed	Assumed
Astronomical North	Astronomical North
Astronomical South	Astronomical South
Geodetic North	Geodetic North
Geodetic South	Geodetic South
Magnetic North	Magnetic North
Magnetic South	Magnetic South
Unknown	Unknown

Coded value domain
DistanceType
Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Ground	Ground
Sea Level	Sea Level
Grid	Grid
Unknown	Unknown

Coded value domain
DistanceUnit
Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Chains	Chains
US Survey Feet	US Survey Feet
International Feet	International Feet
Meters	Meters
Poles	Poles
Arpents	Arpents
Perches	Perches
Rods	Rods
Sticks	Sticks
Varas	Varas
Varas - California	Varas - California
Varas - Texas	Varas - Texas
Unknown	Unknown

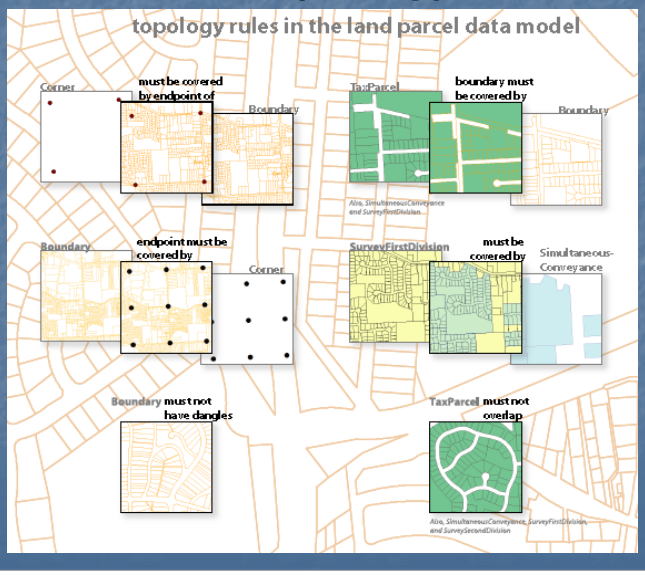
Coded value domain
DirectionUnit
Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Deg	Decimal Degrees
DMS	Degrees Minutes Seconds
Rad	Radians
Grad	Gradians
Gons	Gons
Other	Other
Unknown	Unknown

Coded value domain
RecordBoundaryStatus
Description
Field type: String
Split policy: Default Value
Merge policy: Default Value

Code	Description
Ambulatory	Ambulatory
Tidal	Tidal
Deputed	Deputed
Adjudicated	Adjudicated
Connecting Line	Connecting Line
Competed	Competed
Contructed	Contructed
Duplicate	Duplicate
Archived	Archived
Unknown	Unknown

Land Parcel Data Standard - Topology



RDBMS Concepts

- Normalization – Spread data across multiple tables when possible
- Don’t duplicate data available elsewhere ie Assessor Data
- Server/System Performance
- Index creation and maintenance
- Joins and Relates

Attribution

- Feature Classes (Meriden, Manchester, Avon)
  - Parcel Polygons, Parcel Lines, Other? (Dimensions, Easements, ...)
- Feature Level Metadata (Milford, Meriden)
  - Edit Source, Edit Method, Editor, Edit Date

Parcel Polygon Feature Class Attribution

- Unique ID (GISID, GPIN, ...)
  - Town/Town Code - Domain
  - Map Block Lot, Map Lot, ... - Text
- Type – Subtype
  - Fee Simple Property, Condominium, Right-of-Way (State, Town, Railroad...), Water, Other?
- Ownership – Domain
  - Private, Utility, Town, State, Federal
- Feature Level Metadata

Parcel Lines Feature Class Attribution

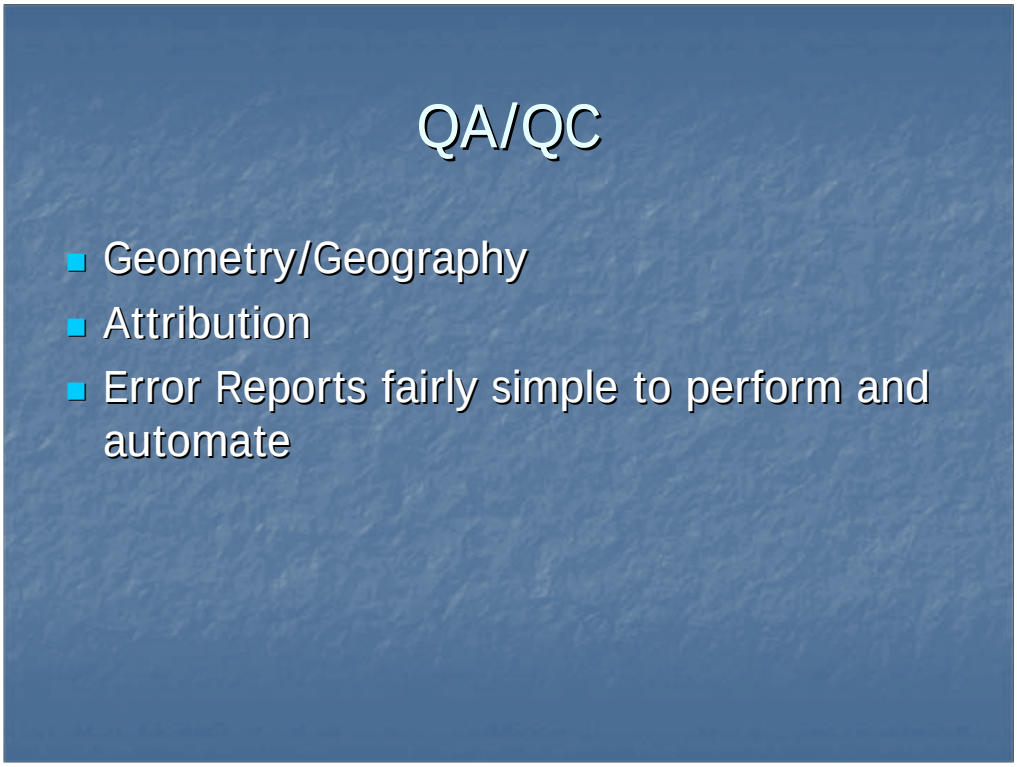
- Subtype – Type of Line (Avon?)
  - Town Line, Parcel Line, Subdivision, Right-of-way (State, Town, Railroad, ...), Right-of-way break line (non-cartographic)
- ESRI COGO Fields (Meriden)
- Feature Level Metadata

Feature Level Metadata

- What was the source of the feature geometry?
- How was the feature geometry constructed?
- Who edited the feature geometry?
- When was the feature edited

Parcel Construction

- At least ArcEditor
- Sources and Methods
- Spatial accuracy very important, a survey will always be the best source
- Digital Submissions helpful for updates
- SINGLE TOWNWIDE RIGHT-OF-WAY = BAD
  - Break up at logical locations
  - State ROWs
  - Railroad ROWs
  - New Subdivision ROWs



Geometry/Geography

- Topology Errors
- Alignment with lines of occupation
- Parcel intersections with buildings…
- State Plane NAD 83?

Attribution

- Match with Assessor Database (CAMA)
- Duplicate Unique ID's
- Null values

Error Reports fairly simple to perform and automate

- Geometry/Geography – Topology Tools and geoprocessing
- Attribution – MS Access link tables and select querries

Metadata

- Necessary for Standard
- Template should be developed