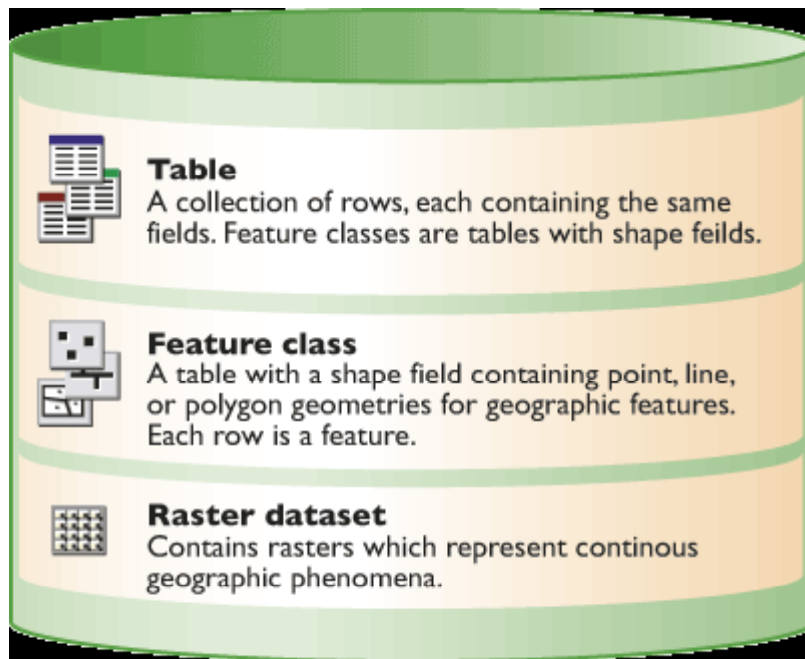


# Geographic Information Systems and Remote Sensing for Natural Resource Management

FW3540

## Lecture 20

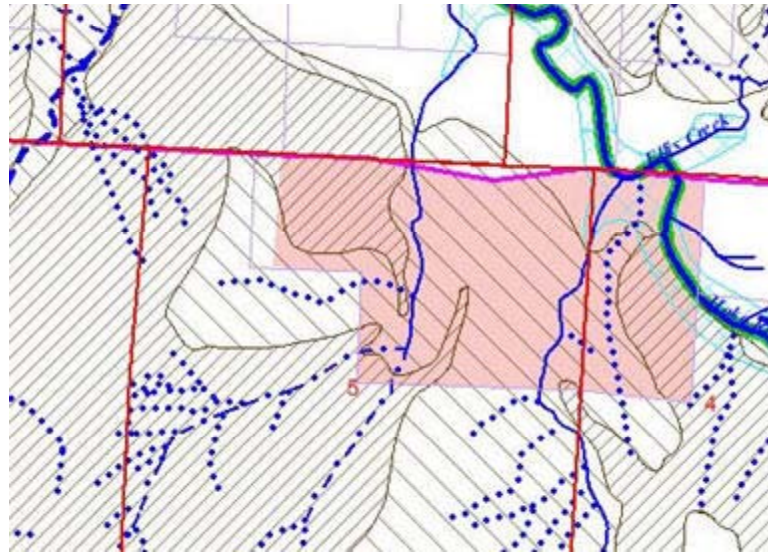
### ArcMap Geodatabases Continued



Is a collection of geographic datasets of various types held in a common file system folder.

Topology is the arrangement for how point, line, and polygon features share geometry. Topology is employed in order to:

Constrain how features share geometry. For example, adjacent polygons such as parcels have shared edges; street centerlines and census blocks share geometry; adjacent soil polygons share edges; etc.

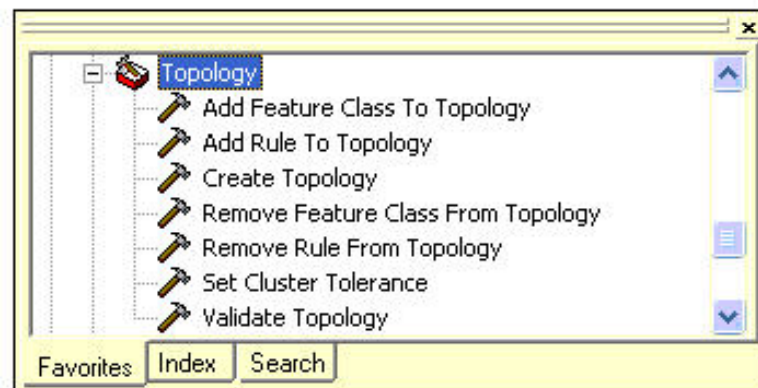


Define and enforce data integrity rules (e.g., no gaps should exist between polygons; there should be no overlapping features; and so on).

Support topological relationship queries and navigation (e.g., to navigate feature adjacency and connectivity).

Support sophisticated editing tools (tools that enforce the topological constraints of the data model).

Construct features from unstructured geometry (e.g., to construct polygons from lines).



# Polygon

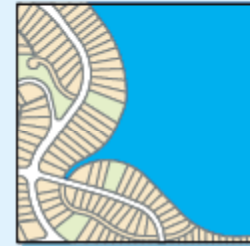
## Must not overlap with

Polygons of the first feature class or subtype must not overlap polygons of the second feature class or subtype.



Polygon errors are created where polygons from the two feature classes or subtypes overlap.

*Use this rule when polygons from one feature class or subtype should not overlap polygons of another feature class or subtype.*



Lakes and land parcels from two different feature classes must not overlap.

# Line

## Must be covered by boundary of

Lines in one feature class or subtype must be covered by the boundaries of polygons in another feature class or subtype.



Line errors are created on lines that are not covered by the boundaries of polygons.

*Use this rule when you want to model lines that are coincident with the boundaries of polygons.*



Polylines used for displaying block and lot boundaries must be covered by parcel boundaries.

# Polygon

## Must not overlap

Polygons must not overlap within a feature class or subtype. Polygons can be disconnected or touch at a point or touch along an edge.



Polygon errors are created from areas where polygons overlap.



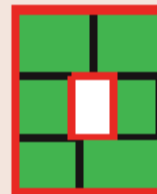
A voting district map cannot have any overlaps in its coverage.

**Use this rule to make sure that no polygon overlaps another polygon in the same feature class or subtype.**



## Must not have gaps

Polygons must not have a void between them within a feature class or subtype.



Line errors are created from the outlines of void areas in a single polygon or between polygons. Polygon boundaries that are not coincident with other polygon boundaries are errors.



Soil polygons cannot include gaps or form voids—they must form a continuous fabric.

**Use this rule when all of your polygons should form a continuous surface with no voids or gaps.**

# Polygon



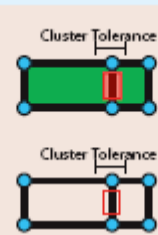
# Line or Polygon

## Must be larger than cluster tolerance

Cluster tolerance is the minimum distance between vertices of features.

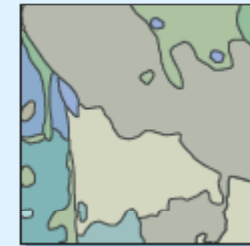


Vertices that fall within the cluster tolerance are defined as coincident and are snapped together.



Any polygon or line feature that would collapse when validating the topology is an error.

***This rule is applied to all line and polygon feature classes that participate in the topology.***

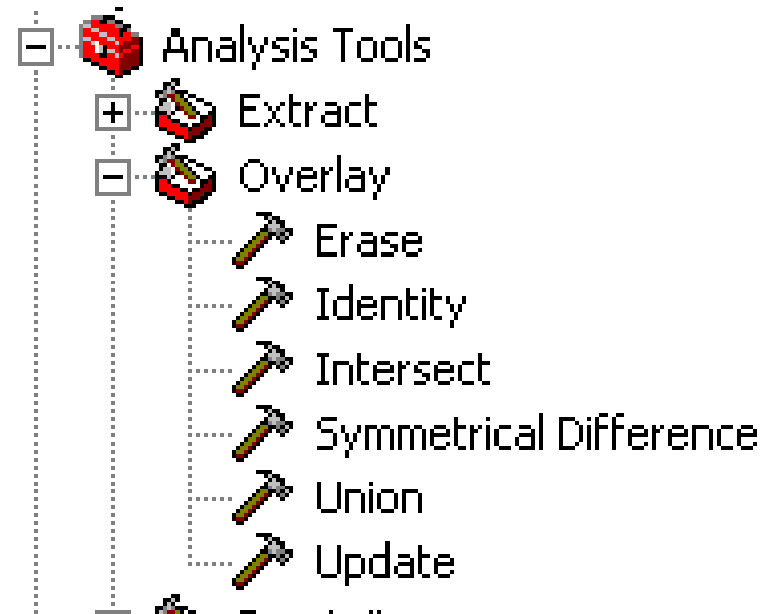


Soil polygons must be larger than the cluster tolerance.

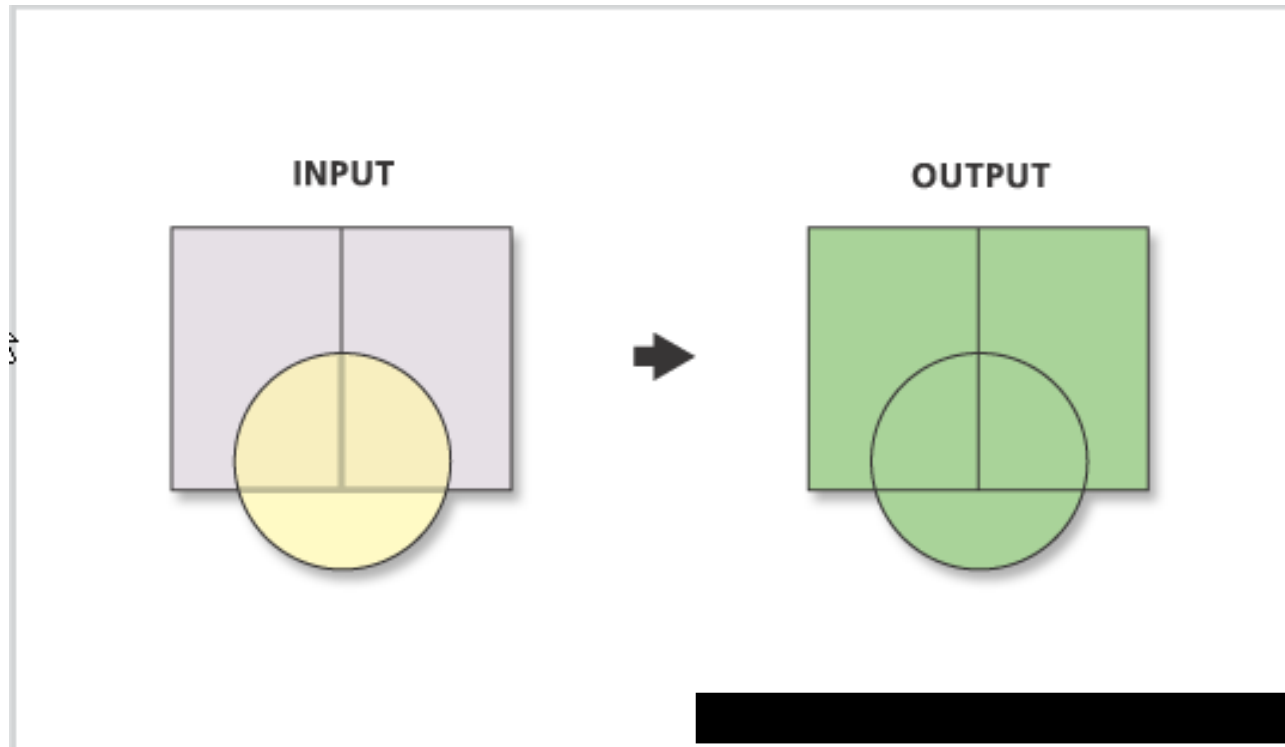
# Overlay Function

Registration to a geographic coordinate system is requisite, particularly when working with thematic layers of different scales (vector) or spatial resolution (raster). Layers must be .shp, feature class, or grid thematic layers.

Performed using 2 thematic layers at a time. May generate many intermediate thematic layers.

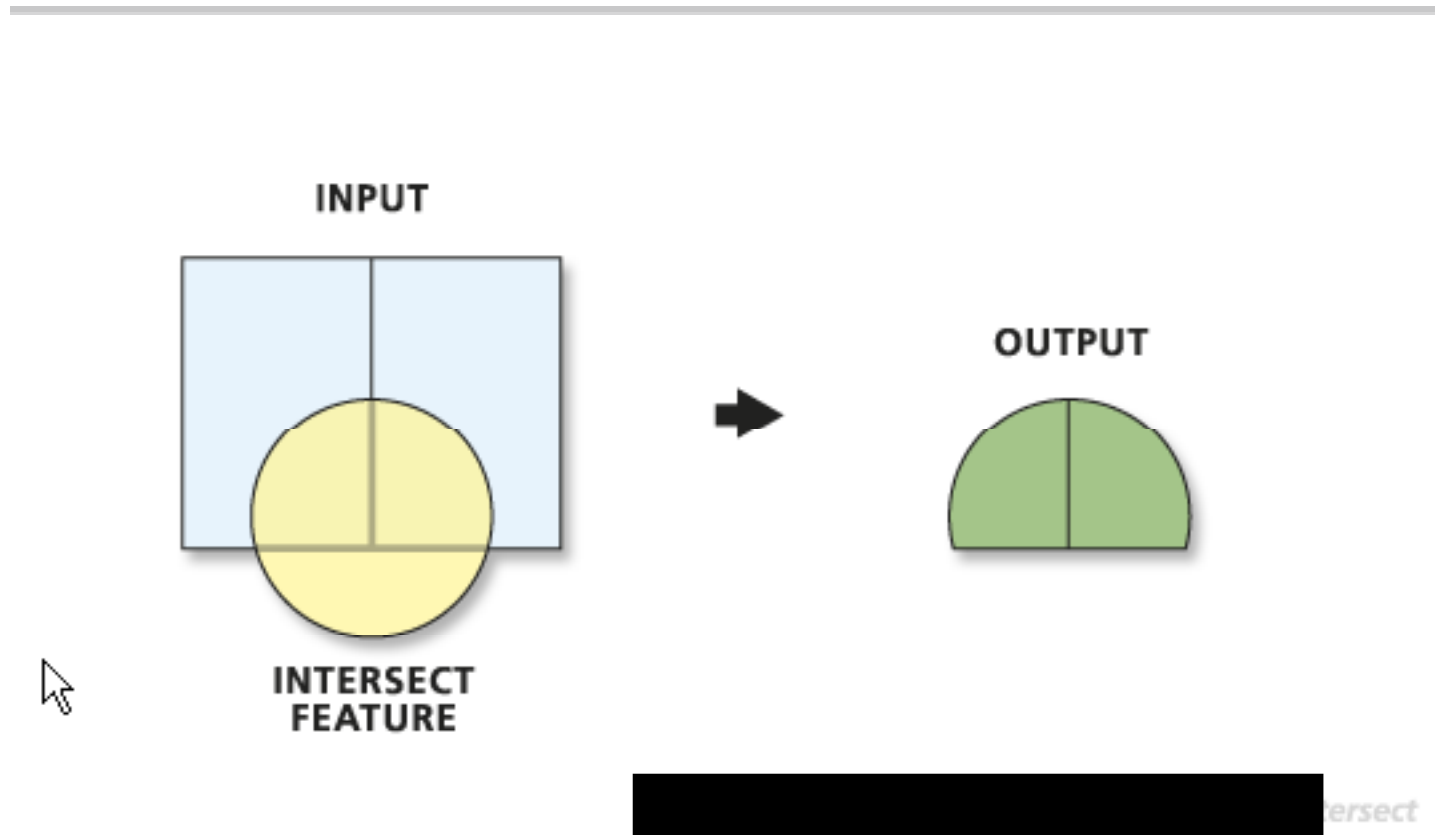


**Union** computes a geometric intersection of two thematic layers. All features will be written to the output thematic layer with all attributes from the input thematic layers.



All input thematic layers must have polygon geometry. “OR” function

**Intersection** computes a geometric intersection of two thematic layers. Features or portion of features common to all layers will be written to the output. “AND” function



Valid geometry for input thematic layers is: point, line or polygon.

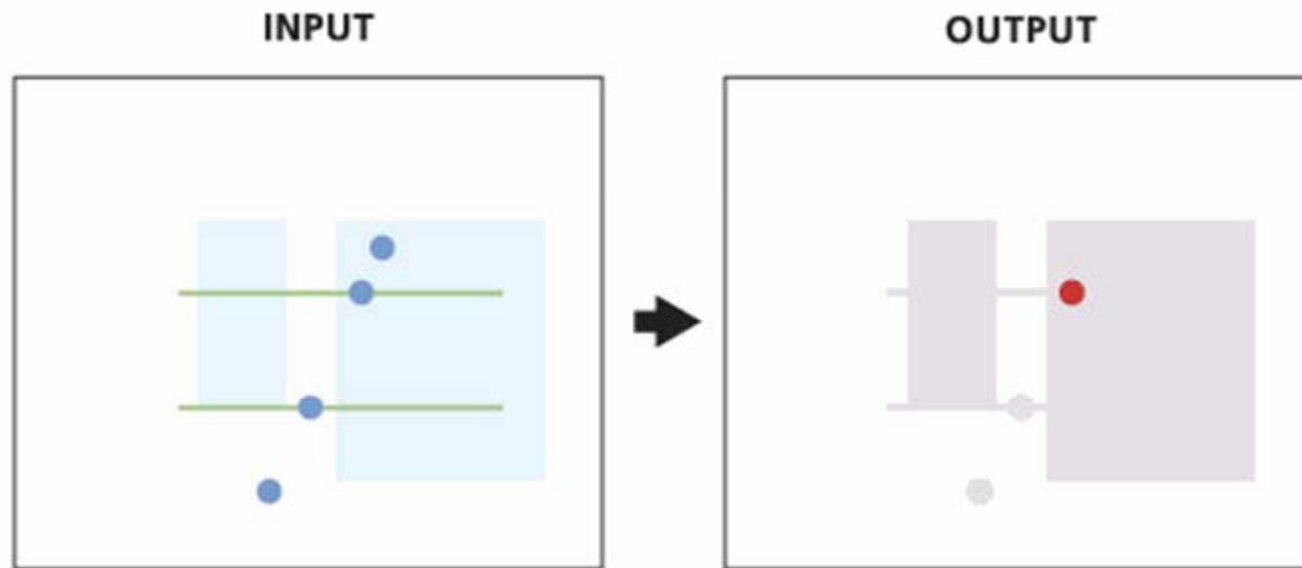
Attribute table(s) should be check and updated as needed. Area, distance, and perimeter measures should be checked and recalculated as needed.

If the inputs have different geometry types (i.e. line on poly, point on line, and so on), the output thematic layer's geometry type will default to be the same as the input thematic layers with the *lowest dimension geometry*.

If one or more of the inputs is a point file- output will be point.

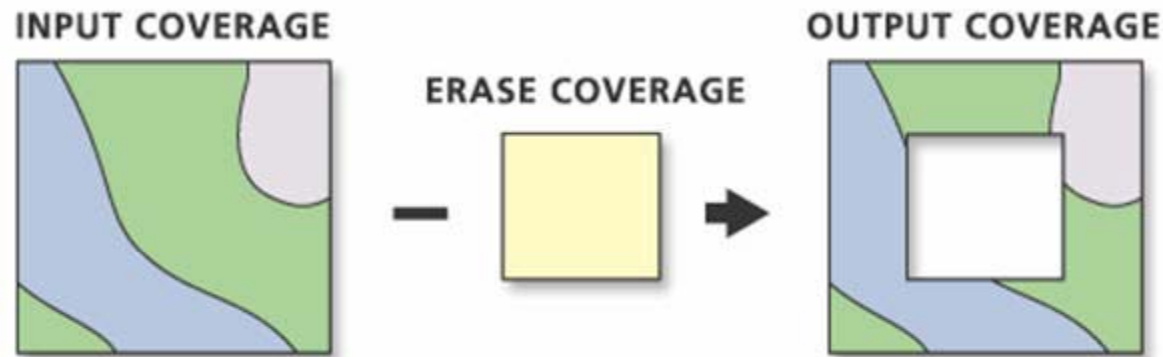
If one or more of the inputs is a line- output will be line.

If all inputs are polygon, the default output will be polygon.



**Erase** creates a new thematic layer by overlaying the polygons of the erase polygon with features of the input thematic layer.

Only those portions of the input thematic layer falling *outside* the erase polygon's outside boundaries are copied to the output thematic layer. Topology is automatically rebuilt if input is feature class.



**Identity** computes geometric intersection of two thematic layers. All features of the input thematic layers, as well as those features of the identity thematic layer that overlap the input thematic layer, are preserved in the output thematic layer. Order of input is important- first layer defines spatial extent.

