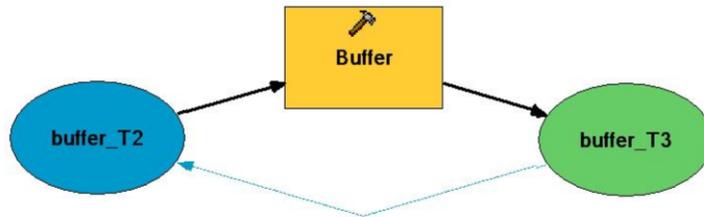


Explanation of procedure in  
week 2 homework  
(setting up a feedback loop)

This video explains the procedure used in the Suitability Analysis assignment.

# Feedback Loops

- The output of one iteration is used as input of the next iteration.



2

The Suitability Analysis assignment makes use of a **feedback loop**. This diagram illustrates a feedback loop in ArcGIS ModelBuilder.

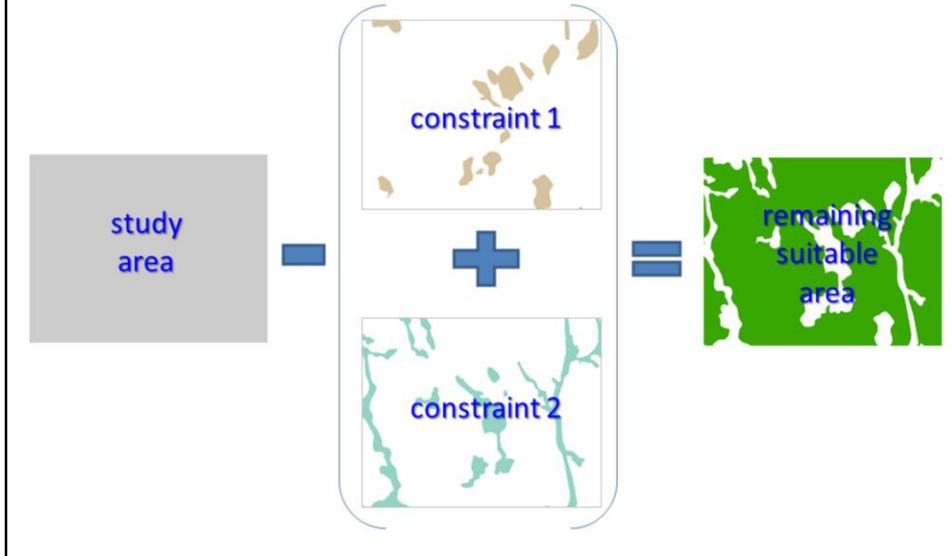
In the 1<sup>st</sup> iteration of this feedback loop, the origin feature class is buffered to create the buffer\_T0 feature class.

In the 2<sup>nd</sup> iteration, buffer\_T0 now becomes the input and is used to create buffer\_T1.

For each iteration after the 1<sup>st</sup>, the output of the previous iteration is used as the input of the current iteration.

# Suitability analysis

- Eliminate all unsuitable areas from the study area

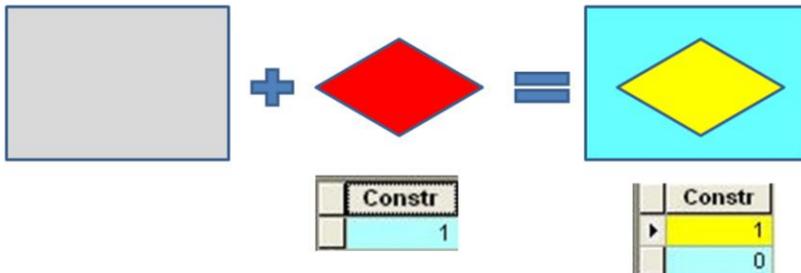


The Suitability Analysis exercise erases the constraint 1 and constraint 2 polygons from the study area.

The remaining areas are considered suitable.

## Erasing polygons from study area

- If the **Erase** tool is unavailable, how do we erase polygons of one shapefile from those of another?
  1. Use **union** tool to intersect two layers at a time (ArcView restriction)
  2. Delete intersecting polygons after each union
    - Attributes from each layer carry over into the unioned layer.
    - Delete polygons with attribute value of constraint layer



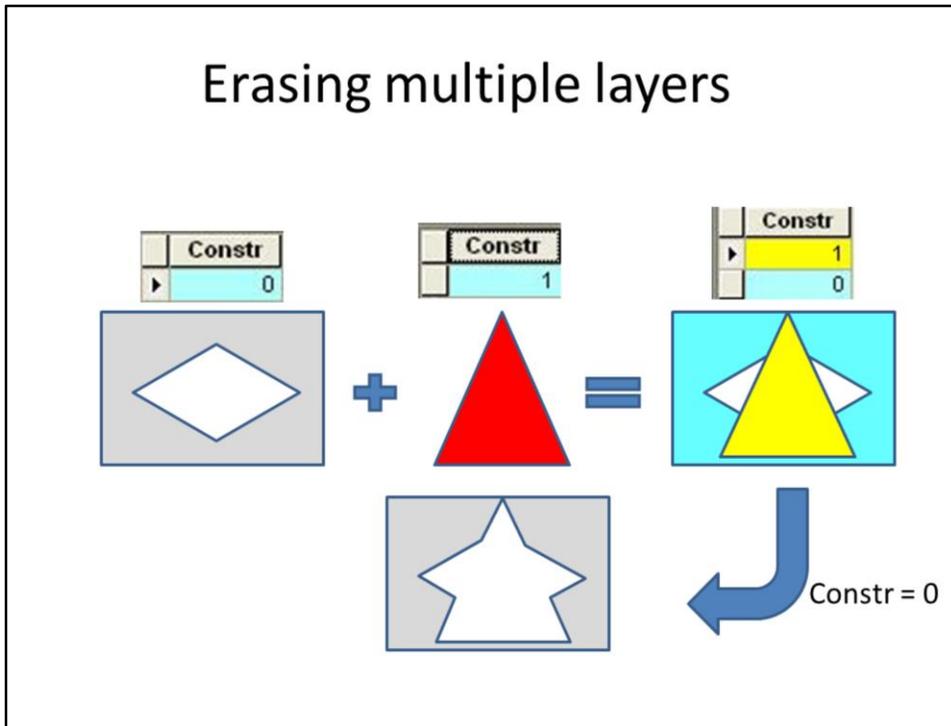
The Suitability Analysis exercise doesn't allow us to use the Erase tool which complicates what would otherwise be a fairly straight-forward analysis.

To erase polygons from the study area, given our limitation, we can use the union tool to intersect 1 constraint layer with the study area polygon.

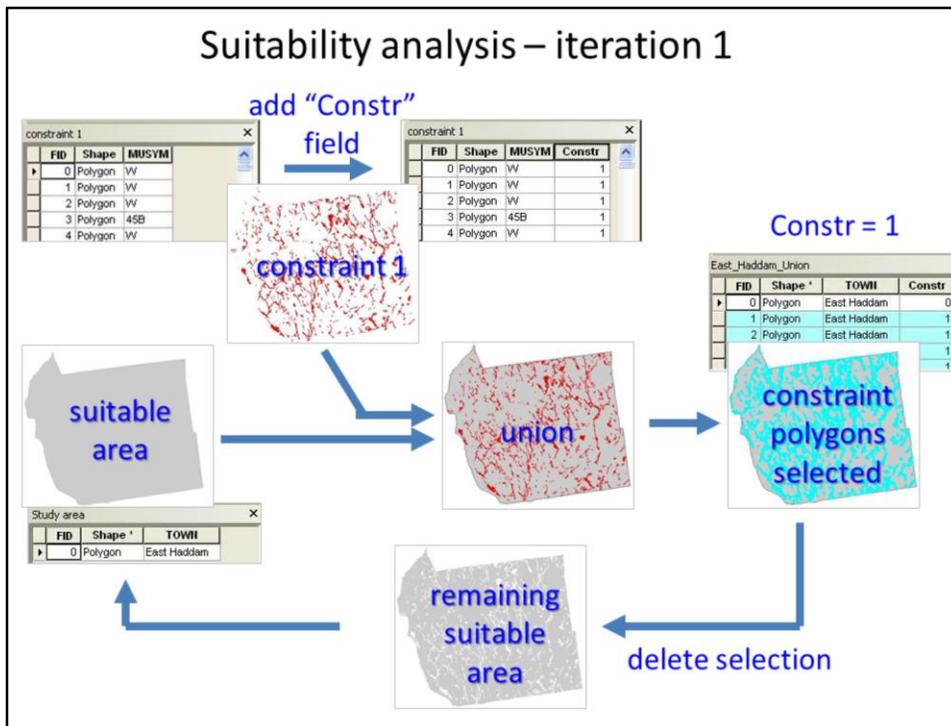
If the constraint polygons have an identifying characteristic, then we can use it to identify the constraint polygons in the union output.

We can delete the constraint polygons in the union output layer once we've identified them.

## Erasing multiple layers



Because the Suitability Analysis exercise limits us to Basic level ArcTools, we cannot input more than 2 layers at a time in the union tool. In order to remove polygons from a 2<sup>nd</sup> constraint layer, we need to repeat the union process and delete the intersecting polygons. However, in this 2<sup>nd</sup> iteration, we need to use the output of the 1<sup>st</sup> iteration (which are the areas remaining after deleting the polygons from the 1<sup>st</sup> constraint layer).



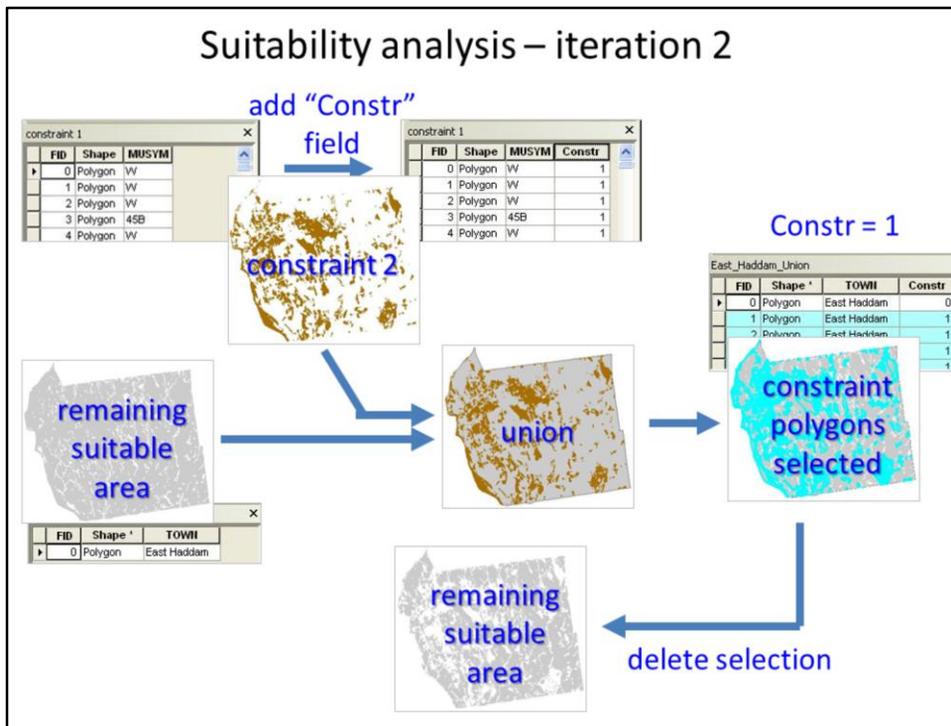
Let's look at an illustration of what occurs in the first iteration of the suitability analysis.

The first step adds a field to the 1<sup>st</sup> constraint layer and sets the value 1 for all polygons.

The constraint layer is then unioned with the study area polygon.

The resulting feature class contains the field that we added to the constraint layer. All areas that intersected the constraint layer polygons have a value of 1 in this field; all other areas have a value of 0. We can use a select by attribute operation to select all polygons that have a value of 1 in the field.

The selected polygons can then be deleted which leaves behind only polygons that did not intersect the constraint areas.



In iteration 2, we repeat the operation of the 1<sup>st</sup> iteration:

We start by adding a field to the 2<sup>nd</sup> constraint layer so that we can identify the constraint polygons in the result of the union.

For the union operation, in this iteration, we use the output of the 1<sup>st</sup> iteration instead of the study area.

The 2<sup>nd</sup> constraint layer is unioned to the polygons that remained after the 1<sup>st</sup> iteration. The areas that intersect the constraint 2 polygons are then identified

And deleted. Although the Suitability Analysis exercise only requires you to include two constraint layers in the analysis, the script you developed will continue running for any number of constraint feature classes.