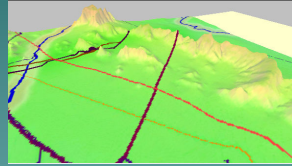
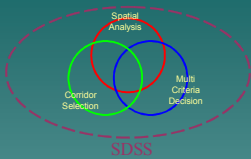


Spatial Decision Support System



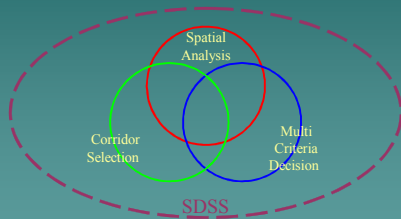
Claude Kershaw

MapSmart

Contents

- ◆ Spatial Decision Support System
- ◆ 3D Visualization

Spatial Decision Support System



MapSmart

Spatial Analysis

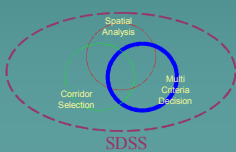


- ◆ Measurement Operations
- ◆ Re/Classification Operations
- ◆ Scalar Operations
- ◆ Overlay Operations
- ◆ Neighborhood Operations
- ◆ Connectivity Operations

MapSmart

Multi Criteria Decision Making

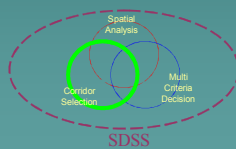
- ◆ Cost-benefit Analysis
- ◆ Pros and Cons Analysis
- ◆ Outranking Methods
- ◆ Multi Attribute Utility Theory
 - Simple Multi-attribute ranking technique
 - Generalized means
 - The Analytic Hierarchy Process
 - ◆ Pair-wise comparisons on fixed scale
 - ◆ Support for group decision making
 - ◆ Consistency Ratio



MapSmart

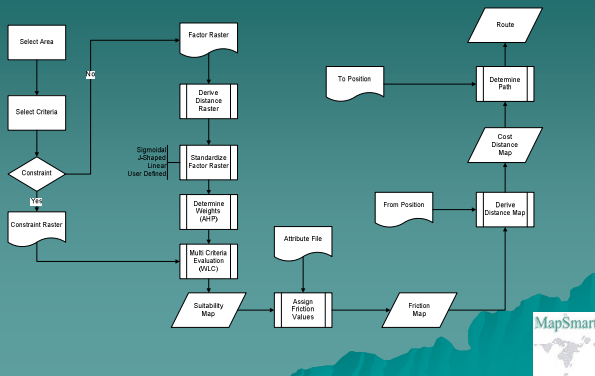
Corridor Selection

- ◆ Complex Problem
- ◆ Multiple Criteria to be considered:
 - Ecological
 - Electrical
 - Aesthetic
 - Socio-Economic
 - Environmental
 - Right of Way
 - Engineering

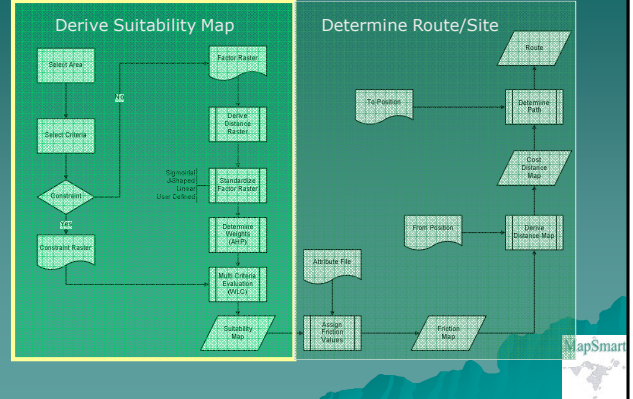


MapSmart

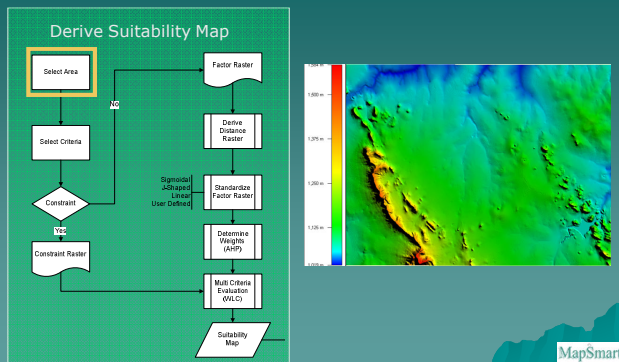
Model Overview



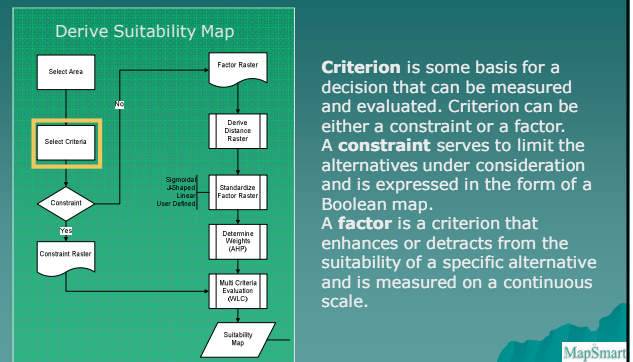
Model Overview



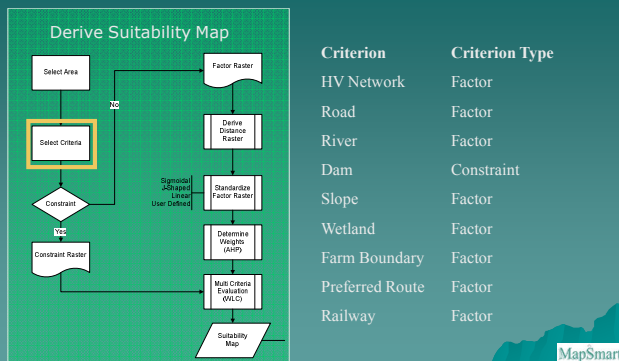
Select Area



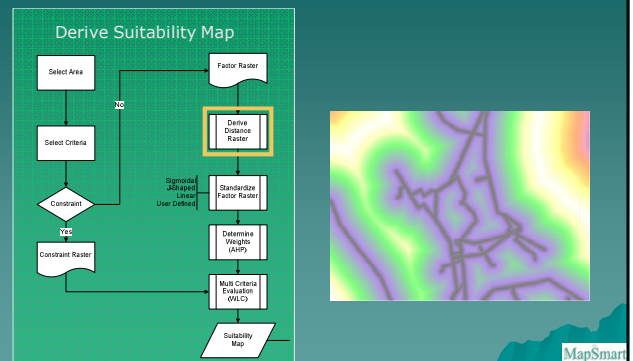
Criteria Definition



Select Criteria

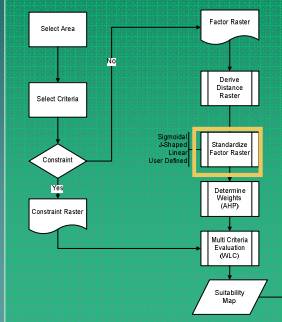


Distance Raster



Standardize Raster

Derive Suitability Map



Fuzzy Set Theory

Sigmoidal



J-Shaped



Linear

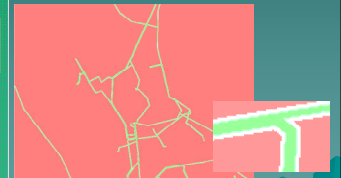
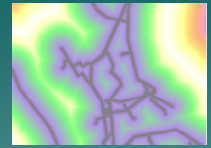
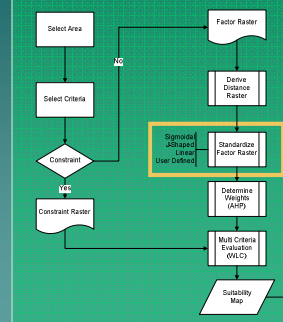


User-Defined



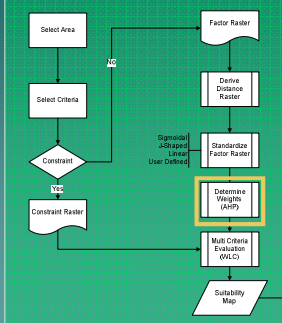
Fuzzy Output

Derive Suitability Map



Determine Weights

Derive Suitability Map



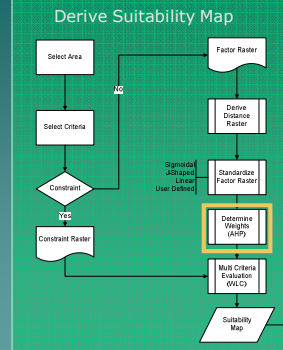
Many Methods

Analytic Hierarchy Process

Pairwise Comparison 9 Point Continuous Rating Scale								
1/9	1/7	1/5	1/3	1	3	5	7	9
extremely less important	very strongly less important	strongly less important	moderately less important	equally	moderately more important	strongly more important	very strongly more important	extremely more important

	Farm Boundary	HV Network	Preferred Route	Railway	River	Road	Slope
Farm Boundary	1						
HV Network	3	1					
Preferred Route	5	3	1				
Railway	3	1	1/5	1			
River	7	5	3	5	1		
Road	3	1	1/5	1	1/5	1	
Slope	3	5	3	5	1/5	5	1
Wetland	9	7	5	7	3	7	3

Weights

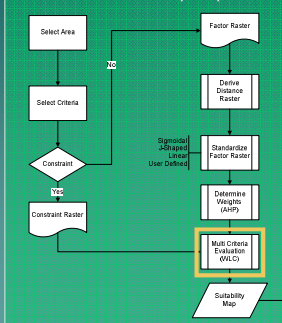


Farm Portion	: 0.0239
HV Network	: 0.0407
Preferred Route	: 0.1079
Railway	: 0.0391
River	: 0.2153
Road	: 0.0391
Slope	: 0.1479
Wetland	: 0.3860

Consistency ratio = 0.07
Consistency is acceptable.

Spatial Multi Criteria Evaluation

Derive Suitability Map



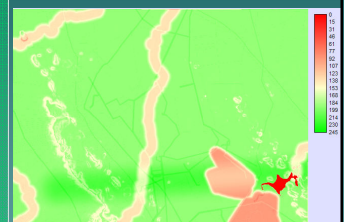
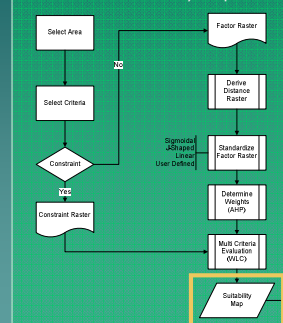
Weighted Linear Combination

$$S = \sum W_i \cdot X_i \cdot \prod C_j \dots (xxx)$$

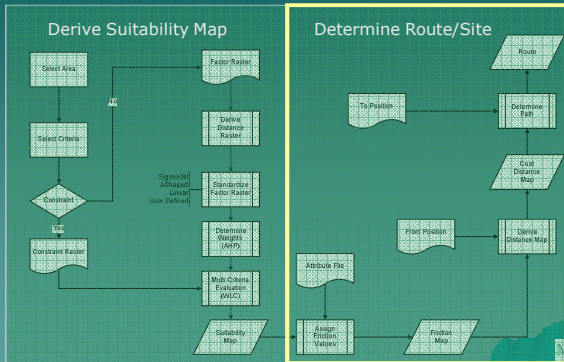
where: S = suitability
W_i = weight of factor i
X_i = criterion score of factor i
∏ = product
C_j = Criterion score of constraints j

Suitability Map

Derive Suitability Map

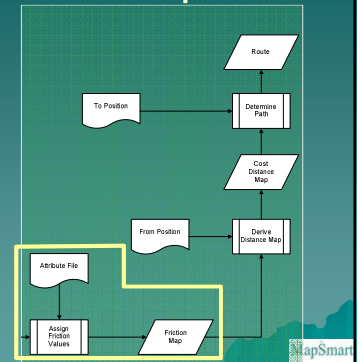


Model Overview

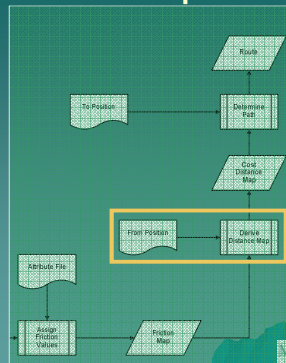
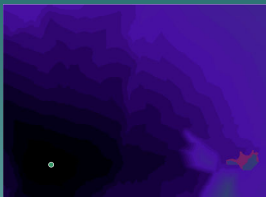


Derive Friction Map

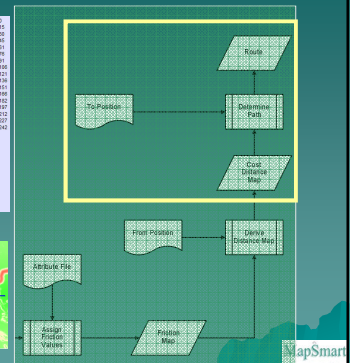
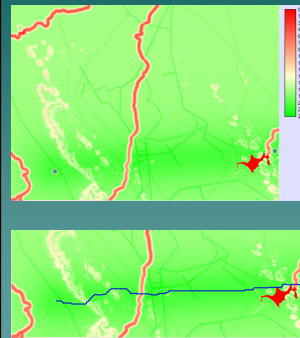
- ◆ Reclassification of the Suitability Map
- ◆ Used to derive the Distance Map



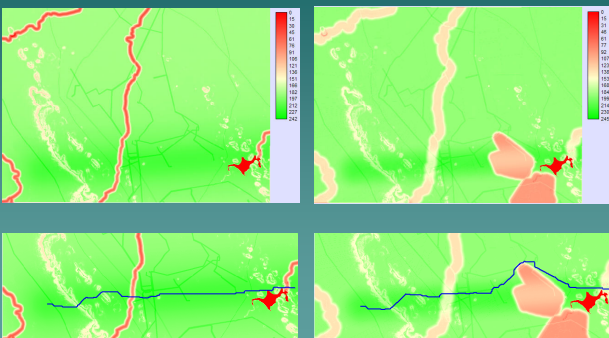
Derive Distance Map



Determine Route



Considering Different Criteria



3D Visualization