

Geodesignhub

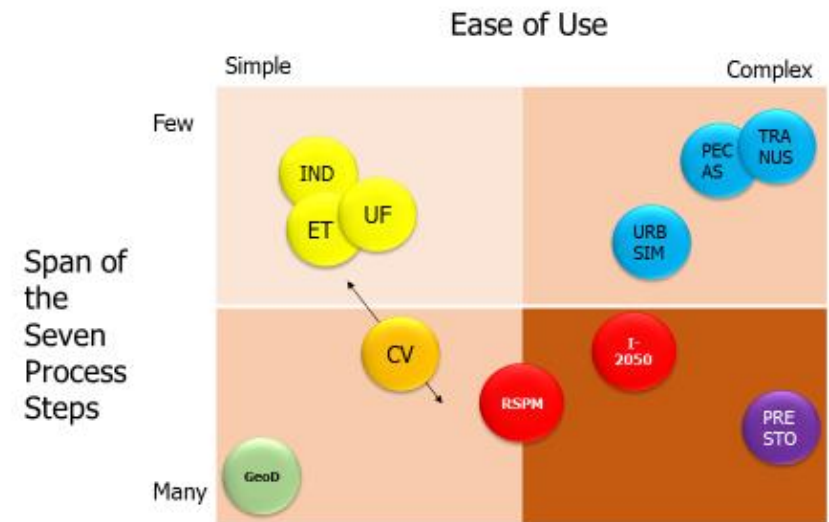
TRB Conference

Tuesday, August 16, 2016

Uri Avin FAICP, UMD

uavin@und.edu

Tools trade off Complexity with Process Support



Sequence of Presentation



- Geodesignhub (GDH) in the bigger picture; key features
- Case study
- Tool structure

GDH has many unusual strengths

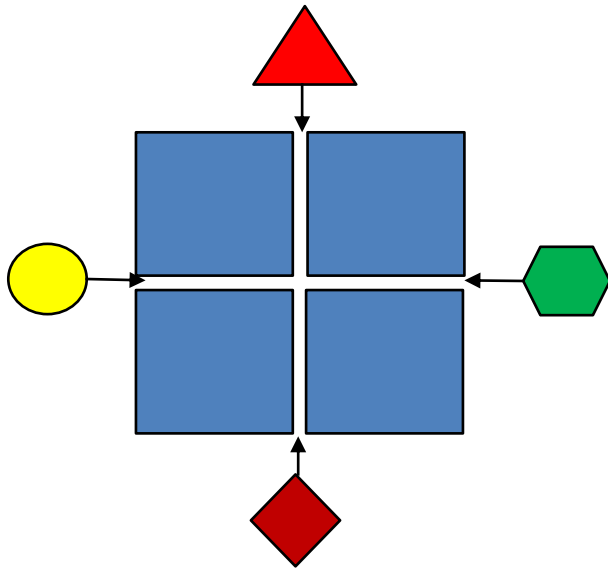
Feature	Lightweight Tools			Middleweight Tools/Models			Heavyweight Models		
	ET+	UF	CV	RSPM	2050	Geod	UrbanS	PECAS	SILO
Theory based model				Moderate fit	Strong fit		Strong fit	Strong fit	Strong fit
Generates forecasts					Strong fit		Strong fit	Strong fit	Strong fit
Validated/calibrated			Weak Fit		Strong fit		Strong fit	Strong fit	Strong fit
Generates scenarios	Strong fit	Strong fit	Strong fit		Weak Fit	Strong fit			
Handles policies & projects	Moderate fit	Moderate fit	Moderate fit	Moderate fit		Strong fit	Weak Fit	Weak Fit	
Collaboration driven	Weak Fit	Weak Fit	Weak Fit	Weak Fit		Strong fit			Weak Fit
Structures negotiations	Weak Fit	Weak Fit	Weak Fit	Weak Fit		Strong fit			
Range of impacts/indicators	Strong fit	Strong fit	Moderate fit	Moderate fit	Moderate fit	Moderate fit	Weak Fit	Weak Fit	Weak Fit
Little data needed	Moderate fit	Moderate fit	Moderate fit			Strong fit			Weak Fit
Web Based	Strong fit	Strong fit		Strong fit		Moderate fit			Strong fit
Open Access	Moderate fit	Weak Fit	Weak Fit	Strong fit		Strong fit	Strong fit		Strong fit

Source: Adapted from Avin et al, NCHRP Project 8-36, Task 117, 2016

 Strong fit
  Moderate fit
  Weak Fit
  Blank = no fit

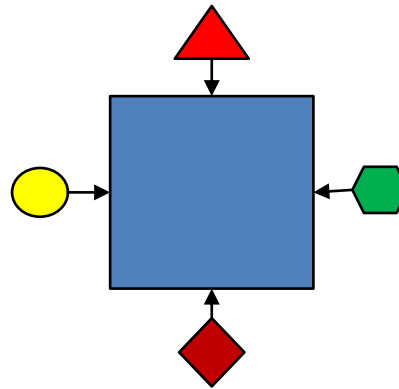
Relationships to External Data and Models

UrbanSim



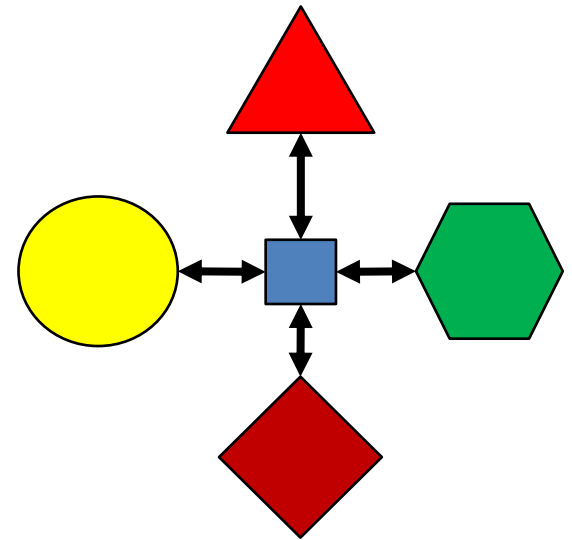
Multiple internal models fed with outside data

CommunityViz



Tool contains multiple internal applications built with outside data

Geodesignhub

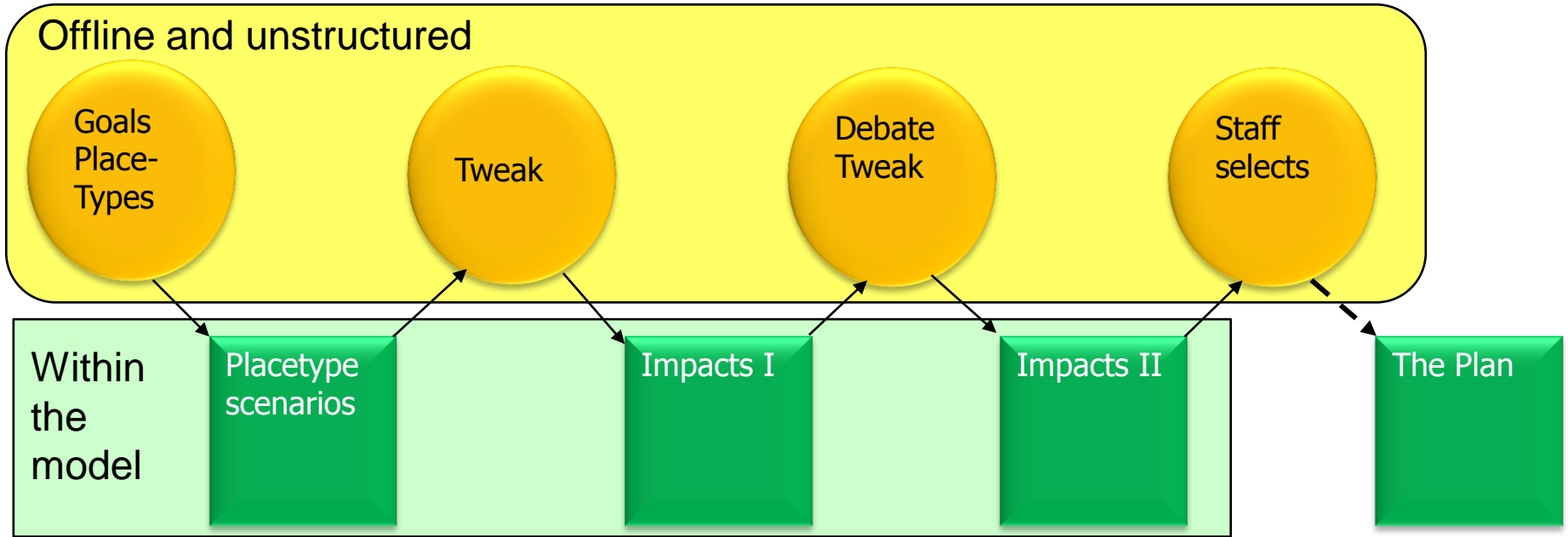


Tool contains simple operations but **interacts** with outside models

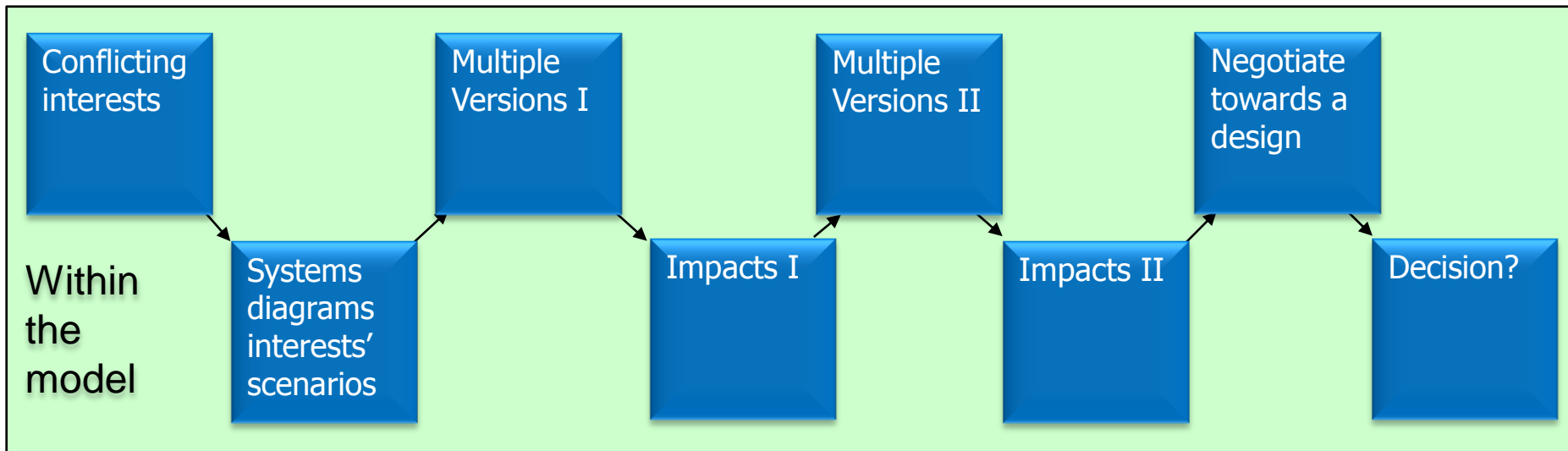
A cloud-based, open-source, open-platform software written in Python and Node/JavaScript explicitly designed to link to other tools or models, rather than containing complex substantive algorithms itself

Geodesignhub Structured to Support Collaborative Processes

Most Sketch tools



Geodesignhub

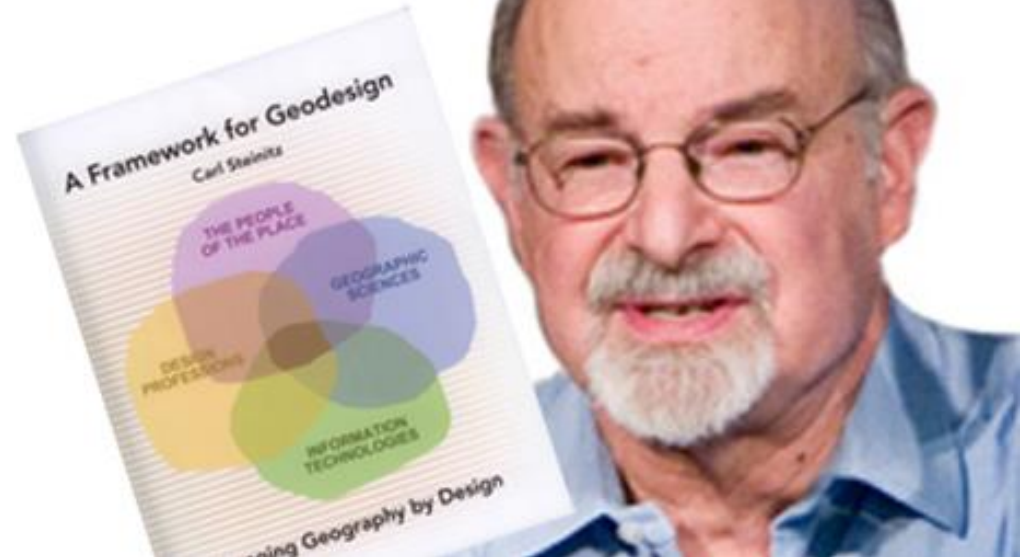


GDH: Mature Approach, Much-Tested

- Carl Steinitz (ex-Harvard Landscape Dept; now at CASA in London) been applying and refining this approach for 50 years
- Applied in 150 case studies in 30 countries in analog, GIS, and now, in digital modes; for 20 acres up to 16,000 sq. mi.
- Converted to a PSS as Geodesignhub in last 2 years
- Geodesignhub applied in over 20 places in 8 countries over last 2 years
- Built around stakeholder negotiation; does not separate design from analysis; **inverts** goals > data > analysis > design sequence
- Best used at very beginning, strategic stages of resolving a large, complex problem



Dr. Hrishkesh Ballal, Software designer

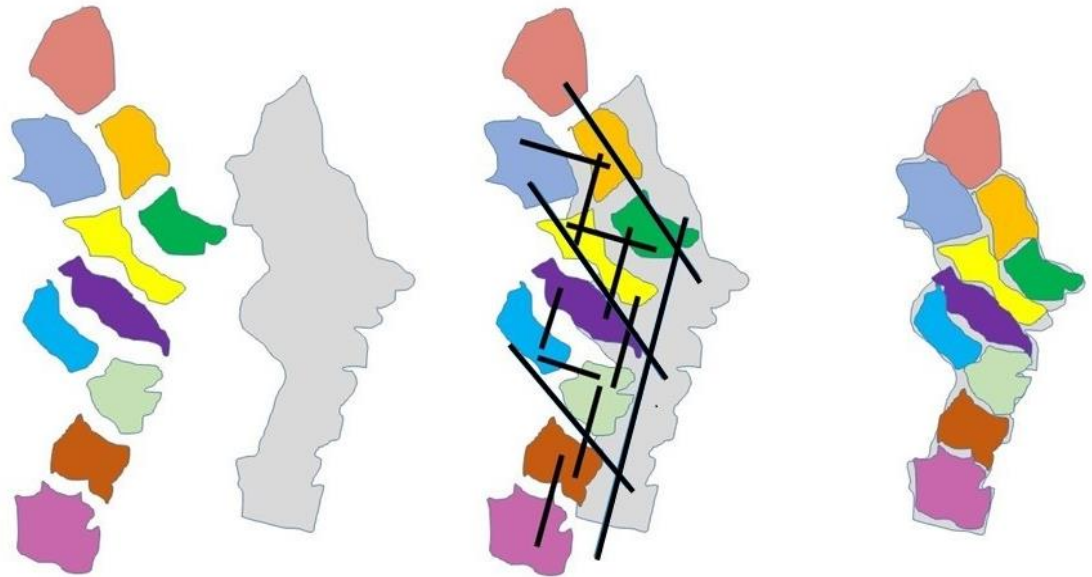


AN ALTERNATIVE FUTURE FOR THE COASTAL ZONE OF GEORGIA, USA

AN EXPERIMENT IN MULTI-SCALE AND MULTI-JURISDICTIONAL GEODESIGN DYNAMICS



April 20-21, 2016



INDEPENDENT ⇒ **RELATED** ⇒ **INTEGRATED**

Lupita McLenning, Hunter Key, Georgia Coastal Regional Commission
 Rosanna Rivero, Alison Smith, Brian Orland, Jon Calabria, University of Georgia
 Ryan Perkl, University of Arizona
 Carl Steinitz, Hrishi Ballal, Tess Canfield, Geodesignhub.com



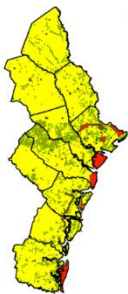
Day One Schedule

- 08:30 – 09:00** Set up and connect to Geodesignhub
- 09:00 – 09:45** Personal Introductions, Description of Study Area and Organization of Workshop
- 10:00 – 10:30** Geodesignhub tutorial
- 10:30 – 12:15** System teams make at least 10 diagrams of policies and projects
- 12:15 – 12:30** Form Change-design teams
- 12:30 – 13:30** Lunch
- 13:30 – 13 50** Geodesignhub tutorial
- 13:50 – 15:00** Create Decision model and Change design Version independently, assess Impacts
- 15:00 – 16:30** Create Change design Version 2, with negotiation as wanted, assess Impacts
- 16:30 – 17:30** Allocation of development by externally linked model

Day Two Schedule

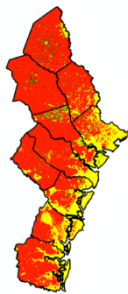
- 09:00 -- 10:00** Presentations of Change designs Version 2
- 10:00 – 12:30** Negotiate Change designs Version 3, in paired teams with similar Decision models: ECO, DEV, SOC and assess Impacts
- 12:30 -- 13:30** Lunch
- 13:30 -- 16:00** Publically negotiate among ECO, DEV, SOC to make a final Change design Version 4
- 16:00 -- 17:00** Visualize in 3-D
- 17:00 – 17:30** Discussion
- END**

The Ten Systems Teams Products



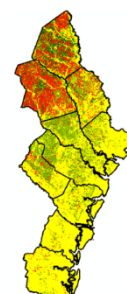
ic/02 - Historic/Cultural Protection			
System 2	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group A</p> <p>Look red things that should be protected</p> <p>Look green things that should be protected</p> <p>Look orange things that should be protected</p> <p>Look yellow things that should be protected</p> <p>Look purple things that should be protected</p> <p>Look blue things that should be protected</p> <p>Look pink things that should be protected</p> <p>Look brown things that should be protected</p> <p>Look grey things that should be protected</p> <p>Look white things that should be protected</p>	Alan	Alison/Hannah	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

HISTORY AND CULTURE



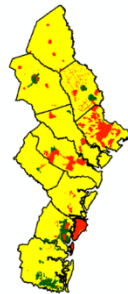
ry03 - Forestry			
System 3	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group A</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p>	Alan	Alison/Hannah	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

FORESTRY



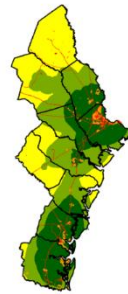
lty04 - Agriculture			
System 4	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group A</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p>	Alan	Alison/Hannah	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

AGRICULTURE



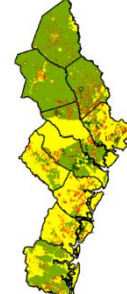
3S05 - Utilities			
System 5	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group B</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p> <p>Look of this as an attractiveness model for commercial forestry, based on commercial feasibility and capability</p>	Alan	Alison	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

UTILITIES



Jor06 - Transportation (port, ships, air, roads and trucks)			
System 6	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group B</p> <p>Identify areas of increased connectivity between industrial and high density commercial and employment centres and areas suitable for multimodal and other transportation modes/tracks</p> <p>Identify areas of increased connectivity between industrial and high density commercial and employment centres and areas suitable for multimodal and other transportation modes/tracks</p> <p>Identify areas of increased connectivity between industrial and high density commercial and employment centres and areas suitable for multimodal and other transportation modes/tracks</p>	Rosalee / Jack Crowley	Rosalee	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

TRANSPORTATION



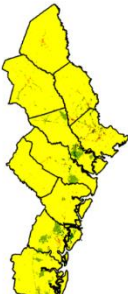
De07 - Housing - Lower density			
System 7	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group C</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p>	Alan	Alison	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

HOUSING, LOWER DENSITY



rD08 - Housing - Higher density			
System 8	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group C</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p>	Alan	Alison	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

HOUSING, HIGHER DENSITY



er09 - Commerce			
System 9	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group C</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p>	Alan	Alison	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

COMMERCE



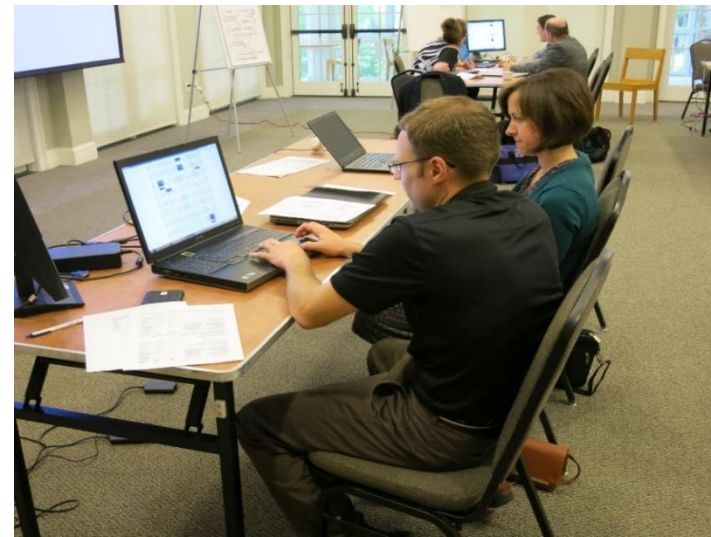
ry10 - Industry			
System 10	Contact / Expert Name	Map Maker	
<p>Description of Evaluation: Group C</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p> <p>Identify areas of high suitability for agriculture</p>	Alan	Alison	
<p>Most Appropriate for Change</p> <p>Possible Change</p> <p>Possible Protect</p> <p>Most Appropriate for Protection</p>			

INDUSTRY

**MAKING DIAGRAMS
OF POLICIES AND
PROJECTS TO
IMPROVE EACH OF
THE TEN
SYSTEMS**



[https://www.
geodesignhub.com/p/
join/vn/](https://www.geodesignhub.com/p/join/vn/)



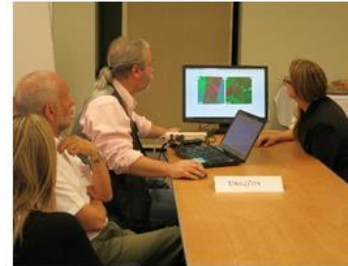
MAKING POLICY AND PROJECT DIAGRAMS

» 30	» 30	» 30	» 30	» 30	» 30	» 30
» 31	» 31	» 31	» 31	» 31	» 31	» 31
» 32	» 32	» 32	» 32	» 32	» 32	» 32
» 33	» 33	» 33	» 33	» 33	» 33	» 33
» 34	» 34	» 34	» 34	» 34	» 34	» 34
» 35	» 35	» 35	» 35	» 35	» 35	» 35
» 36	» 36	» 36	» 36	» 36	» 36	» 36
» 36	» 36	» 36	» 36	» 36	» 36	» 36

TEN COUNTY TEAMS MAKING VERSIONS 1 AND 2 OF THE CHANGE DESIGNS



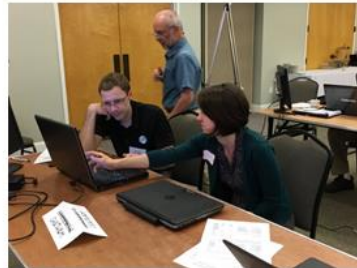
Long



Bryan



McIntosh



Chatham



Camden



Liberty



Bulloch



Glynn



Screven



Effingham

VERSIONS 1 AND 2 OF THE CHANGE DESIGNS

Note how different the Decision models and the Change designs are.



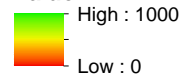
END OF DAY 1 OF THE WORKSHOP

**COMPARING
IMPACTS ON
CORRIDOR
CONTINUITY
IN THE GREEN
INFRASTRUCTURE**

Cost Surface

Landscape Permeability

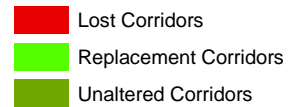
Value



Corridors

Corridor Change

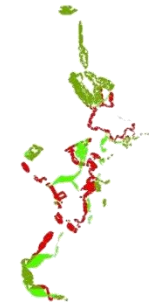
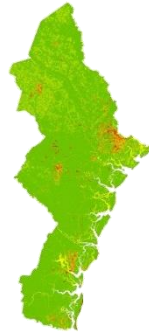
Status



Benchmark

Regional
Development

Regional
Conservation



Ryan Perkl,
University of Arizona

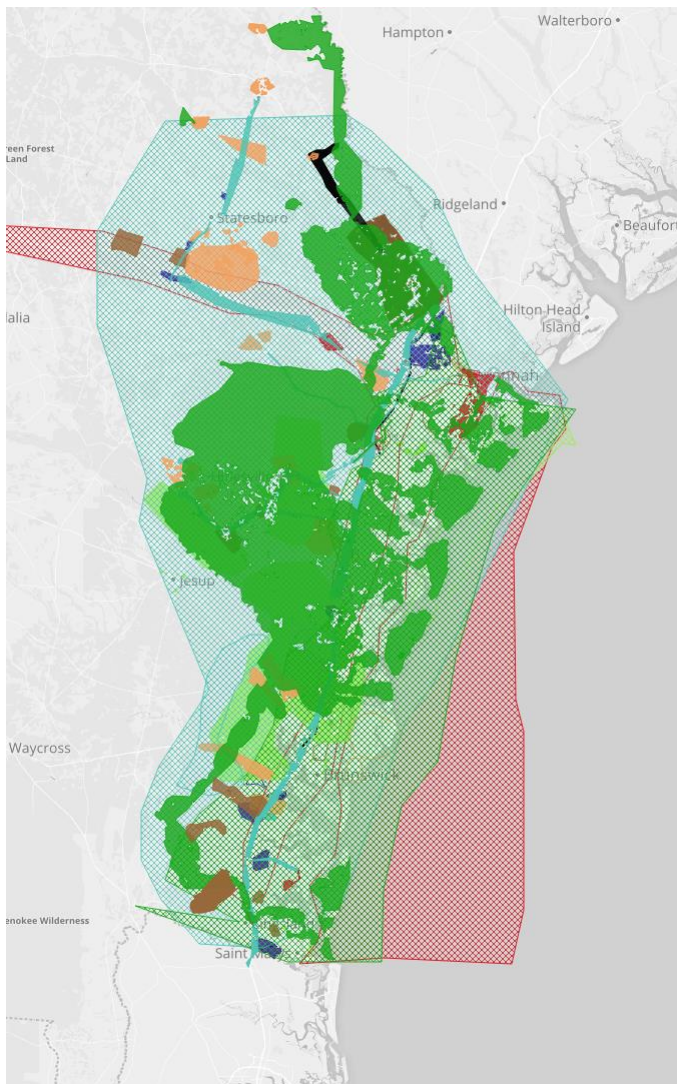
**NEGOTIATION
BETWEEN
REGCON AND REGDEV**



**RESULT OF
NEGOTIATION
BETWEEN
REGCON AND REGDEV**

**AND THE NEED TO
NEGOTIATE WITH
THE TEN COUNTY
CHANGE TEAMS**

GRNFR ■ HISCUL ■ FOR ■ AG ■ UTIL ■ TRANS ■ LDH ■ HDH ■ COM ■ IND ■

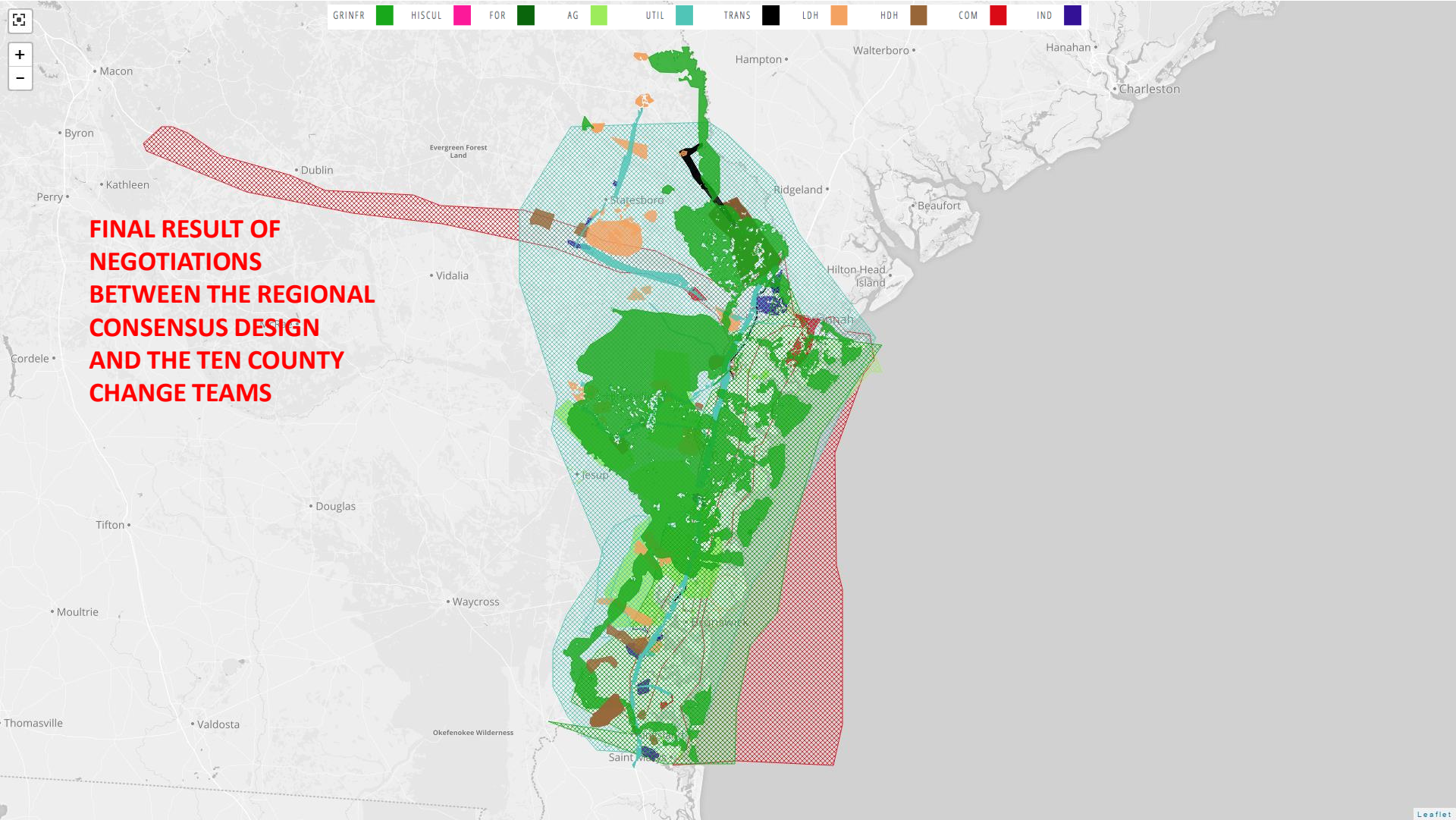


GEODESIGNHUB DESIGN VERSION NAMES

TEAMS	FIRST DESIGN	END OF DAY 1	LAST/FINAL DESIGN
	v1	v2	v3
① BRYAN	Bryan Cty v1	Bryan Cty v2	Bryan Cty v5
② BULLOCH	Bulloch Design	Bulloch County v1	Bulloch County v1
③ CAMDEN	Camden v1	Camden v2	Camden v3
④ CHATHAM	Green Infra 1	Chatham v1	Conserv Final
⑤ EFFINGHAM	Effingham v1	Effingham 2	Effingham v5
⑥ GLYNN	First design	Second design	Glynn 9
⑦ LIBERTY	LIBERTY v1	LIBERTY v2	LIBERTY v4
⑧ LONG	Long v1	Long v2	Long v3
⑨ MCINTOSH	McIntosh v1	McIntosh v3	McIntosh v4
⑩ SCREEN	3.1	3.6	v6.1
⑪ REG. CON	REGCON v1	REGCON v2	REGCON v14
⑫ REG. DEV	REGDEV v1	REGDEV v2	REGDEV v4



**NEGOTIATION
WITH COUNTY
TEAMS**



**FINAL RESULT OF
NEGOTIATIONS
BETWEEN THE REGIONAL
CONSENSUS DESIGN
AND THE TEN COUNTY
CHANGE TEAMS**

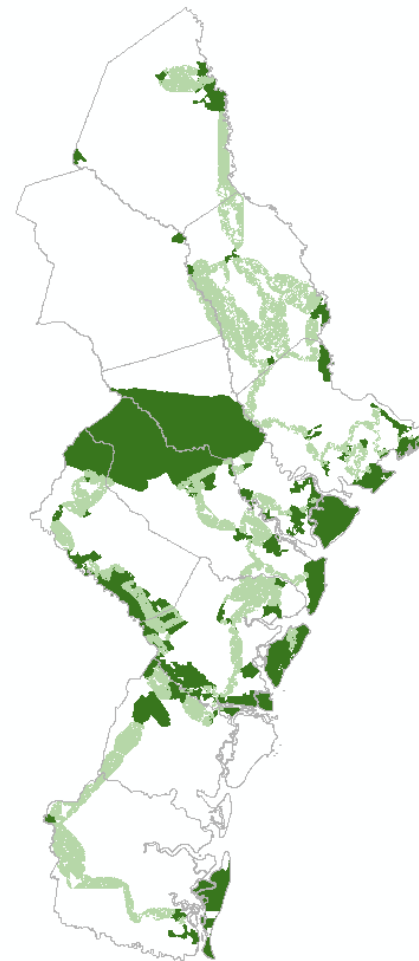
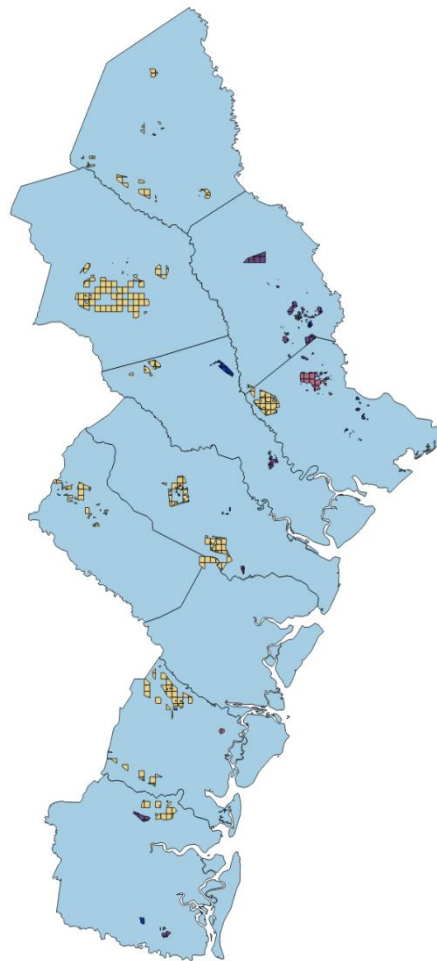
GRINFR  HISCUL  FOR  AG  UTIL  TRANS  LDH  HDH  COM  IND 

Layers Panel

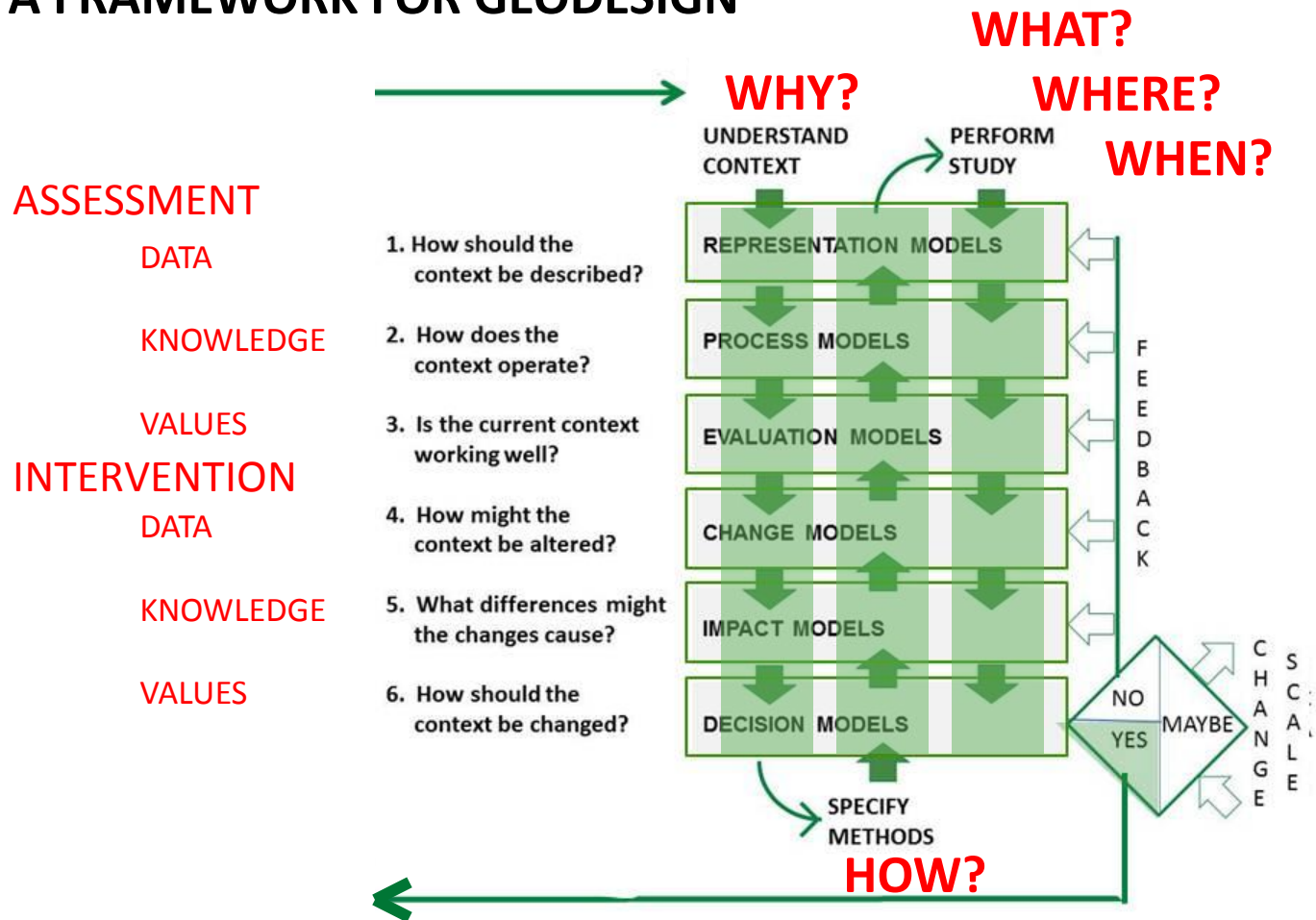
- Commerce-op OGRGeoJSON Polygon
- HD Housing-op OGRGeoJSON Polygon
- Industry-op OGRGeoJSON Polygon
- LD Housing-op OGRGeoJSON Polygon
- county-boundaries-simplified OGRGeoJSON MultiPolygon

**REGIONAL
URBAN LAND USES
ALLOCATION BASED ON
THE FINAL RESULT
OF NEGOTIATIONS
BETWEEN THE REGIONAL
CONSENSUS DESIGN
AND THE TEN COUNTY
CHANGE TEAMS
by the exogenous
Geodesignhub
allocation model**

**BASELINE CONTINUITY CORRIDORS
OF GREEN INFRASTRUCTURE
by the exogenous
landscape structure model of
Ryan Perkl, University of Arizona**



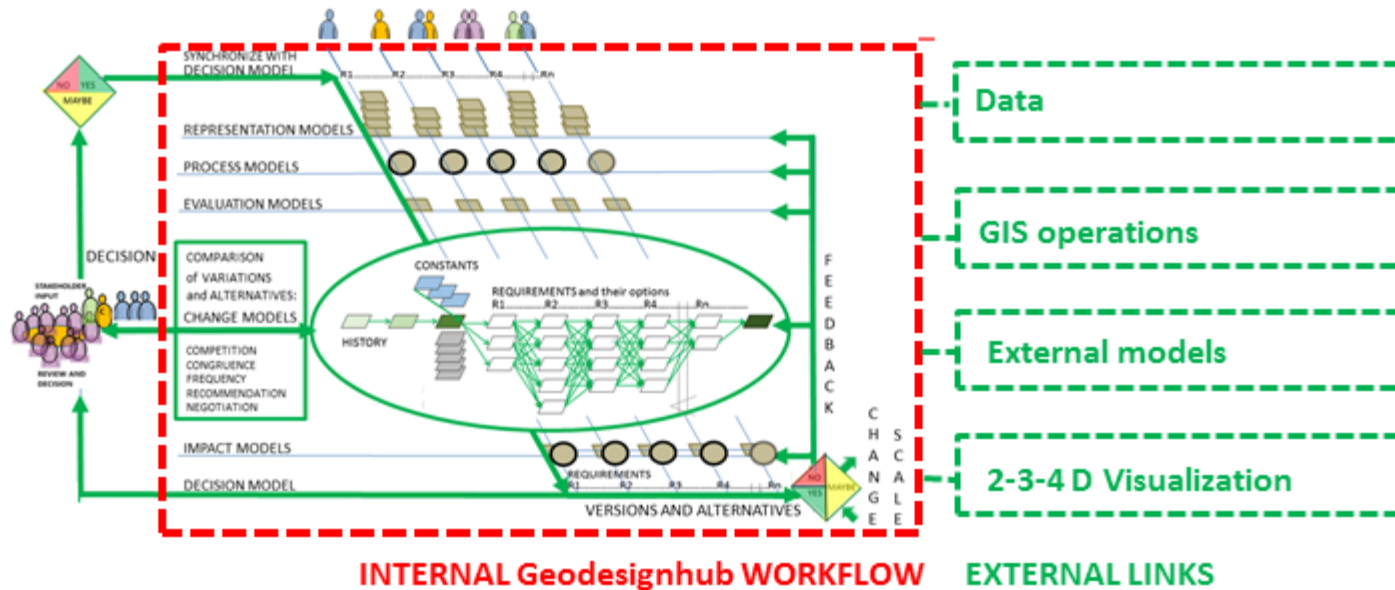
A FRAMEWORK FOR GEODESIGN



Steinitz, C., A Framework for Geodesign, Redlands California, Esri Press, 2012
<http://www.youtube.com/watch?v=rwZjeUCSqc0>

THE DYNAMICS OF GEODESIGN SUPPORT TECHNOLOGY

ALL ASPECTS OF GEODESIGN WORKFLOW ARE DYNAMIC
ALL UPDATE AND CHANGE AS THE DESIGN IS BEING MADE



Geodesignhub

THEREFORE, FOCUS ON SUPPORTING THE WORKFLOW AT BEGINNING AND DIAGRAMMATIC STAGES OF GEODESIGN
WHEN ALL ASPECTS OF THE GEODESIGN WORKFLOW ARE MOST DYNAMIC
AND ALL ASPECTS CAN RAPIDLY UPDATE AND/OR CHANGE AS THE DESIGN IS BEING MADE
AND....KEEP IT AS SIMPLE AS POSSIBLE: EASY TO LEARN, SET UP, USE, AND (MOST IMPORTANT) UNDERSTAND

“Diagram: a graphic that explains rather than represents; especially a drawing that shows arrangement and relations”

THE DYNAMICS OF DIAGRAMS

DRAWN POLICY DIAGRAMS
GIS-IMPORTED POLICY DIAGRAMS

DRAWN PROJECT DIAGRAMS
GIS-IMPORTED PROJECT DIAGRAMS

INITIAL EVALUATIONS



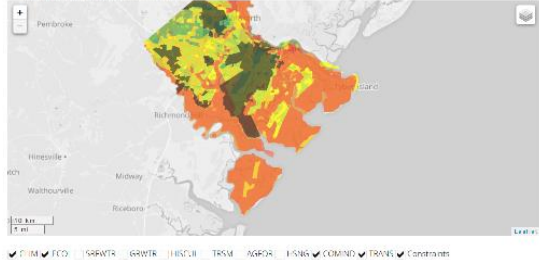
DYNAMIC EVALUATIONS



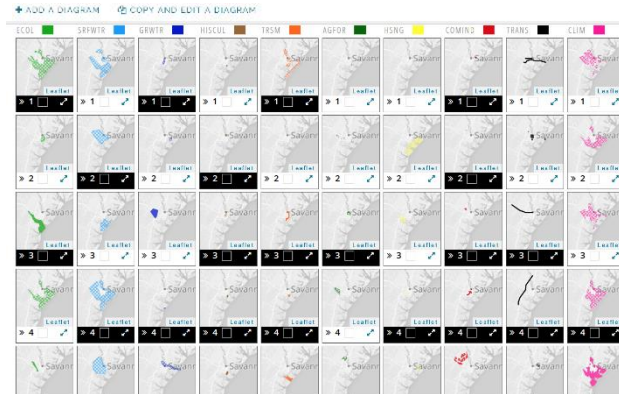
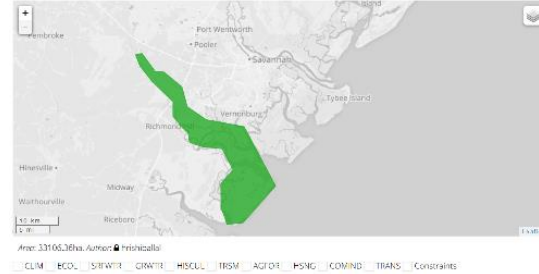
CONSTRAINTS



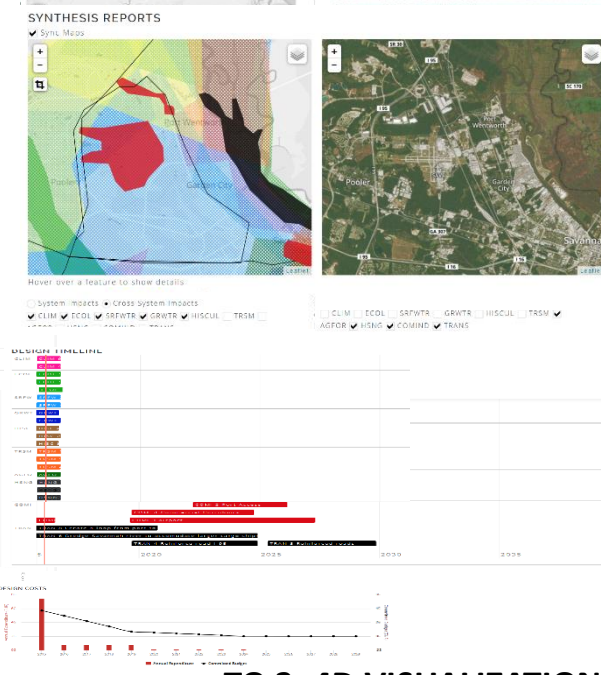
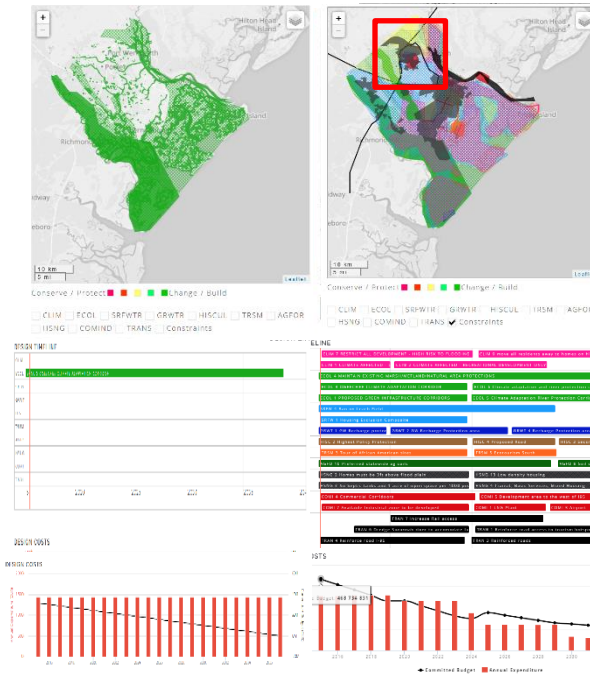
EVALUATION MODELS OVERLAIN



ECOL_3 OGECEEE CLIMATE ADAPTATION CORRIDOR



REPORT



TO 3- 4D VISUALIZATION

Geodesignhub

Website: www.geodesignhub.com

Support Portal and Consulting Services:
www.geodesignsupport.com

Support team email:
support@geodesignhub.com

