CommunityViz in Prince George's County: Scenario Planning and Beyond

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About Me

- Planner/architect with focus on analytical use of GIS
- At The Environmental Simulation Center, coordinated the 3 development teams involved with the first release of CommunityViz in 2001
- Have used CommunityViz on many projects across the country.
- Currently working for The Maryland-National Capital Parks & Planning Commission: Prince George's County
- Affiliate with The National Center for Smart Growth

What is CommunityViz?

- A GIS-based Planning Decision Support System
- Consists of two extensions for ArcGIS[®] Desktop
 - Scenario 360 Interactive analysis tools and a decision-making framework
 - Scenario 3D creates 3D scenes using underlying GIS data



CommunityViz is Designed and Known for Alternative Scenario Analyses...



... but by design it can do much more.

- The software has been supplemented with powerful functions and tools.
- Open and accessible framework makes it flexible , scalable, and customizable.
- Its many layers of functionality make it useful for a wide range of skill levels and applications.





Scenario 360 Components: Dynamic Attributes



- A Dynamic Attribute is an attribute that is automatically updated as changes are made in the analysis using the unique capabilities of Scenario 360.
- Think of it like you would think of a cell with a formula in Excel: when data that the cell formula references changes, the cell automatically updates

			NumberNewUnits	VewUnits
×	Image: Scenario Active (BuildOut 2005) Image: Biddouto_stay Image: Scenario Active (BuildOut 2005) Image: Scenario Active (BuildOut 2005)	=	9,230	3.026
	Dus/acre		1: Numt	berNewUnits

Scenario 360 Components: Assumptions ?

- An assumption is a user-defined variable that is used as input to an analysis.
- Assumptions can be referenced in any analysis formula. All analysis calculations that depend on an assumption value will be automatically recomputed if you modify that assumption value.
- Assumptions can be:
 - A numeric value within a valid range
 - A choice from a list
 - Boolean (Yes/No)

Assumptions	
Graphical Tabular	
Scenario Active (Existing Conditions) 🗸 🔽 🕞 😭 😭	e co
<u>New Dwelling Units</u> New Dwelling Units)0 dus
Distribution Method 🔞 Forecast 🗸	
Implement SB236 💽 💿 Yes 🔿 No	

Scenario 360 Components: Indicators



- Indicators are similar to the field "Statistics" command in ArcGIS except much more powerful.
- Unlike statistics, Indicator values are automatically recalculated as you experiment with alternatives and can be displayed in a chart or a table.

Scer	Estimated (nario 360 - I	Capacity Dynamic Update			Sup D	oply an evelope	d Demand d Centers
Indicators			^{xx}	L	20,000 18,000 16,000	17,405	13 143 13 144
Indicator	Units	Existing Conditions	*		14,000		13,143
ERROR - Supply	dus	0	=		≌ 10.000-	_	
Allocation - Developed Centers	dus	13,144			8 000		
Allocation - Developed NonCenter	dus	10,775		_	6,000		
Allocation - Developing Centers	dus	9,348			4,000		
Allocation - Developing NonCenter	dus	26,546			2,000		
Allocation - Priority Centers	dus	2,395			2,000-		
Allocation - Rural Tier	dus	1.113	-		0+	Supply	Demand Allocater

Prince George's County General Plan 2035 Update: **Scenario Analysis**

Many "Apps" along the way to get to the Scenario Analysis:

- Used CommunityViz to **clean up data**, fix existing dwelling unit counts.
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 - SUPPLY: Performed a **Buildout Analysis** to determine remaining development capacity under current zoning
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 - Created dozens of **indicators** to measure impacts of different scenarios

Using CommunityViz for Data Generation and Clean-up: Prince George's County



Correct DUs by checking against Land Use and Building Footprints

- Check for habitable building footprints on the parcel.
- Correct DUs
 - If Land Use is NOT residential, then "0" DUs.
 - If there is no building footprint, then "0" DUs.
 - If Land Use is residential and no DUs are shown, estimate DUs by dividing building area by "per-unit" square feet.

...But there was no Land Use data!

The SDAT has five sources for Land Use... ... all different



Needed a system that can handle many different categories at different levels of detail

Using APA's Land-Based Classification System to "Normalize" Land Use Data

M-NCPPC Planning Department > User Groups > Planning Technology > BPRUC Table BPRUC Table

The	The Bureau of Public Roads Use Codes (BPRUC) from the State Department of Assessment and Taxation with their corresponding LBCS Codes.				
Ne	w - Action	s • Settings •		View: All Ite	ems 🔹
U	BPRUC Code	BPRUC Description	LBCS Activity	LBCS Function	LBCS Structure
	10	RESIDENTIAL STRUCTURE/IMPROVEMENT ON COMMERCIAL OR INDUSTRIAL ZONED LAND	2000	9900	1110
	20	RESIDENCE ON COMMERCIAL OR INDUSTRIAL ZONED LAND THAT RECEIVES REZONED REAL PROPERTY VALUATION	1100	9900	1100
	30	AGRICULTURAL, LLC	8100	9000	8000
	50	COMMON USE FACILITIES RECEIVING NO ASSESSMENT OR "ZERO VALUE"	1100	1100	9200
	60	PROPERTIES NON-LOCATABLE, NO VALUE	9200	9900	9200
	70	PROPERTY OWNED BY A COOPERATIVE CORPORATION.	1100	1100	1140
	1000	APARTMENTS	1100	1100	1200
	1400	SENIOR APARTMENT UNITS	1100	1200	1200
	1500	APARTMENTS, GARDEN	1100	1100	1200
	1550	APARTMENTS, HI RISE	1100	1100	1200
	1600	APARTMENTS, TOWNHOUSE	1100	1100	1140
	1650	APARTMENTS, MIXED	1100	1100	1200
	1800	APARTMENTS-SUBSIDIZED	1100	1100	1200
	1842	SUBSIDIZED HOUSING SECTION 42, W/LIHTC	1100	1100	1200
	3500	TRAILER PARK	1100	1100	1150
	4000	HOTEL	1200	1330	1330
	4200	HOTEL-EXTENDED STAY	1200	1330	1330
	5000	MOTEL	1200	1330	1330

Assign custom Land Use categories

LAND USE	LBCS Activity	LBCS Structure
Agricultural - Natural Resources	8 000's	-
Residential - Other	1000's	-
Residential - Single Family	1000's	1110
Residential - Attached	1000's	1120
Residential - Townhouse	1000's	1140
Residential - Multi-family	1000's	1200
Mixed Use	1999	2300, 2400
Commercial Commercial	2000 - 2300	-
Office ←	2300's	-
Industrial		-
Institutional	4000's	-
Mass Assembly	6000's	-
Transportation and Utilities	5000's	-
Parks and Open Space	7000's	-
Unsubdivided		-
Vacant - Subdivided		9000

The Property Info Land Use Layer



Correct Dwelling Unit Counts



Perspective: 75 Years of Growth



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CommunityViz Build-Out Wizard

NAVIGATOR	Welcome to the Build-Out Wizard Setup a new build-out analysis, or edit or run a previously set up build-out analysis.		
Welcome			
Numeric Build-Out			
Specify Land-Use Layer >>	Numeric build-out is the first step in the build-out analysis process and must be run before you can run		
Density Rules >>	spatial build-out. Similarly, you must run spatial build-out in order to run visual build-out.		
Mixed-Use Designations >>			
Mixed-Use Buildings >>			
Mixed-Use Land Area >>			
Efficiency >>			
Building Information >>	Numeric Provides as estimated building essentia, (in such as) for each solution is a lower		
Constraints to Development >>	Numeric Provides an estimated building capacity (in numbers) for each polygon in a layer.		
Existing Buildings >>			
End of Numeric Phase >>	Spatial Places buildings on a 2D map.		
Spatial Build-Out			
Spatial Layout >>	Visual Associates spatial build-out building points with three-dimensional models.		
Spatial Buildings >>			
End of Spatial Phase >>	Finish Run one or more previously set up build-out analyses.		
Visual Build-Out >>			
Finish	More information on build-out analyses		
2	< Back Next > Cancel		

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20

Remaining Development Capacity



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Plan 2035 Alternative Future Scenarios

1. Grow Primarily in Greenfields

- Scenario 1a: Grow in all centers*; or
- Scenario 1b: Prioritize growth in several centers (possibilities: Konterra, Westphalia, Largo)

2. Mix of Greenfields and Infill/Redevelopment

- Scenario 2a: Grow in all centers; or
- Scenario 2b: Prioritize growth in several centers (possibilities: Largo, Greenbelt, Branch, National Harbor)

3. Grow Primarily through Infill and Redevelopment

- Scenario 3a: Grow in all centers; or
- Scenario 3b: Prioritize growth in several centers (possibilities: Greenbelt, Branch, Hyattsville, West Hyattsville, Landover Mall)

Creating Demand Scenario Dwelling Unit Distributions (%)

Assumptions				x
Graphical	Tabular			
Scenario Bu	isiness As Usua		B 🔅	¢2
Distribution	Method 🕅	Percentage		*
New Dwellin	q Units 🛛 🕅	0 63000 2000 Image: Constraint of the second	63,000 dus	
Percent Di Developed C	<u>Us in</u> Centers		12 percent	
Percent D Developed Nor	<u>Us in</u> n-centers		13 percent	
Percent D Developing (<u>Us in</u> Centers		4 percent	
Percent D Developing No	<u>Us in</u> n-centers		69 percent	
Percent DUs in	Rural Tier 🕅		2 percent	
Percent DUs i <u>Center</u>	n Priority 's		0 percent	Ŧ

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Suitability Wizard

- The Suitability Wizard "scores" features based on their suitability or desirability for a particular application.
- What parcels are best for building?
- What tracts most need protection?
- What locations are most likely to attract retail business?

🚳 Suitability Wizard - 'Suitability' in layer 'Grid_1000'	
Set up Suitability Factor Create or change a suitability factor.	EZ
Edit Suitability Factor	
Type a name for this suitability factor:	R_PROXIMITY
This will be used as the name of a new attribute in you	ur layer.
How the value of this factor is determined:	
Proximity to other features.	(1) Specify field:
Amount of overlap with another layer.	CENTERS_PROXIMITY3
Average value of underlying grid.	(2) Higher v scores result
From an existing numeric attribute.	from higher field values.
Where Condition	
No where condition exists	Add
3	< Back Next > Cancel

Suitability Score



Center Proximity

+ Greenfield Capacity

= Suitability

Preparing Data for the Allocation Wizard

- We have SUPPLY ,DEMAND, and SUITABILTY
- Now we can ALLOCATE









Mix - Greenfields & Infill





Infill & Redevelopment





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Land Consumption



Grid_1000 -Urban Land Forest Agricuture Other Land

Transit Choice





Households Served by Transit

by Number of Transit Options





Efficient Public Investment



1.04

1A

2Å

Critical Services per DU

ЗÅ





Scenario 360 has very useful report tools, but they tend to be fairly "wonky"



But Scenario 360 can also generate Excel tables and graphics that can be used by other platforms, like MetroQuest.



www.pgc.metroquest.com

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Progress:

A Few Simple "Apps"

Density Calculator

DUs/acres the "Old" way: Manually Click EVERY parcel and Add

	ustorn Identify Results			
	Layers: <top-most layer=""></top-most>	_ ● Identify O	Selection Save As Text Save As HTML	125
	- Property (2 features)	Location (1334014.15973848, 42979	2.705281927)	
			Value	
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			GlobalD	
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		SHAPE.LEN	1613.690668	RHL
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Prince George's		LAND_AREA_ACRE	5.14	
		LAND_AREA_SQFT	223898.4	41

DUs/acres the "Old" way: Manually Click EVERY parcel and Add

	Custom Identify Results			
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	⊡ Property (2 features)	Location (1334014.15973848, 42979)	2.705281927)	HTE I
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		SUBDIVISION_PLAT_DATE		[7]
		VEAR BUILT	1940	1114
		DWELLING_UNITS	0001	
		TRANSFER_DATE	19840706	RAT
		CONDO_PLAT_NUMBER	<null></null>	V777
1 - FIH//		CONDO_PHASE_NUMBER	<null></null>	KH4
		CONDO_BUILDING_NUMBER	<nul></nul>	티지선으
		CONDO_UNIT_NUMBER	<nul></nul>	IL KAT
		PARCEL	<null></null>	IF VLU
		TAXMAPGRID	080E4	
Prince George's			080	
			E4 🗸	42



A Few Simple "Apps"

Site Selection Tool

Set up four simple test variables:



A Few Simple "Apps"

A Massing Modeler

Scenario 360 – Generates 3D Models

Scenario 360 generates **parametric data** (data the describes physical characteristics) that can be used to generate 3D scenes with **Scenario 3D**, Google Earth, or ArcGIS 3D Analyst.



Scenario 3D



Scenario 3D



A Few Simple "Apps"

Distributed Overlays

Transferring Attributes from One Geographic Unit to Another



Transferring Attributes from One Geographic Unit to Another



Transferring Attributes from One Geographic Unit to Another



What are the steps without CommunityViz?

- Create a new intersection layer of the two layers A and B (Geoprocessing)
- Divide the area of the new shapes by the area of the original shape in layer A to get percentage overlap
- Multiply the original dwelling units by the percentage overlap to get the DUs that fall within the new shape
- Aggregate the intersection layer back into layer B

There's an easier way...

Edit Attribute Census_DUs_2010 in COG Traffic	: Analysis Zones
Edit Attribute Census_DUs_2010 Analysis Zones	in COG Traffic 🐑
Properties Formula Alerts	
Formula	
OverlapSum ([Attribute:Census Tracts 2010:TOTAL HOUSING UNITS 2010])	Formula Wizard
	Edit Formula
Execute formula	
When dynamic updates occur	
When the formula changes	
Dynamic updates are currently set to automatic. Ch cause all values for this attribute to be automatically <u>Click here to set analysis-wide dynamic updates to</u>	anges to the formula will recomputed. <u>manual.</u>
Update Now	OK Cancel

Hours of work in a few minutes...



Wrapping it up...

- It is an open framework that can be completely customized
- "Apps" can be built by more experienced users to be used by others with little experience with CommunityViz



- Large and complicated projects can be broken down into smaller manageable pieces, and tested independently from each other.
- CommunityViz is a sophisticated tool, but can be used for everyday in-house planning activities.

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