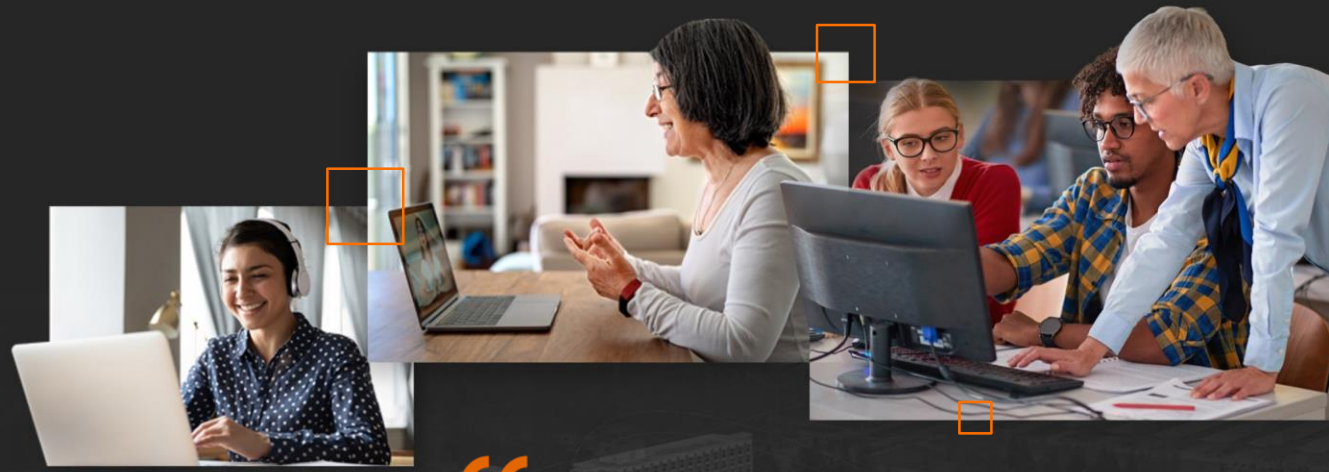
GIS in Urban & Regional Planning and Geodesign

Brian Baldwin – Esri
Keera Morrish – Esri
Dottie Dewey, Ph.D. – West Chester University
Shin Kue Ryu, Ph.D. – Idaho State University
James Sipes – Penn State University
Dan Meehan – Penn State University



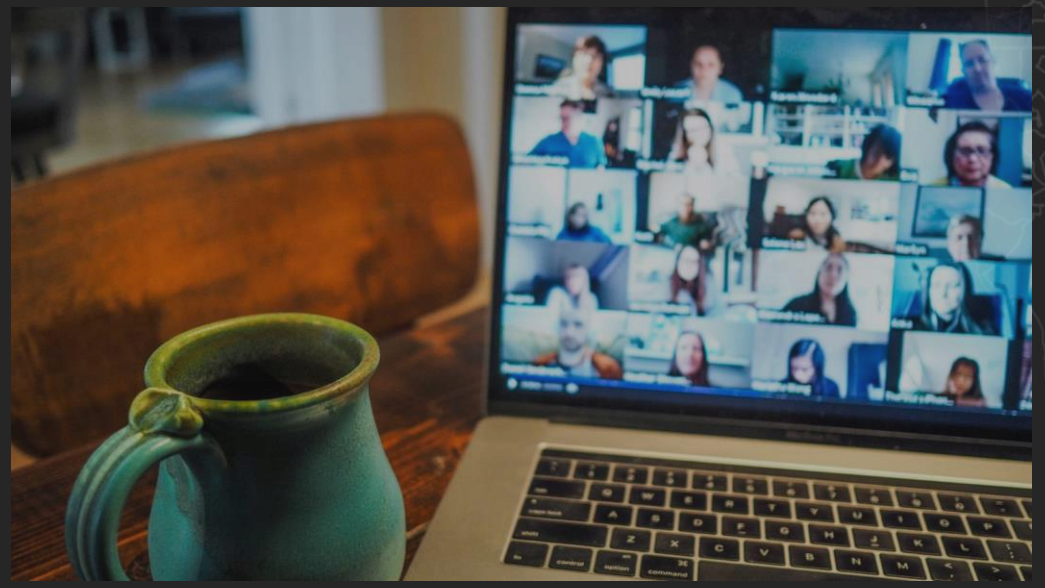
> The willingness to experiment with innovative approaches to GIS has yielded benefits for numerous field-based teaching and research activities across the university.
>
> – *Peter Knoop | University of Michigan*

Outline

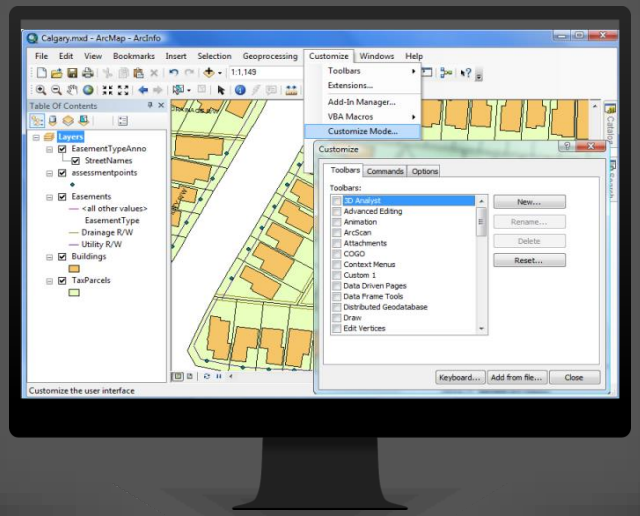
- Housekeeping
- Urban & Regional Planning and Geodesign support at Esri
- Educators
  - Dottie Dewey, Ph.D., Professor, West Chester University
  - Shin Kue Ryu, Ph.D., Assistant Professor, Idaho State University
  - James Sipes, Lecturer in Geodesign, Penn State University
  - Dan Meehan, Geodesign Program Manager, Penn State University
- Panel Q & A
- ArcGIS Urban Updates
- Audience Q&A

Webinar Housekeeping

- Please enter your questions in the chat box
- Microphones will be muted
- Q&A session at the conclusion of the webinar
- Webinar & slides will be available
- Survey following the webinar



GIS for planners?

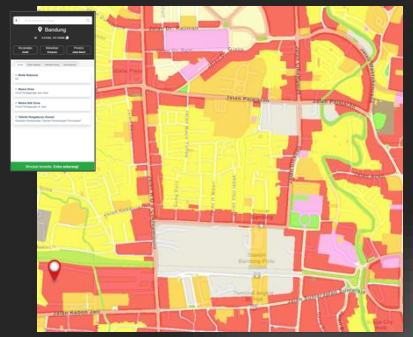


GIS today

Solar Performance

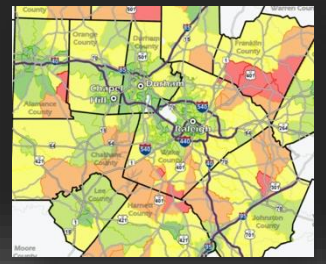
Boston

Interactive Community Planning



Indonesia

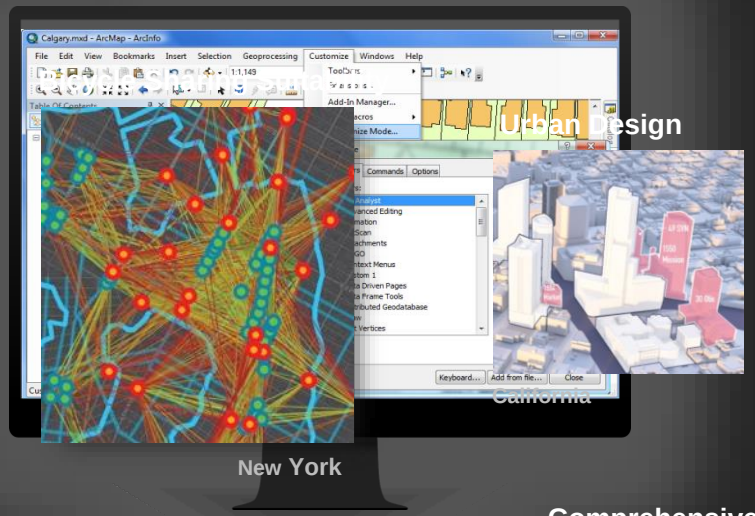
Average Commute Times



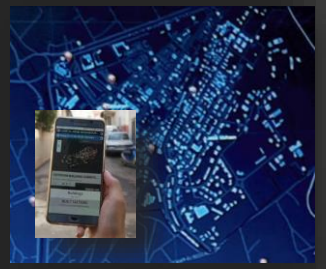
North Carolina

Scenario Planning

United Kingdom

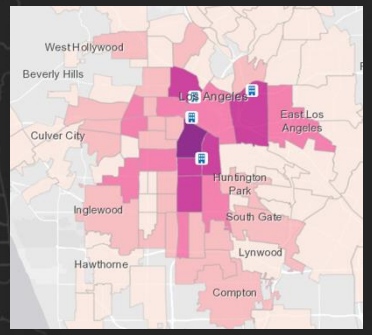


Disadvantaged Neighborhood Survey



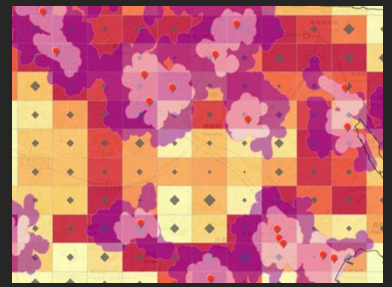
Lebanon

Racial and Ethnic Disparities



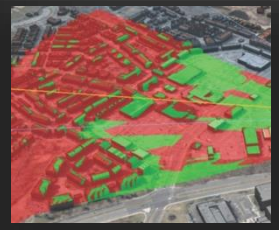
California

Grocery Store Accessibility



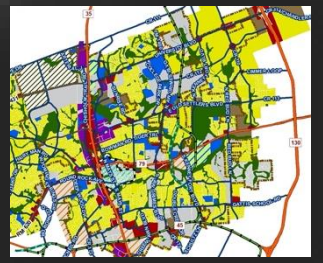
Japan

Viewshed Analysis



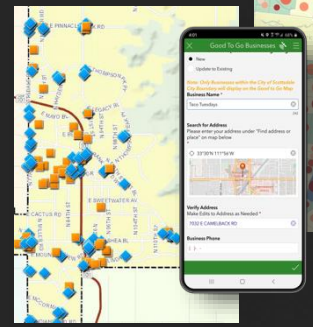
Maryland

Comprehensive Plan



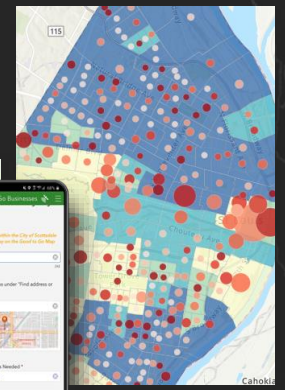
City of Round Rock Texas

Open for Business

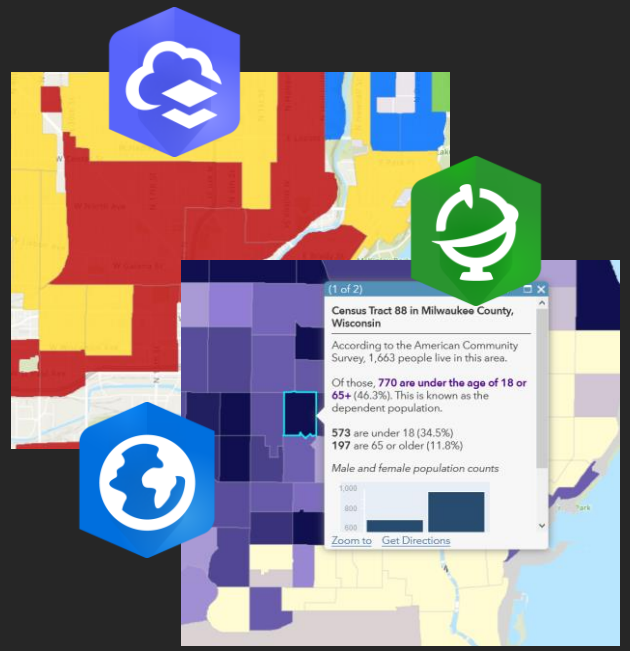


City of Scottsdale Arizona

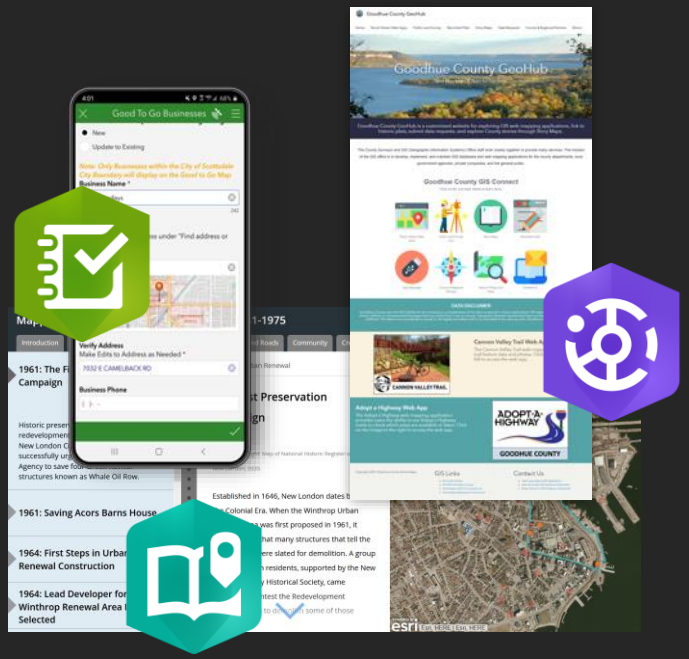
Business Loan & Grant Targeting



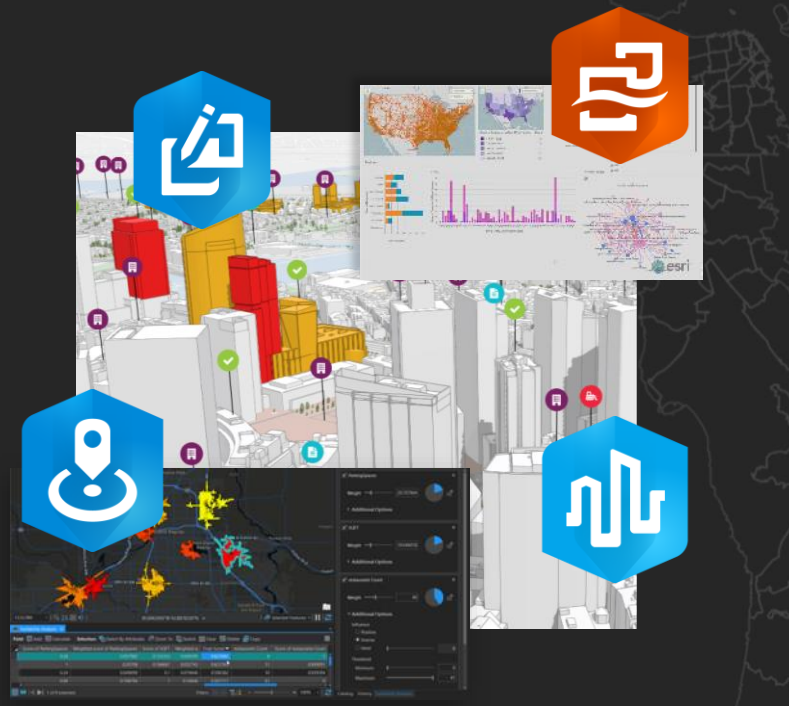
City of St. Louis Missouri



Data & Mapping



Public Engagement



Analysis & Design


Ways we can work with you.
Webinars
Highlight Successes
Networking
Technology Updates
Lectures
Data
Curriculum Resources
Community

Dottie Dewey, Ph.D.

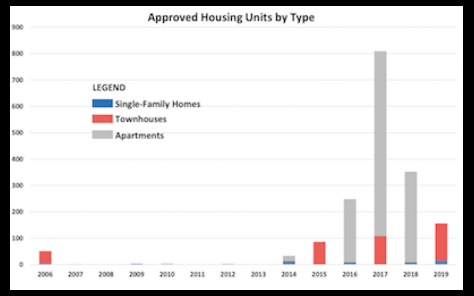
Professor, Department of Geography and Planning, West Chester University

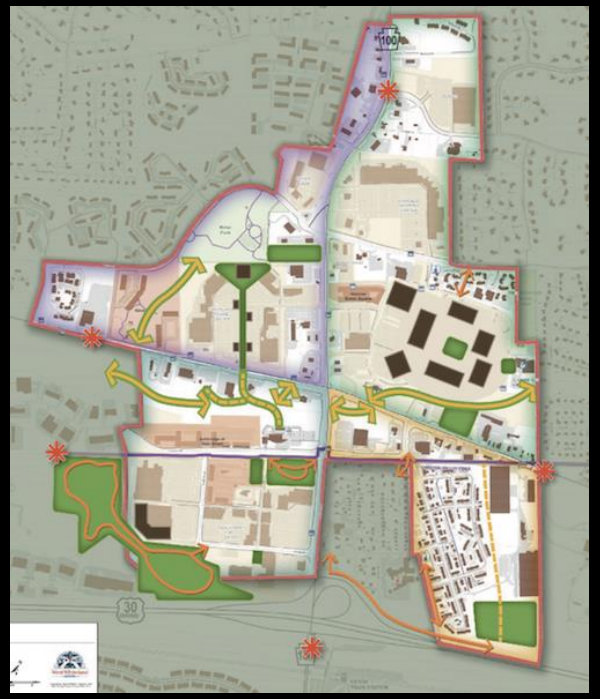
WCU
WEST CHESTER UNIVERSITY
Geography & Planning

Development by Design
WEST WHITELAND TOWNSHIP

Analysis, Visualization, and Engagement with ArcGIS Urban

- Community Viz
- City Engine
- Geo Planner
- City Engine VR (UnReal Engine)
- ArcGIS Urban



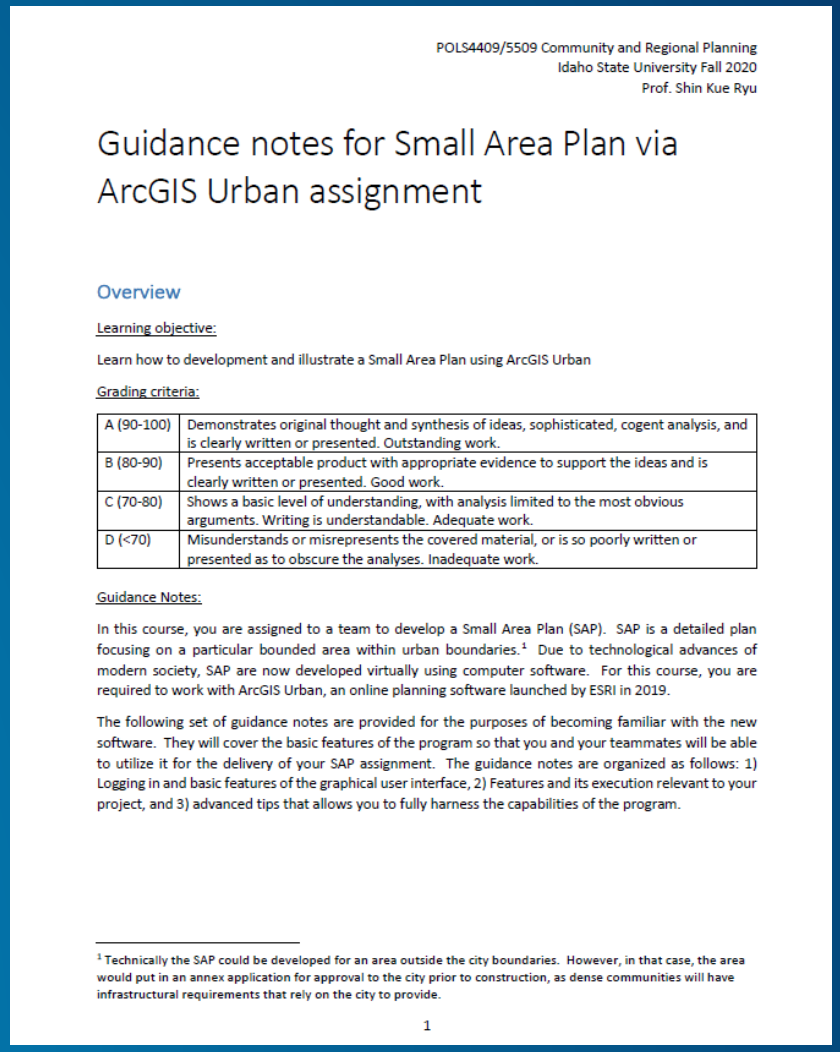


Shin Kue Ryu, Ph.D.

Assistant Professor, Department of Political Science, Idaho State University

Integrating ArcGIS into existing Community and Regional Planning course: Setup

- Integrated it into the Small Area Plan exercise
  - Due to its urban planning utility, it fit into this particularly curriculum discussion rather than the Areawide Land Policy Plan
- Write-up instructions
  - Because it is so new, students needed a written up guidance. Work with ESRI's team on this regards.
- Ensure that land use scenarios are disciplined within the broader Comprehensive Plan
  - Importance of the how the structure serves the local development vision and agenda



POLS4409/5509 Community and Regional Planning
Idaho State University Fall 2020
Prof. Shin Kue Ryu

Guidance notes for Small Area Plan via ArcGIS Urban assignment

Overview

Learning objective:

Learn how to development and illustrate a Small Area Plan using ArcGIS Urban

Grading criteria:

A (90-100)	Demonstrates original thought and synthesis of ideas, sophisticated, cogent analysis, and is clearly written or presented. Outstanding work.
B (80-90)	Presents acceptable product with appropriate evidence to support the ideas and is clearly written or presented. Good work.
C (70-80)	Shows a basic level of understanding, with analysis limited to the most obvious arguments. Writing is understandable. Adequate work.
D (<70)	Misunderstands or misrepresents the covered material, or is so poorly written or presented as to obscure the analyses. Inadequate work.

Guidance Notes:

In this course, you are assigned to a team to develop a Small Area Plan (SAP). SAP is a detailed plan focusing on a particular bounded area within urban boundaries.[1] Due to technological advances of modern society, SAP are now developed virtually using computer software. For this course, you are required to work with ArcGIS Urban, an online planning software launched by ESRI in 2019.

The following set of guidance notes are provided for the purposes of becoming familiar with the new software. They will cover the basic features of the program so that you and your teammates will be able to utilize it for the delivery of your SAP assignment. The guidance notes are organized as follows: 1) Logging in and basic features of the graphical user interface, 2) Features and its execution relevant to your project, and 3) advanced tips that allows you to fully harness the capabilities of the program.

[1] Technically the SAP could be developed for an area outside the city boundaries. However, in that case, the area would put in an annex application for approval to the city prior to construction, as dense communities will have infrastructural requirements that rely on the city to provide.

1


E Lawton St
E Logan St
S 5th Ave
2D

Integrating ArcGIS into existing Community and Regional Planning course: Experience and Lessons

- Receive parcel data from the county
  - May need cleaning
- 3D visualization of the city helps
  - Use to highlight contextualization, remove for speed during assignments
- Mapillary link helps contextualization
  - Useful for horizontal view. However, it is time intensive.
- More analytical spatial layers would enrich and refine scenario formulations
  - Analytical spatial layers help better policy design but labor intensive due to local customization
- Remind students, structure development is private sector initiative (in the US)
  - The scenario presentation needs to be tied with Government tools that are available to incentive such vision realization.

James Sipes

Lecturer in Geodesign, Department of Landscape Architecture, Penn State University

Dan Meehan

Geodesign Program Manager, Stuckeman School of Architecture and Landscape Architecture, Penn State University

Utica NY – Revitalizing a Rustbelt City
GEODZ 852 | LARCH 414

PennState
College of Arts
and Architecture

PENN STATE
GEODESIGN
GEODESIGN.PSU.EDU

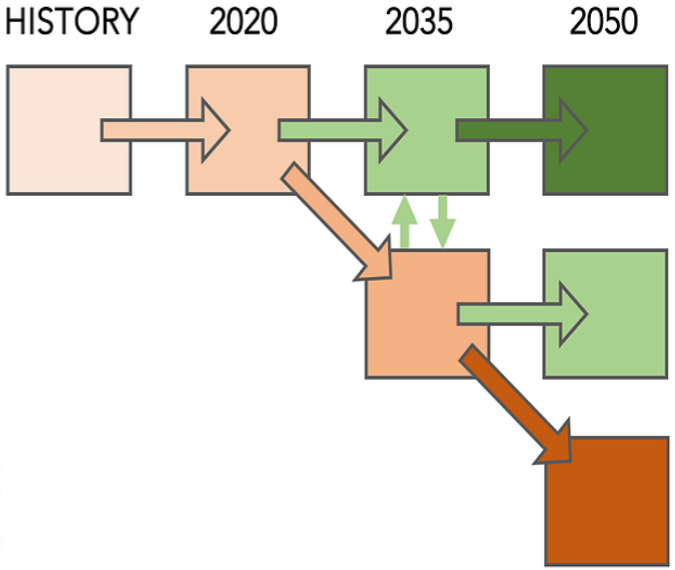
PEOPLE OF THE PLACE
DESIGN PROFESSIONS
GEOGRAPHIC SCIENCES
INFORMATION TECHNOLOGIES

IGC
INTERNATIONAL GEODESIGN COLLABORATION

Changing Geography by Design

- Over 150 Institutions involved
- Similar scales and similar systems
- Scenarios based on global assumptions and innovations
- Impacts on UN SDG

- Water Infrastructure
- Agriculture
- Green Infrastructure
- Energy Infrastructure
- Transport Infrastructure
- Industry and Commerce
- Institutional
- Residential, Mixed
- Flexible, e.g., Cultural/Historical
- Flexible, e.g., Desert, Mangrove



Scenario A
Early Adopter

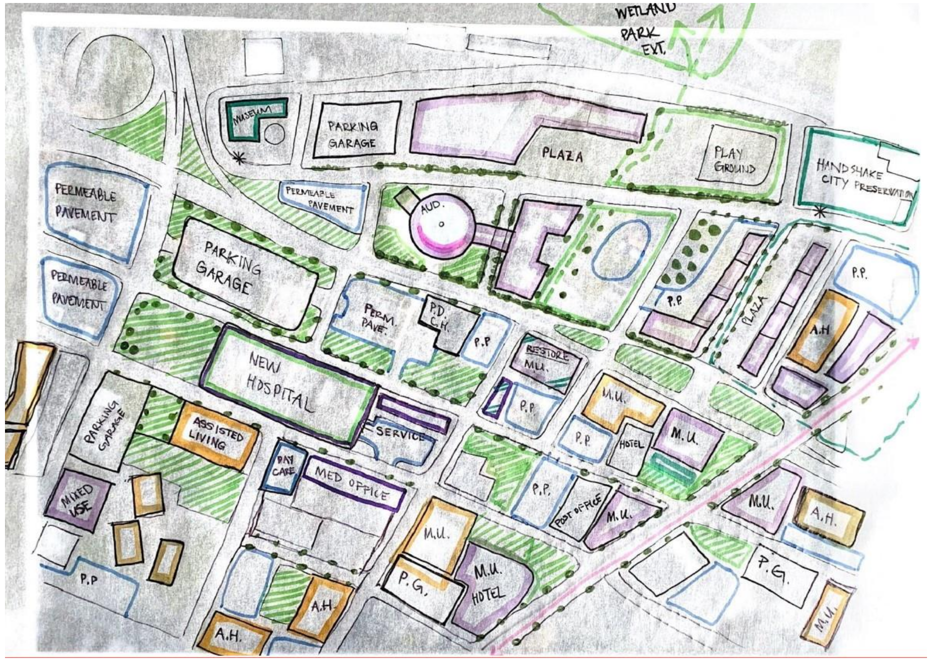
Scenario B
Late Adopter

Scenario C
Non-Adopter

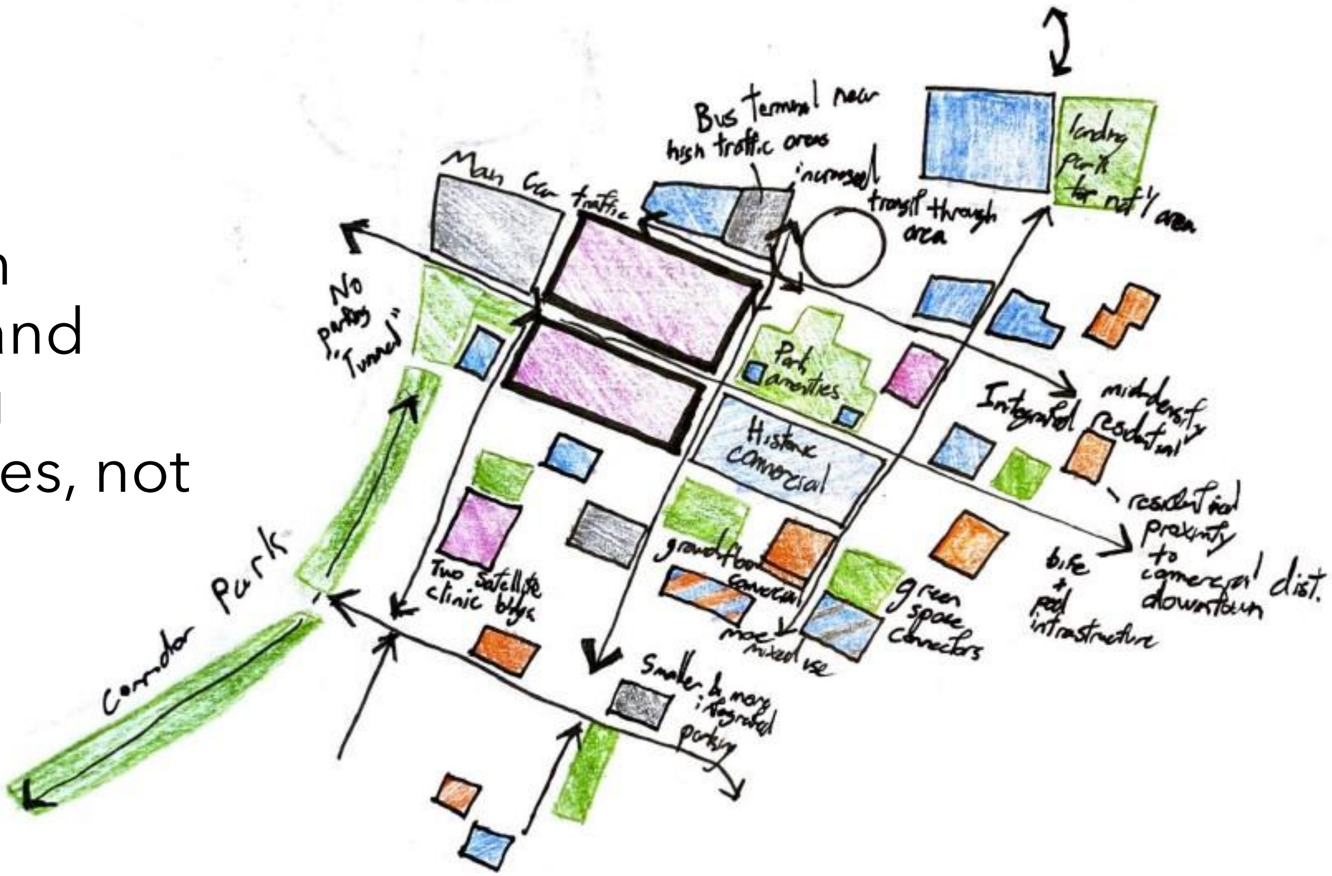
SUSTAINABLE DEVELOPMENT GOALS

Studio Format

Hand Drawn Sketches



Focus on Design and Planning Objectives, not Tools



Digital Tools

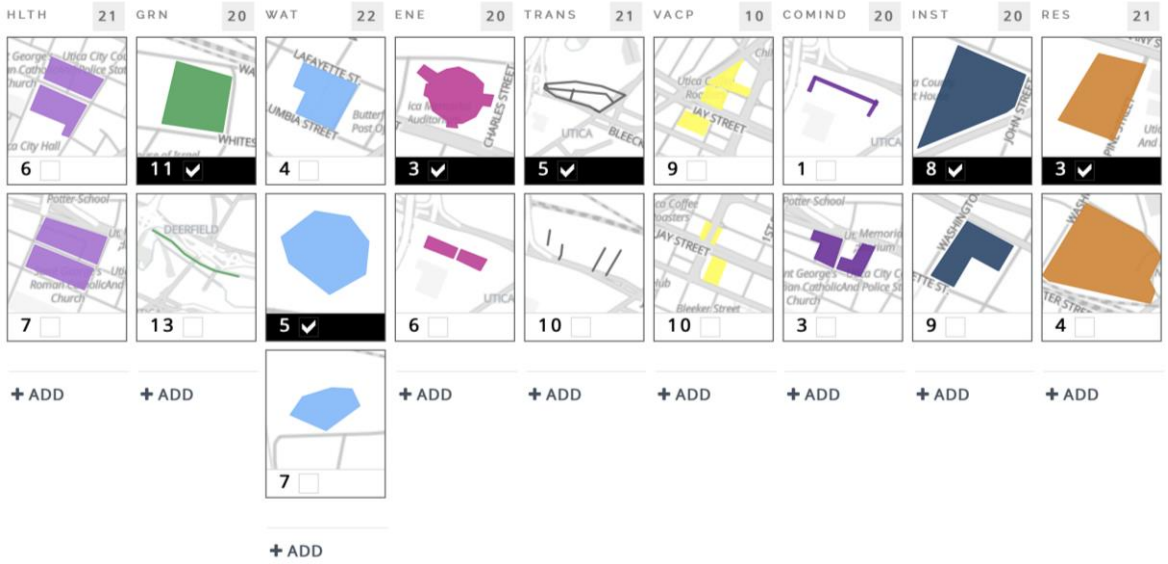
- Esri ArcPro
- Esri GeoPlanner
- Esri ArcUrban
- Geodesign Hub
- Esri Arc Online

Support Tools

- Sketchup
- InDesign
- Lumian
- Illustrator
- Photoshop

GEODESIGN HUB

- Research and Background
- Stakeholders/Values
- Diagrams of Priojects
- Proximity to Hospital



Comments from Residential Group

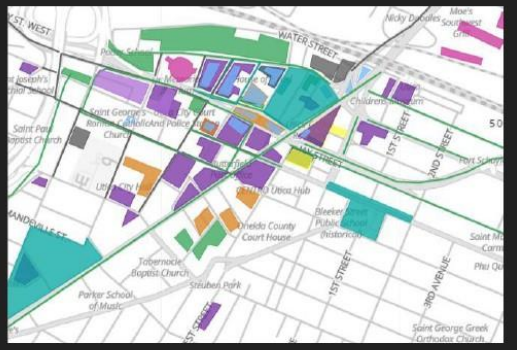
Comment 1

If you are concerned about creating a high density of residential and businesses, are there going to be more parking opportunities or expansion of mobility and/or public transit options?

We added parking garages in dense areas and will have sunken parking in mixed use buildings. Additionally we added transportation hubs and created a more walkable design

Comment 2

Prioritize the reestablishment of historic buildings. Older structures may be of interest to business owners.



We designated historic areas to protect and preserve, adding character to the city morphology and hoping to economically support the existing buildings

FINAL VERSION

Commercial system:
U district & affordable mixed-use development.

Historical system:
Upgrade historical buildings for retail—cultural programming and trails to celebrate historical character.

Institutional:
College expansion, fine arts facilities, community college. Job training center.

Transportation:
Commercial shared street system.

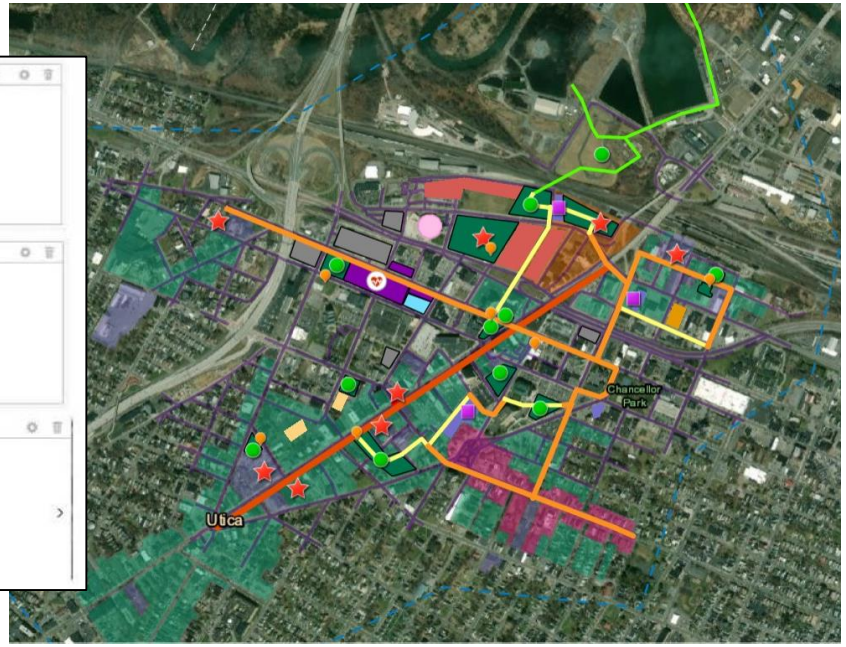
Health:
Unconventional healthcare campus.

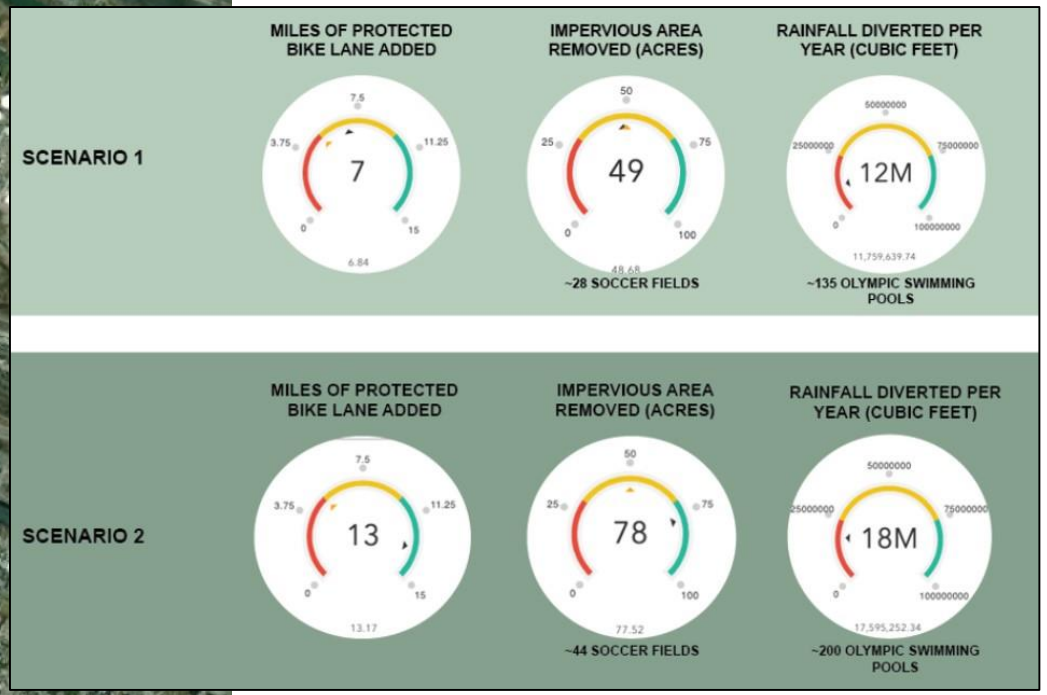
Green and water:
Wellness pocket parks + Constructed wetland park.

SYSTEM PRIORITIES

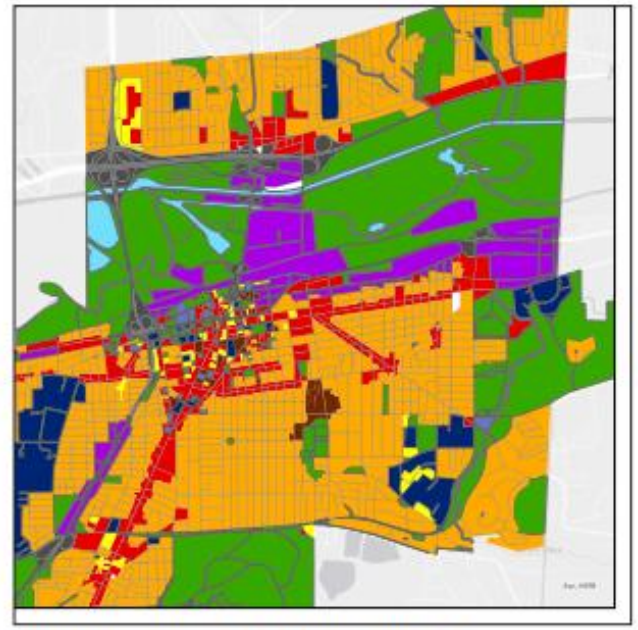
GeoPlanner

- Elaborate on Concepts, Metrics & feedback
- Present ideas Hospital Area

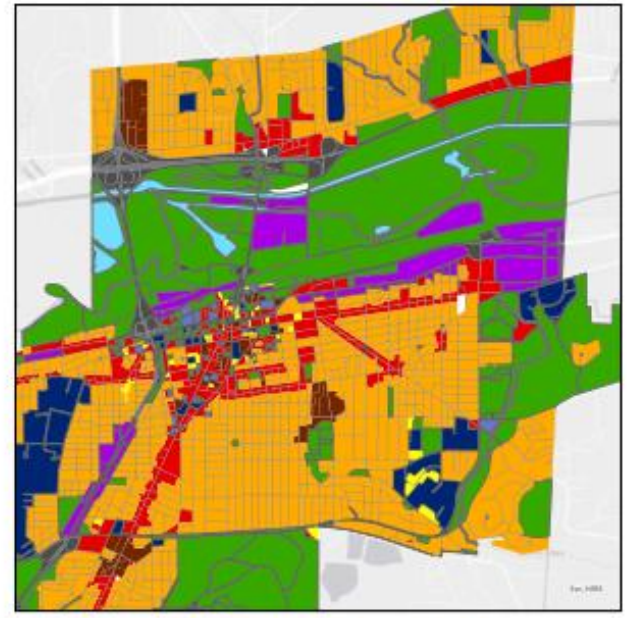




EXISTING 2020



EARLY ADOPTER 2035



EARLY ADOPTER 2050

PROJECT SURROUNDINGS

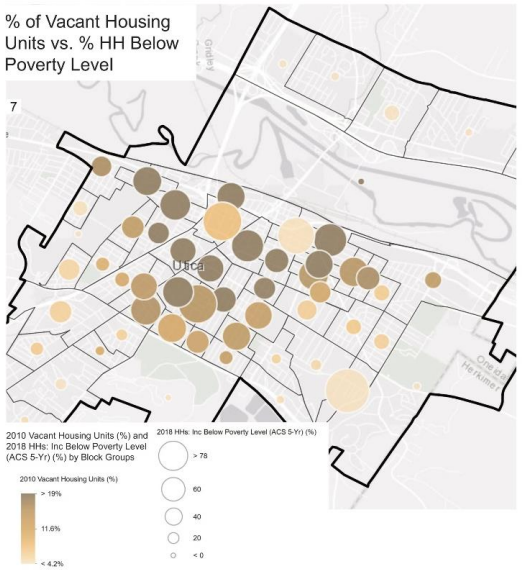
NON & LATE ADOPTER 2035

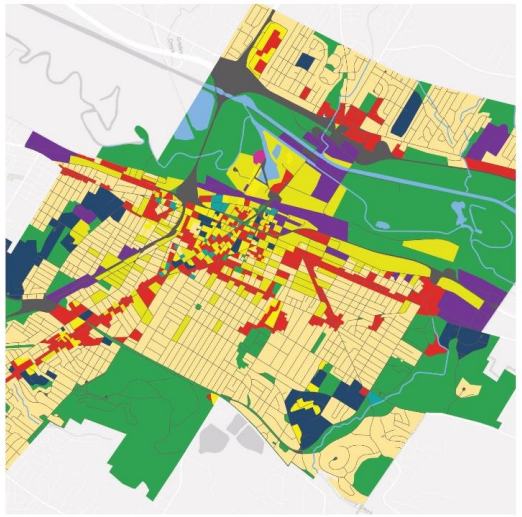
LATE ADOPTER 2050

Analysis Maps:

Unemployment vs. Pop Density

% of Vacant Housing Units vs. % HH Below Poverty Level





Non Adopter 2050

The photos above display vacancy and deserted parking lots along Lafayette St, close to the new MVHS hospital site.

Sustainable Development Goals
1: No Poverty
2: Zero Hunger
3: Good Health and Well-being
4: Quality Education
5: Gender Equality
6: Clean Water and Sanitation
7: Affordable and Clean Energy
8: Decent Work and Economic Growth
9: Industry, Innovation and Infrastructure
10: Reduced Inequality
11: Sustainable Cities and Communities
12: Responsible Consumption and Production
13: Climate Action
14: Life Below Water
15: Life on Land
16: Peace and Justice Strong Institutions
17: Partnerships to achieve the Goal
Most benefici / Bene-ficial / Neutral / Detri-mental / Most detrime

Early adopter

WAT	MIX	COM	GRN	ENE	TRAN	IND	INST	RES	HLTH	CUL	TOTAL
0	3	3	1	1	1	1	3	1	3	0	17
0	1	1	1	0	0	1	0	1	1	0	6
3	3	1	3	1	3	0	1	3	3	1	22
0	0	0	0	0	0	0	3	0	1	3	7
0	0	0	0	0	0	0	0	0	0	0	0
3	1	1	3	3	0	1	0	1	1	0	14
0	3	3	1	3	3	1	0	3	0	0	17
1	3	3	1	1	3	3	1	1	3	1	21
1	1	3	0	3	3	3	1	0	3	1	19
1	3	1	0	0	1	3	3	1	1	1	15
3	3	3	3	3	3	1	3	3	3	1	29
0	1	1	1	3	1	3	0	1	1	0	12
3	1	1	3	3	1	1	1	1	0	1	16
3	0	0	1	0	0	0	1	0	0	0	5
1	0	0	3	0	-1	-1	1	-1	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0
1	3	1	1	1	1	1	3	1	1	1	15
20	26	22	22	22	19	18	21	16	21	10	217

Late adopter

WAT	MIX	COM	GRN	ENE	TRAN	IND	INST	RES	HLTH	CUL	TOTAL
0	3	3	0	1	1	1	3	1	3	0	16
0	1	1	0	0	0	1	0	1	1	0	5
1	3	0	1	1	3	0	1	3	3	1	17
0	0	0	0	0	0	0	1	0	1	1	3
0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	0	1	0	1	1	0	8
0	1	1	1	3	3	1	0	3	0	0	13
1	3	3	0	1	3	3	1	1	3	1	20
0	1	1	0	3	3	3	1	0	3	1	16
1	3	1	0	0	1	-1	1	1	1	1	9
0	3	1	1	3	3	1	3	3	3	1	22
0	1	0	0	3	1	3	0	1	1	0	10
1	1	1	1	3	1	1	1	1	0	1	12
1	0	0	1	0	0	0	1	0	0	0	3
1	-1	0	1	0	-1	-1	1	-1	0	0	-1
0	0	0	0	0	0	0	0	0	0	0	0
1	3	1	1	1	1	3	1	1	1	1	15
8	23	14	8	20	19	14	17	16	21	8	168

Non-adopter

WAT	MIX	COM	GRN	ENE	TRAN	IND	INST	RES	HLTH	CUL	TOTAL
0	0	1	0	0	1	1	3	-1	1	0	6
0	0	1	0	0	0	1	0	0	1	0	3
0	0	0	-1	-1	-3	-3	1	1	3	1	-2
0	0	0	0	0	0	0	1	0	1	1	3
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	1	1	0	1	0	6
-3	0	-1	1	-3	-3	-3	0	-1	0	0	-13
0	0	1	0	1	1	1	1	0	1	0	6
0	0	1	0	-3	1	1	0	0	1	1	2
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-11
0	0	1	1	0	0	0	0	1	0	0	3
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0	0	3
1	0	0	1	0	0	0	1	0	0	0	3
1	0	0	1	0	-1	-1	1	-1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-11
-3	-2	3	3	-7	-6	-4	6	-2	7	1	-4

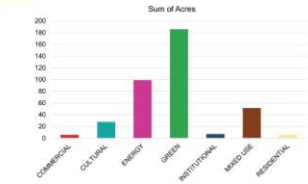
11 SUSTAINABLE CITIES AND COMMUNITIES · 3 GOOD HEALTH AND WELL-BEING · 8 DECENT WORK AND ECONOMIC GROWTH · 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 7 AFFORDABLE AND CLEAN ENERGY · 1 NO POVERTY · 13 CLIMATE ACTION · 10 REDUCED INEQUALITIES

New Residents profile and housing demands

Population Group	Age group	%	# People	Average household size	Dwelling Units
Millennials	22-34	60%	11,000	1.8	6,111
Immigrants	20-40	20%	2,000	3	667
Baby boomers	65-74	20%	2,000	1.8	1,111
TOTAL	-	100%	15,000	-	7,889

Graphic 1: Early Adopter Scenario 2050

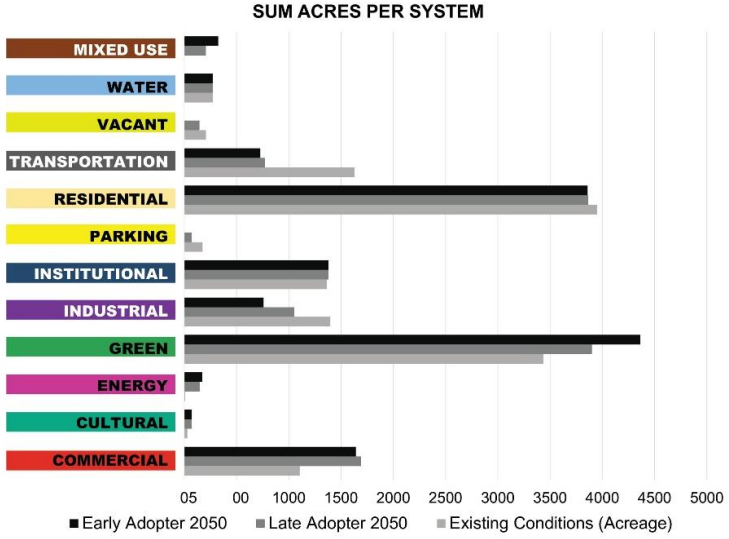
Allocation of change on existing (2020) **vacant & parking** sites



Co-benefits Analysis

Adopter Scenario	# Street Trees	#Park Trees	#Marsh Trees	# Total Trees	Carbon Sequestration Offset (# Households annual emissions)	Stormwater (Relative to # of Olympic Swimming pools retained)	Solar Power Projection (If harvesting solar energy in all COM + MIX parcels, # of Households Powered)
Existing	10,915	44,005	525,131	580,051	1,876	6,643	0
Late Adopter 2050	16,520	166,235	537,246	725,662	2,346	7,711	162,738
Early Adopter (EA) 2050	**21,798**	**176,638**	**658,193**	**856,629**	**2,770**	**8,437**	**168,589**
Increase % (EA)	**100%**	**301%**	**25%**	**48%**	**48%**	**27%**	-

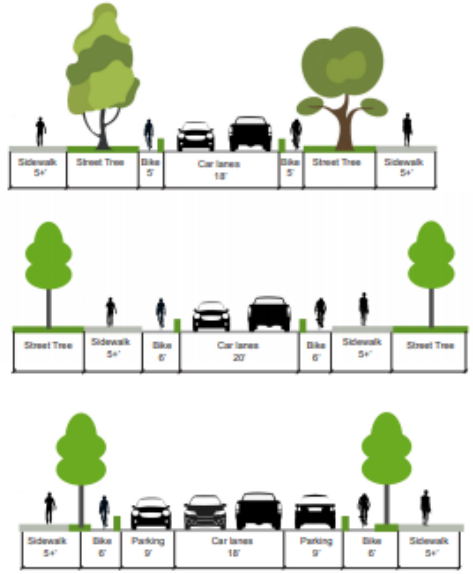
Graphic 2: IGC Systems vs. Scenarios



The Health Effects of Green Space

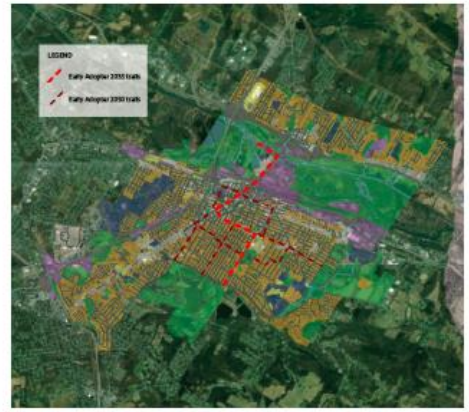
Often times, urban life is conducive to symptoms of negative wellbeing due to lack of accessible and adequate green space, such as chronic stress, exposure to pollutants and other environmental hazards, and most commonly, insufficient physical activity (WHO, 2017). However, providing green spaces for urban dwellers can promote a more positive mental and physical health. Accessing these green spaces while living in an urban environment can aid in "providing psychological relaxation and stress alleviation, stimulating social cohesion, supporting physical activity, and reducing exposure to air pollutants, noise and excessive heat" (WHO, 2017).

Green Street Typologies



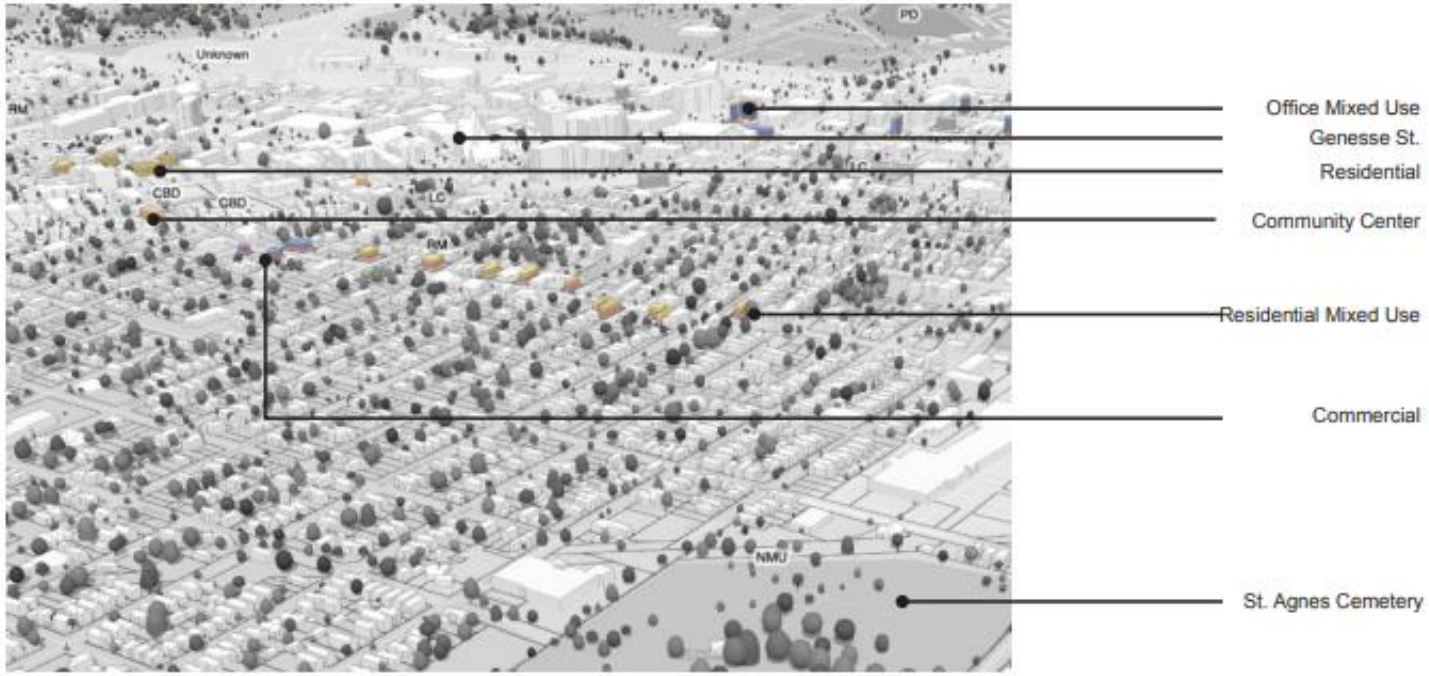
Street Trees

Trail Connectivity



Utica Green Street

Added Buildings



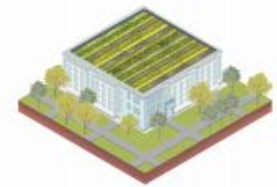
Utica Community Garden

Utica Prayer Garden

AGRICULTURAL TYPOLOGIES


RESIDENTIAL GARDENS


COMMUNITY GARDENS


GREENROOF AGRICULTURE


URBAN INTEGRATION

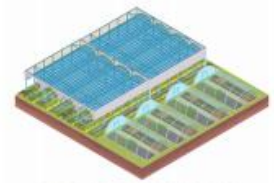

GREEN SPACE INTEGRATION

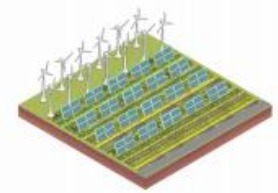

LOCALIZED MARKETS


COMPOST PROGRAMS


AGRITOURISM

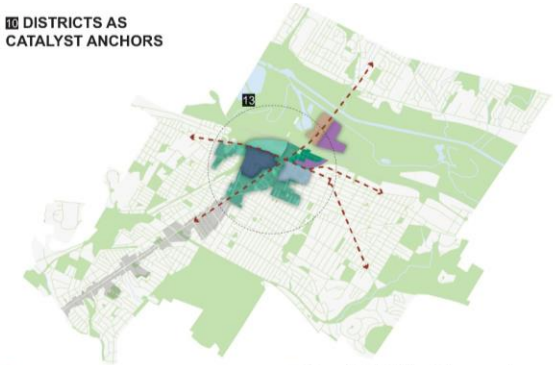

RESEARCH AND TECHNOLOGY


AGRICULTURE INDUSTRY


ENERY IMPLEMENTATION


NURSERY AND GRAZING

10 DISTRICTS AS CATALYST ANCHORS

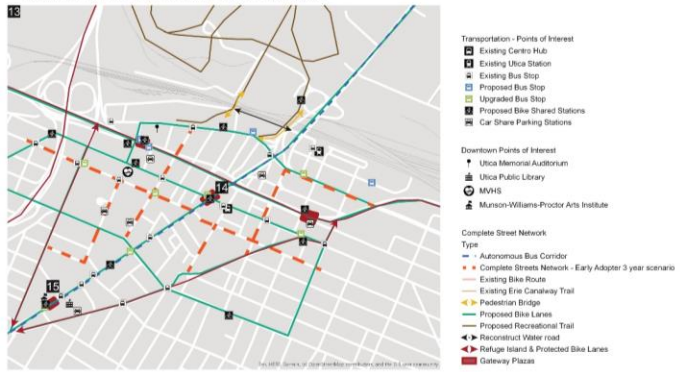


- Revitalized Historical District: Mixed use + Office.
- U District: Entertainment + Mixed use.
- Wellness District : MVHS, health training school, labs, and mixed uses (senior housing).
- Research District: Utica College expansion, community college and research center.
- Resized Harbor point: Supporting marsh tourism (hotels, waterfront shops, and mixed use).
- Compact Industrial Campus: Light/green manufacturing, innovation technology, business start ups, services, and mixed.

COMMUNITY BASED ANCHORS CONCEPT - WELLNESS DISTRICT

MIXED USE + POCKET PARKS CONCEPT

TRANSIT SYSTEMS CHANGE SCENARIOS



Lafayette Street Gateway Plaza: Changes for the next 5 to 7 years...

Genesee St. Gateway Plaza: Changes for the next 15 to 25 years...

Fig. 13: Implementation of complete street concepts, reducing car lane width, allocating green guttters, street trees and protected bike lanes.

Fig 14: Implementation of Genesee St. autonomous bus corridor.

UTICA DOWNTOWN MIXED-USE INFILL DEVELOPMENT POTENTIAL

EARLY ADOPTER SCENARIO 2050


MUC
R1
NMU
RM
LC
LC
LC
LC
UMU
LC
CBD
LC
LC
LC
LC
I
Unknown

Panel Q&A

Keera Morrish

Esri

New Features in ArcGIS Urban

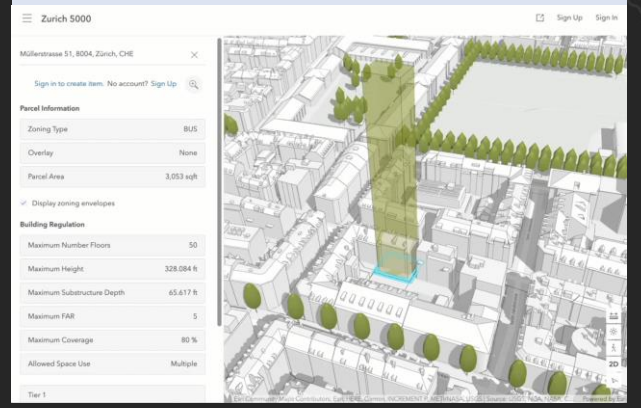
The latest release is focused on improving user experience and adding broader platform capabilities

Workflow

Development Potential

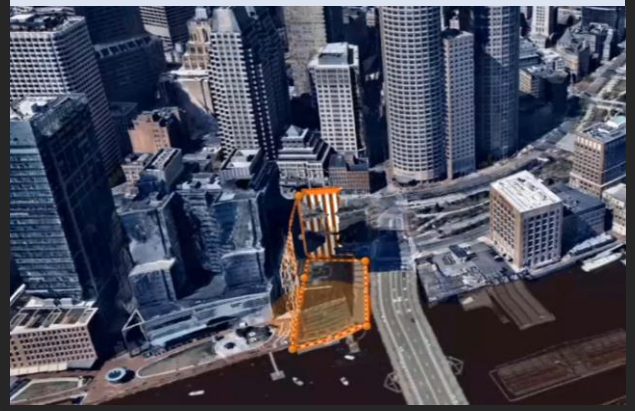
Workflow

Community Engagement



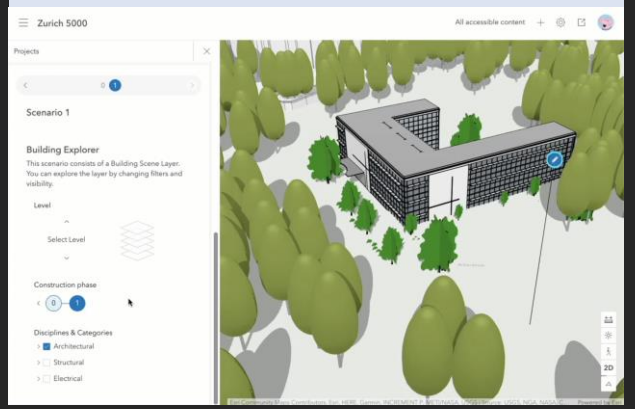
Workflow

Improved 3D Context



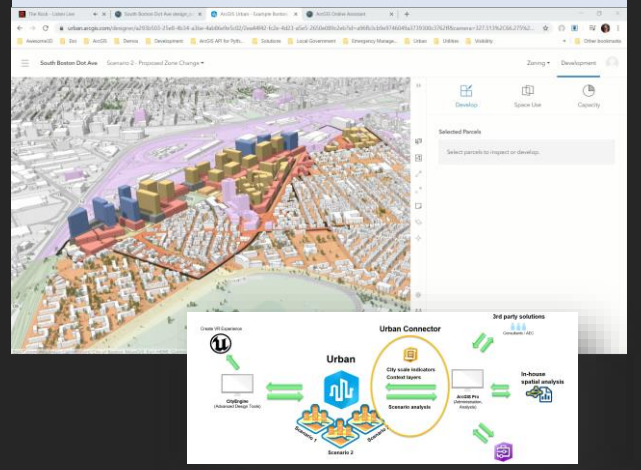
Workflow

Development Review



Workflow

Integration Support



Resources

- March 2nd at 12 EST – Exploring the Urban Environment with ArcGIS Urban (GIS in Higher Education Chat)
- Geodesign and Urban & Regional Planning landing page
- Esri Community – Higher Education

Q&A

To connect, please reach out to Brian at:

bbaldwin@esri.com