Applying Geodesign to Urban Design of Mixed Use Developments

- James L. Sipes
- Dan Meehan
Geodesign Hub is a web-based geospatial tool that allows easy collaboration developed by Dr. Hrishikesh Ballal.

The Geodesign Hub template has 5 tabs:

1. Evaluation Models
2. Evaluations Update Model
3. Cross System Impact Model
4. Cost Estimate Model
5. Project Participants.
Evaluation Models - The Evaluation Models uses a classification methodology developed by G. Angus Hills in the 1950s. Five classifications are used, with each having a different color to represent levels of change.

1. **Red** is where the system is existing already and in a healthy state, meaning that it is feasible to remain.

2. **Yellow** is the lowest priority for change and is “not appropriate” or not capable of supporting the stem, meaning don’t put in there.

3. **Light Green** is low but higher priority, and is “capable”, meaning that you can place it here IF you also provide the technology and market to make it feasible.

4. **Green** is a higher priority and is “suitable” meaning that the area can support the project and it already has the appropriate technologies to support the activity taking place, but there may not yet be a market for the change.

5. **Dark Green** is the highest priority for change and is “feasible”, meaning that it is suitable and there is a demand or market to provide the change.
Evaluations Update Model - The Evaluations Update Model is based on an aggregation of systems that have similar impact generators and responses, as needed for efficient cross-system impacts dynamics. Evaluation models have five classification: Feasible, Suitable, Capable, Inappropriate, and Existing.
Public Facilities (City, County, Regional, Federal, Etc.)

<table>
<thead>
<tr>
<th>System 1</th>
<th>Contact / Expert Name</th>
</tr>
</thead>
</table>

Description of Evaluation: Public facilities in the area/region can be linked to the Sun Trust Stadium in order to enhance public interaction and connectivity. This includes libraries, city halls, community centers, transit centers.

<table>
<thead>
<tr>
<th>Feasible</th>
<th>Suitable</th>
<th>Capable</th>
<th>Not Appropriate</th>
<th>Existing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All privately owned facilities and uses and other non-public uses.</td>
<td>Public-owned facilities, but existing opportunities for enhanced linkage is limited.</td>
<td>Existing public facilities and land uses provide a link to the stadium, or good opportunities for enhanced linkage to the stadium.</td>
</tr>
</tbody>
</table>

Landscaping Character

<table>
<thead>
<tr>
<th>System 2</th>
<th>Contact / Expert Name</th>
</tr>
</thead>
</table>

Description of Evaluation: Landscape character of the existing land use enhances the overall visual and physical qualities of the community.

<table>
<thead>
<tr>
<th>Feasible</th>
<th>Suitable</th>
<th>Capable</th>
<th>Not Appropriate</th>
<th>Existing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Landscape character is limited and is considered to have a negative visual and physical impact on the community. Strip development, neglected areas, areas in disrepair, and other areas with limited landscape character can be greatly enhanced.</td>
<td>Existing site/development has some degree of landscape character, but is not considered to be high visual or landscape character.</td>
<td>Existing site has high landscape character, sites/development and a high sense-of-place. The site/development is considered to be aesthetically pleasing either because of cultural elements, natural features, or a combination of both and should be preserved.</td>
</tr>
<tr>
<td>System #</td>
<td>SYSTEM CHANGE</td>
<td>SYSTEM EXISTING CONDITION</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------------</td>
<td>---------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PUBF</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>LAND</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TRANSR</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>PEDA</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>COM</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>YOUTH</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>HDH</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>PSPC</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>PUBT</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>PARK</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IMPACT MODEL**

- **2** most positive, best
- **1** positive, good
- **0** neutral
- **-1** negative, bad
- **-2** most negative, worst
Cross System Impact Model - The Cross System Impact Model is based on an aggregation of systems needed for efficient cross-system impacts dynamics. The five classifications are Most Positive (Best), Positive (Good), Neutral, Negative (Bad), and Most Negative (Worst).
This list and table is based on an aggregation of systems that have similar impact generators and responses, as needed for efficient cross-system impacts dynamics. Impact of change of a system on evaluation models of all systems.

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<th>Inappropriate</th>
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<tbody>
<tr>
<td>PUBF</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**EXISTING SYSTEM**

<table>
<thead>
<tr>
<th>System</th>
<th>IMPACT and UPDATED EVALUATION</th>
<th>SYSTEM TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBF</td>
<td>1 5 1 4 0 0 1</td>
<td>Small Building e.g. Low der</td>
</tr>
<tr>
<td>LAND</td>
<td>1 5 1 4 0 0 1</td>
<td>Porous e.g. Agriculture, For</td>
</tr>
<tr>
<td>TRANSR</td>
<td>1 4 1 2 0 2 1 2</td>
<td>Paved e.g. Roads, transpor</td>
</tr>
<tr>
<td>PEDA</td>
<td>1 4 1 2 0 2 1 2</td>
<td>Paved e.g. Roads, transpor</td>
</tr>
<tr>
<td>COM</td>
<td>1 4 1 2 0 2 1 2</td>
<td>Large Building e.g. Industry</td>
</tr>
<tr>
<td>YOUTH</td>
<td>1 4 1 2 0 2 1 2</td>
<td>Small Building e.g. Low der</td>
</tr>
<tr>
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**RULE**—if more than one polygon is in one location, use the most positive value. E.g high density housing with sewer = 2
Sun Garden Village

1 Build a program for change
Every plan is driven by change, sometimes internal, sometimes external.
In this case, the program for change included:
- Design for year 2030
- A 10% population growth in Smyrna, Georgia: 5,200 new residents
- Primarily in high density mixed-use development
- Consider the impact of the SunTrust Park: 41,500 capacity
- Consider future land use plans

3 Measure impact
It is important to define the criteria for evaluating designs. It takes the complexity out of
decision making and builds trust. The project started with the creation of maps
showing levels of suitability for each of 10 criteria. In this case, color-coded maps
showed areas as capable, not appropriate, or already existing.

8 Make change a reality
Turn this...
...into this.

2 Diversity is key to success
Assemble a diverse team of stakeholders, domain experts, officials, and "people of the
place"; people who know the issues, the community’s vision, goals, and existing plans.

4 No idea is a bad idea
During the ideation phase, no idea is a bad idea. Rapidly sketching diagrams helps get ideas out and fosters
conversation and ultimately, innovation. The graphic to the
right shows the vast number of sketch diagrams created by
the geodesign team, who sought to maximize positive impacts and minimize negative outcomes.

5 Make an informed decision
After all the design ideas were generated, it became
apparent that some participants were more aligned than
others. Two participants consistently put public transit,
high density housing / mixed use, and parks and open
space at the top of their lists. These preferences became
the "decision model" this team used to determine the
design strategy for this development.

The team picked those diagrams that best matched these
preferences (highlighted in black to the right), which
generated the model below.

6 Select the preferred plan
The preferred plan to the right clearly showed an
area in red that met all of the criteria. It was:
- Designated for mixed-use FIU in the 2030 plan
- Across the street from the new stadium
- At a large interchange suitable for transit
- Near a planned BRT route that will connect two
  major cities, Atlanta and Marietta

7 Do some due diligence
Once the site was selected, a 15-minute drive-time
analysis was performed to see who lived in the area.
The criteria included educational status, age, and
income. Turns out there are a lot of people who
might like to live and work in a new, mixed-use
development with amenities such as restaurants and
entertainment.

The evaluation maps were made with Esri ArcGIS Desktop. The diagraming, group negotiation, and preferred plan selection were done with Geodesignhub. The drive-time analysis and demographic "data enrichment" was done in GeoPlanner for ArcGIS. By Shannon McElvaney, GED2 852 Final Urban Design Project. December 7, 2016.
Mixed Use Communities incorporate eight principles:

**Mixture of Uses** – Provide two or more different uses that are interconnected and emphasize walkability

**Connectivity** – Provide the most options for getting from one place to another, reducing traffic and creating a viable street network for multiple modes of transportation

**Pedestrian Access and Transit** – Create a vibrant streetscape, destinations to walk to, connected and safe sidewalks and transit.

**Neighborhood Retail and Services** – Provide services within walking distances of housing to reduce auto travel, increase walkability, and provide for sustainable community hubs

**Social Interaction** – Result from the provision of adequate green space, community centers, neighborhood gardens and more

**Diversity of Dwelling Types** – Allow individuals to remain within the community as their needs and preferences change

**Healthy Living** – Promote physical activity, neighborhood-scale groceries offering fresh fruits and vegetables, and health clinics and medical offices within walking distance

**Consideration for Existing Residents** – Provide options for existing residents to remain in the community as redevelopment occurs
Proposed Mixed-Use Design

Building Types:
- Mixed Commercial Office
- Mixed Commercial Residential
- Mixed Entertainment Residential
- Mixed Office Residential
- Residential (apartments)
- Residential (townhouse)
- Pedestrian path (on-road)
- Pedestrian path (off-road)

Facilities:
- Tennis court
- Basketball court (full)
- Basketball court (half)
- BBQ facility
- Playground
Impervious Surfaces:

Impervious surfaces impact groundwater systems as rainfall isn’t able to soak into the ground, and increased surface water runoff can be destructive.

Impervious surfaces of the current precinct development.

Impervious surfaces of the proposed precinct design.
DESIGN INTENT

This mixed-use concept will be comprised of thriving business, parks, restaurants, bars and event destinations. It will be home to the young and the young at heart, families, new residents and long time residents who want to be where the action is. The concept will connect the newly built Atlanta Braves stadium into one contiguous, walkable area, where families, sports fans, entrepreneurs, job seekers, entertainment lovers and others who crave a vibrant urban setting can connect with each other and the city they love.

Imagine the Atlanta Braves scene as it once was. Now, imagine how it could be in Smyrna!

LEGEND

MIXED COMMERCIAL OFFICE
MIXED COMMERCIAL RESIDENTIAL
MIXED ENTERTAINMENT RESIDENTIAL
MIXED OFFICE RESIDENTIAL
OPEN SPACE
Proposed Mixed-Use Design

Overall precinct design in 3D.

Recreational facilities integrated into the precinct design.

Main street corridor (street, public parking and linear park)
Cost Estimate Model - The Cost Estimate Model identifies the cost of construction for each system.
## Cost Estimate Model

1. **Critical Areas**: [http://nepis.epa.gov/Adobe/PDF/40000LUU.PDF](http://nepis.epa.gov/Adobe/PDF/40000LUU.PDF)  
   Rate = $3,000/acre

   Rate = $3,000/acre

   Rate = $30,000/acre

4. **Forestry**: 
   Rate = $10,000/acre

   Rate = $10,000/acre

   Rate = $500,000/acre

7. **High Density Housing**:  
   Rate = $6,000,000/acre

   Rate = $9,000,000/acre

9. **Utility Infrastructure**:  
   Rate = $130,000/acre

    Rate = $2,000,000/lane mile

### Constants

1. **Critical Areas, Funded Flood Control Project**:  
   $17,500,000

10. **Transport: 9 Funded Highway Projects**:  
    $1,833,000,000
Project Participants - The Project Participants tab is used to keep track of the participants, their affiliations, and areas of interest/expertise. This is particularly helpful for coordinated collaborative projects.
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