

## Week 8: Asynchronous Design Studio

### 3D Printed Housing Project

#### PERSEID Method: Decision Matrix

##### Overview

In this week you will be utilizing the decision matrix technique to identify the most promising or optimal design configurations and choices. First, please make sure you watch the video from 1P13 on applying the decision matrix. It has been posted on Avenue for 2PX3.

Recall that the design objectives for this project required the team to assess and recommend key elements for a chosen community.

1. Material for the printing
2. Construction method
3. Choices in housing mix e.g. single, row, apartments etc.

Through the past weeks, you have reviewed design considerations and made interim choices for all of these relative the PERSEID layers. Decision matrices are a useful tool to sort this out. This is especially important for a complex project like this where you have multiple, very different scenarios and combinations. How do you sort this out?

##### Step 1: Summarize your weekly conclusions

Using the method outlined in the video and class, compose 3 decision matrices one corresponding to each of the above.

For each, your rows will be the considerations from the PERSEID screening while the columns represent the top choices that have come up during all of the screenings. This may be tricky if your group came up with a large number of choices. So you will need to think about how best to extract the most promising options and aggregate them as columns in the table.

Note the column should not repeat i.e. even if an option repeated during the PERSEID steps, only use it once.

*Example: possible matrix for Material Choice*

Design consideration	Weighting	Material option 1: Concrete	Material option 2: Resin	Option 3: mud-based
Throughput (P)	3	5	3	2
Weather (P)	5	5	4	1
Appeal (SC)	4	2	5	2
Price (SC)	4	4	1	5
Total		64	53	39

Once finished this step, you should have sorted out your past screenings as three matrices. One for material choices, one for building technique, and one for neighbourhood layout.

### Step 2: Your first assessment of the weightings and ratings

Using the techniques outlined in the video, and applying the conclusions of your weekly deliberations, rate the options and fill out as many of the cells as you can. You do not have to complete all and in fact, it is better if you only rate those factors that you are sure about as it is important that you have some confidence in your ratings.

Also make sure that the rating scales that you use is the same for all members of the teams so that you are all using comparable ratings. This will ensure that you will be comparing “apples to apples” when your team gets together in the Synchronous session and try to bring everything together.

Material consideration	Weighting	Material option 1: Concrete	Material option 2: Resin	Option 3: mud-based
Weather performance (P)	5	5	4	1
Print throughput (curing time) (P)	3	5	3	2
Material cost (SC)	4	4	1	5

Carbon footprint (E)	5	1	3	5
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Method consideration	Weighting	On-site Construction	Prefabricated Off-site Construction
Throughput (time efficiency) (P)	5	2	5
Construction labour cost (SC)	4	1	4
Construction efficiency (P)	4	3	3
By-laws and building code (R)	2	2	3

Housing type consideration	Weighting	30 detached single-family dwellings (owned)	15 detached + 30 rowhouses (owned)	10 detached + 20 rowhouses (owned) + 2 low-rises of 30 dwellings (rented)
Price (SC)	5	2	4	5
Appeal (SC)	4	5	4	3
Construction time (P)	3	3	2	1
By-laws and building code (R)	2	5	2	1

### Step 3: Complex relationships between considerations

One of the most challenging aspects of multifaceted design challenges in the real world is that there can be dependencies and coupling between design considerations. For example, in this project, prefab

factory printing may only be feasible for certain materials due to the resulting weight of structures – i.e. how will you transport a large, extremely, concrete structure from a factory if this is your material choice. The matrices suggested in Steps 1 and 2 are basically independent. So in this example if your building method matrix suggests prefab, while your materials matrix suggests concrete, the two suggestions conflict.

Additionally you may have each member have very different first assessments and somehow you will need to quickly bring the ideas and individual conclusions together into a single cohesive set of conclusions.

Prior to getting together with your team mates, put some initial thought into how you will deal with these complications. What are some ways that your team can use to quickly pull everyone's input into a single cohesive set of decisions?

We can pull everyone's thoughts into a single cohesive decision by adjusting the matrix further. By adding if-conditions (like in programming), we can reduce the points given to a certain material or construction method based on its compatibility as described in the first paragraph above. When considering the first assessments of each teammate, we can discuss further and add more conditions to the matrix to further refine our ideas. In addition, if this is ineffective, then we can take the average of each person's rating for each category in the matrix and then determine which material/construction method/housing type is most effective.

## Submission Instructions

1. Upload a \*.PDF copy of the Wk-9 - Asynchronous Design Studio 9 Worksheet to the Avenue Dropbox titled **Asynchronous Design Studio Week 9** by Friday, March 18<sup>th</sup>, end of day (5:30pm)
  - Use the following naming convention: **macID\_AsynchDS9.pdf**