3.007 Design Thinking and Innovation
Subject Chosen for 2D Integration: 10.018 Modelling Space and Systems

By F01 Group 4: CommuThinkers

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PLANE X PAVILION

Our DTI Problem Statement:

Our project aims to **transform our site**, which is the plane spotting site at Changi Business Park, into an **interactive aviation-themed attraction** for both **visitors on the ground** and **plane passengers in the sky** through **architecture and an interactive message display**.

Refining the Problem Statement:

We zoomed in on the **visitors on the ground** interacting with the **installations located within the architecture** at our site. We also decided to **vary the possible paths** a visitor can take, which affects the interactivity obtained.

Our MM Problem Statement:

How can we **optimize the interactivity** for visitors at Plane X Pavilion, which is our design idea located at the plane spotting site at Changi Business Park, by **varying the possible paths taken at our site**?

Background Context:

The team aimed to design a model outcome to improve the experience of visitors to our solution, a reimagined plane spotting site, The site is part of a plan to add to the aesthetic and uniqueness of Changi Business Park as an plane spotting area.

Taking into account our previous observations, the team targeted the modelling process to gain insights on the various interpretations the site can take on. For example, the site can be a relaxing area for foreign workers and a photography spot for tourists. Given the area & variety of elements in the site, there was potential in design space and paths for different groups

As our site consists of multiple aspects, such as the architectural features and an interactive message display, we decided to narrow our scope of focus to the first two-thirds of the architectural site (Plane X Tail Pavilion and Plane X Wing Pavilion), along with the various installations present.

Our Math Model:

The site is set up as squares that form a grid, with the installations represented as squares. The paths taken will be pre-determined, and the priority of the paths will vary. For example, some paths will prioritize lesser squares travelled while some will prioritize visiting more interactions. We will be finding the interactive efficiency, which can be derived as:

$$E = I/S$$

where E = Interactive Efficiency;
I = Interaction Points Collected; and
S: number of squares travelled including entry and exit squares

Interaction points can be derived from one or more of the following site installations (with their site area locations):

1) Lightwell (Plane X Tail Pavilion)
2) Light Dome (Plane X Wing Pavilion)
3) Rest Area (Seats) (Plane X Wing Pavilion)
4) Light Tunnels (Plane X Wing Pavilion)

The possible paths a visitor can take are labelled A, B and C in the below diagrams.

Variables and Assumptions:

Dependent Variables:

- Path route taken by visitor
- Distance travelled by visitor in site (measured in squares travelled)

Independent variables:

- Amount of visitor interactivity present at each site installation
- Site areas of focus

Input Variables:

- Number of squares traveled
- Number of squares with interaction points encountered

Output Variables:

- Interactive Efficiency

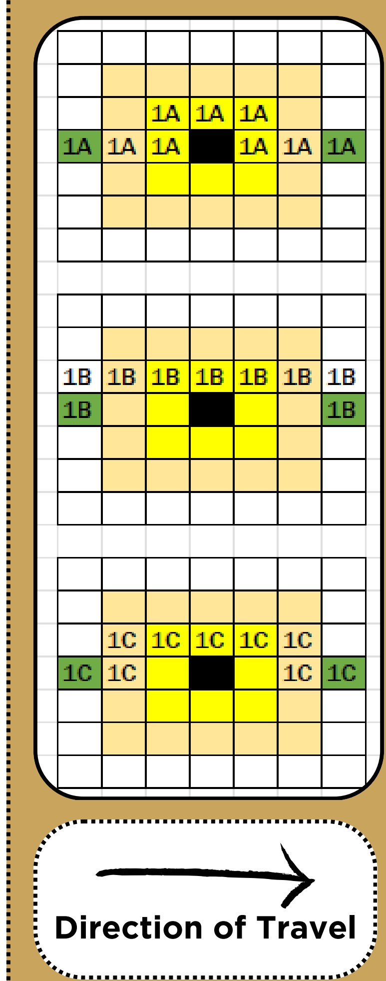
Assumptions:

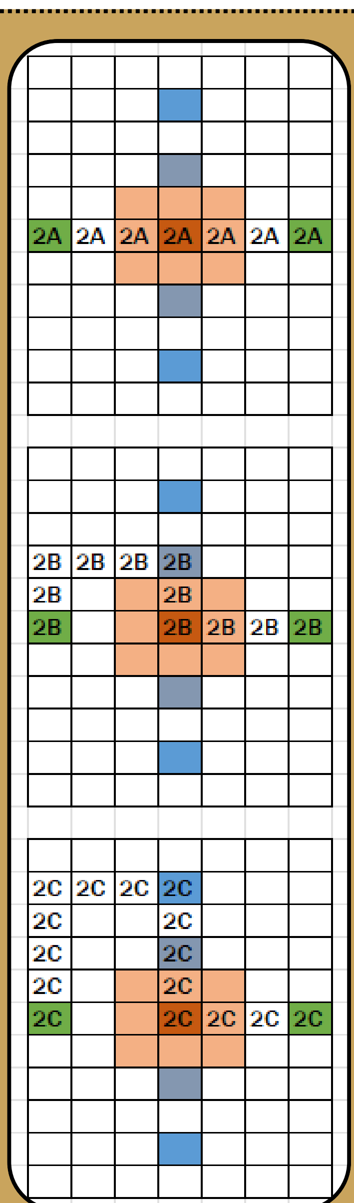
- Visitors would travel forward or sideways, and travel from the entry point to the exit point of each area.
- For the rest area and light tunnels, they may be accessed from all sides.
-For the lightwell and light dome, the interactivity of the site will decrease in a square radius around the site, as the attraction is light based & is assumed to be less visible from further distances
- All 4 installations have the same maximum number of interactive points.
- A successful interaction of the site element is defined as within a square step.
- The efficiency of the site is only affected by the interactivity and the distance of the route taken by the visitor, which is measured in squares on our model's grid system.

Finding the Interactive Efficiency with our Model

Metrics compared:

We will be comparing 3 possible paths to test our model and obtain the interactive efficiency for each path. For the 1st pavilion area, we kept the number of squares traveled constant and mapped out the possible paths a visitor can travel there. As for the 2nd pavilion area, we considered 3 possible paths a visitor could take: the fastest possible route, the route where he can explore the rest areas and light dome, and the route where he explores all the installations in the area.





Legend		
Icon/Colour	Description	Interactivity
	entry/exit	-
	lightwell structure (no entry)	-
	area near lightwell	P
	area further away from lightwell	P/2
	dome structure	P
	area near dome	P/2
	seats	P
	tunnel pathway	P
1A, 1B, 1C, 2A, 2B, 2C	path number (denotes route of path taken)	-

Path Number context:

For paths 1A, 1B and 1C, distance travelled remained constant.

For paths 2A, distance travelled was set to be the shortest.
For 2B and 2C, the number of installations visited and distance travelled both increase.

Model Results:

Path Number	Interaction Points Collected	Number Of Squares Travelled	Interactive Efficiency
For Plane X Tail Pavilion			
1A	**6P**	**9**	**(2/3)P**
1B	4P	9	(4/9)P
1C	5P	9	(5/9)P
For Plane X Wing Pavilion			
2A	**2P**	**7**	**(2/7)P**
2B	3P	11	(3/11)P
2C	4P	15	(4/15)P

From the table of calculations above, the path numbers in **red** denote the paths with the highest interactive efficiency within the corresponding pavilions.

For Plane X Wing Pavilion, an increase in number of installations visited does not directly result in an increase in interactive efficiency. The efficiency decreased with increasing number of installations visited at the area instead.

Model Analysis:

Strengths:

The model provides a quick calculation and simplified view on how site layout & interactivity can be improved through path design.

In addition, each installation can take on arbitrary weight constants to each attraction which can help design specific site experiences when designing paths, leaving room for further optimization and innovation.

Weaknesses:

The model can be quite tedious when scaled up, as the team currently has not worked on a way to compute the most efficient path automatically.

The model correlates interaction to physical closeness, defining a perimeter of "successful interaction" when the concept itself is subjective. For instance, visitors that can see the lightwell and dome from a further distance may be intrigued by the installation, which may lead to the fact that all site visitors, regardless of where they are within the site, would have a certain level of interactivity with these installations.

Conclusion:

The model incorporates the equation and ranking approach in its analysis of the site, which can provide further insights and design considerations to further enhance the transformation of the site. For example, we can conclude that an alternative path that requires less steps can be designed for visitors seeking specific purposes in the site, and how the installations can be reordered within each pavilion to facilitate the different paths where a visitor can take for a different site experience.