









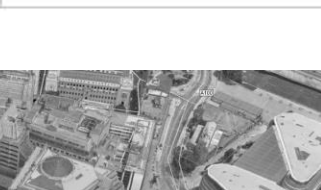




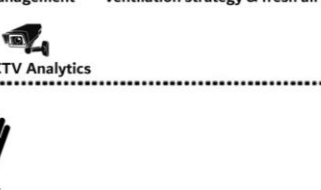

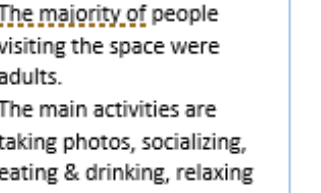
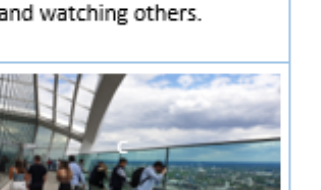

Rethinking Sustainable Vertical Urbanism- design and practice of vertical social spaces in coexistence with COVID-19 Situation

1-Introduction

The COVID-19 pandemic has and will continue to have a significant impact on public spaces in cities around the World. One of the major challenges and debates for governments and professionals alike is therefore how to create safe and usable environments in high-density cities. Significantly, vertical urban spaces have become a major part of the open space offer in large cities and by their unique nature in terms of location, accessibility, scale, etc., these dynamic urban spaces are potentially under threat.

4.1 Direct Observation

The study uses direct observation and space syntax analysis to provide qualitative and quantitative data. The main benchmarks involved in measuring the spatial qualities, such as step depth and visual connectivity.

Data collection pre-pandemic							
Five Questions	Sky Gardens (pre-pandemic observation results)	Notes & Graphical annotations					
How many	Pedestrian Flow (people)	220	<ul style="list-style-type: none">• Around 400 visitors were visiting the place at the same time.• The maximum capacity of the Sky-Garden could reach up to 600 visitors. 	What	Necessary activities	Types of Activities related to Function	
	Stationary activity (People)	82				Walking to bus	
	Seating fixtures	Around 200			Working		
	Activities	8			Jogging		
	Cars	NA			Sitting		
Who	Women	143	Reading				
	Who is using the space	All Age Groups (Children, Teens, Adults & Elderly)	Playing				
	Gender	Both Genders	Eating				
Where	Age	From 3 Years Old to 82 Years Old	Taking Pictures				
	Where people move?	People move freely around the space up and down.	Relaxing				
	Where people stay?	Floor 35 in front of the cafe and beside the green areas.	Children Playing				
	Where are the activities?	Outdoor viewing Platform, Seating area in front of the cafeteria, the pub, the restaurant & beside the green areas.	Greetings				
	Where are the entrances?	Floor 35	Conversations				
Where	Where are the seating spaces?	Seating areas in front of the cafeteria & beside the green areas.	Common activities				
			Passive contact (listening and watching others)				
							
How Long			How long it takes people to cover certain distance?	20 minutes to go around the spaces			
			How long people stay in a certain space?	from 10 to 30 minutes depend on the activity			
			How long the activity last?	People averagely spend one hour to two hours maximum			

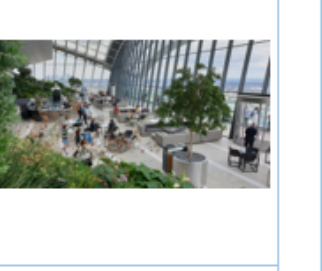



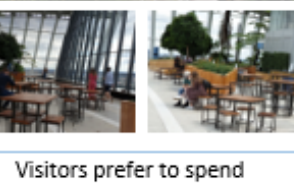
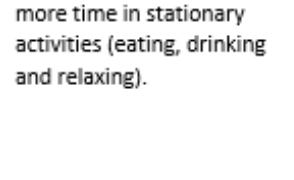
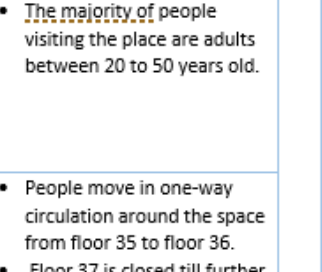
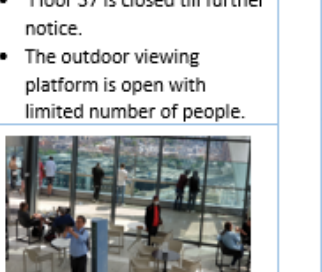



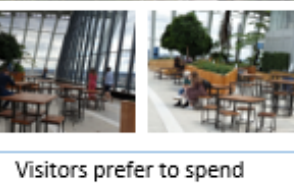
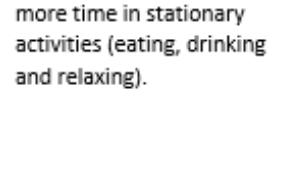

The List of different activities and functions , Sky Garden, London

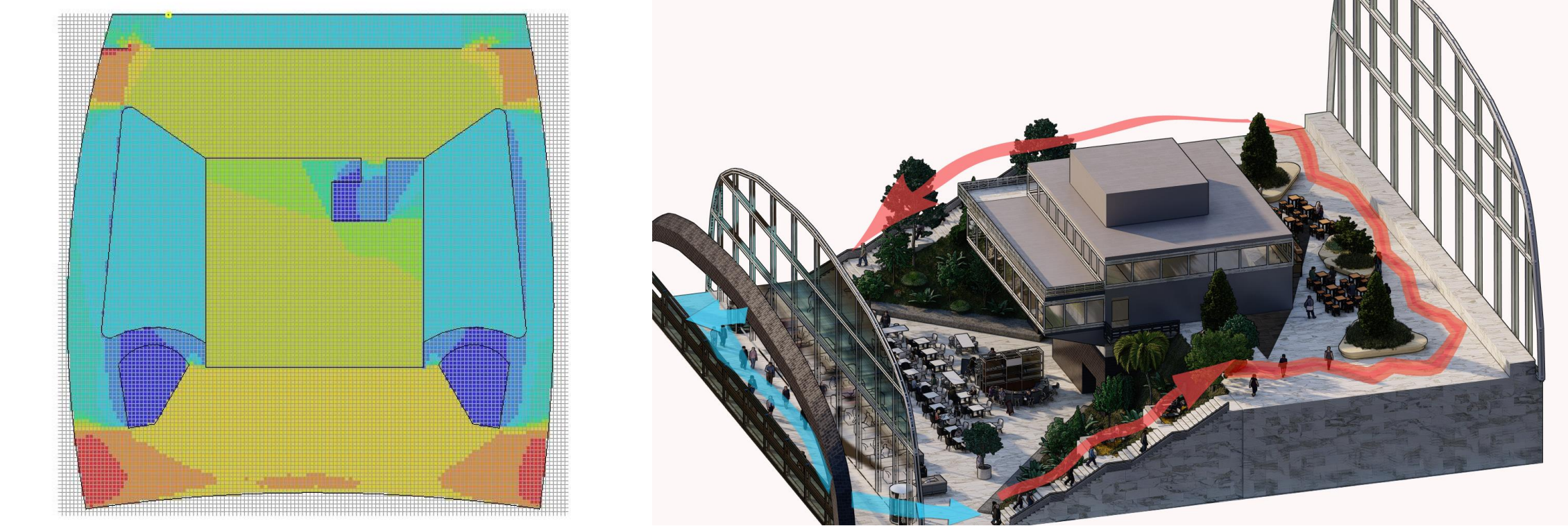


The Hierarchy of controls

Data collection post-pandemic

The Hierarchy of controls

Five Questions	Sky Garden (post-pandemic observation results)	Notes & Graphical annotations					
How many	Pedestrian flow (people)	35-40	<ul style="list-style-type: none">• The maximum number of visitors allowed per hour are for 100 visitors.• The space capacity should always less than 200 people.• 4 guests will be permitted in the lift at any given time. 	What	What are the activities?	Types of Activities related to Function:	<ul style="list-style-type: none">• The majority of people visiting the space were adults.• The main activities are taking photos, socialising, eating & drinking, relaxing and watching others.     
	Stationary activity (People)	70			Necessary activities	Shopping	
	Seating fixtures	Around 200 seats but only half of them are available due to social distancing rules			Walking to bus	Working	
	Activities	5 optional activities & 2 social activities			Optional Activities	Jogging	
	Cars	No Access				Sitting	
Who	Women	60	<ul style="list-style-type: none">• The majority of people visiting the place are adults between 20 to 30 years old. 	Playing	Reading		
	Who is using the space	All Age Groups (Children, Teens, Adults & Elderly)		Eating	Taking Pictures		
	Gender	Both Genders		Talking Pictures	Relaxing		
Where	Age	From 5 Years to 65 Years	<ul style="list-style-type: none">• People move in one-way circulation around the space from floor 35 to floor 36.• Floor 37 is closed off further inside.• The outdoor viewing platform is open with limited number of people. 	Social Activities	Children Playing	<ul style="list-style-type: none">• Visitors prefer to spend more time in stationary activities (eating, drinking and relaxing).     	
	Where people move?	Around the space in a one-way circulation			Conversations		
	Where people stay?	Floor 35 in front of the cafe and beside the green areas			Common activities		
	Where are the activities?	Outdoor viewing Platform, Seating area in front of the cafeteria & beside the green areas			Positive contact (listening and watching others)		
	Where are the entrances?	Floor 35					
Where are the seating spaces?	Seating areas in front of the cafeteria & beside the green areas		How long it takes people to cover certain distance?	20 minutes to go around the spaces			
			How long people stay in a certain space?	from 10 to 30 minutes depend on the activity			
			How long the activity last?	People averagely spend one hour to two hours maximum			



Connectivity map (depthmapX) Pedestrian modelling (one way circulation)

2-Research Aim & Objectives

The study seek to explore the challenges facing London’s vertical social spaces in terms of controlling people flow, pinch points, user experience, and activities. The research aims to analyse the performance of the new suggested solutions for creating spaces that feel safe, operate effectively, and add value for developers and operators.

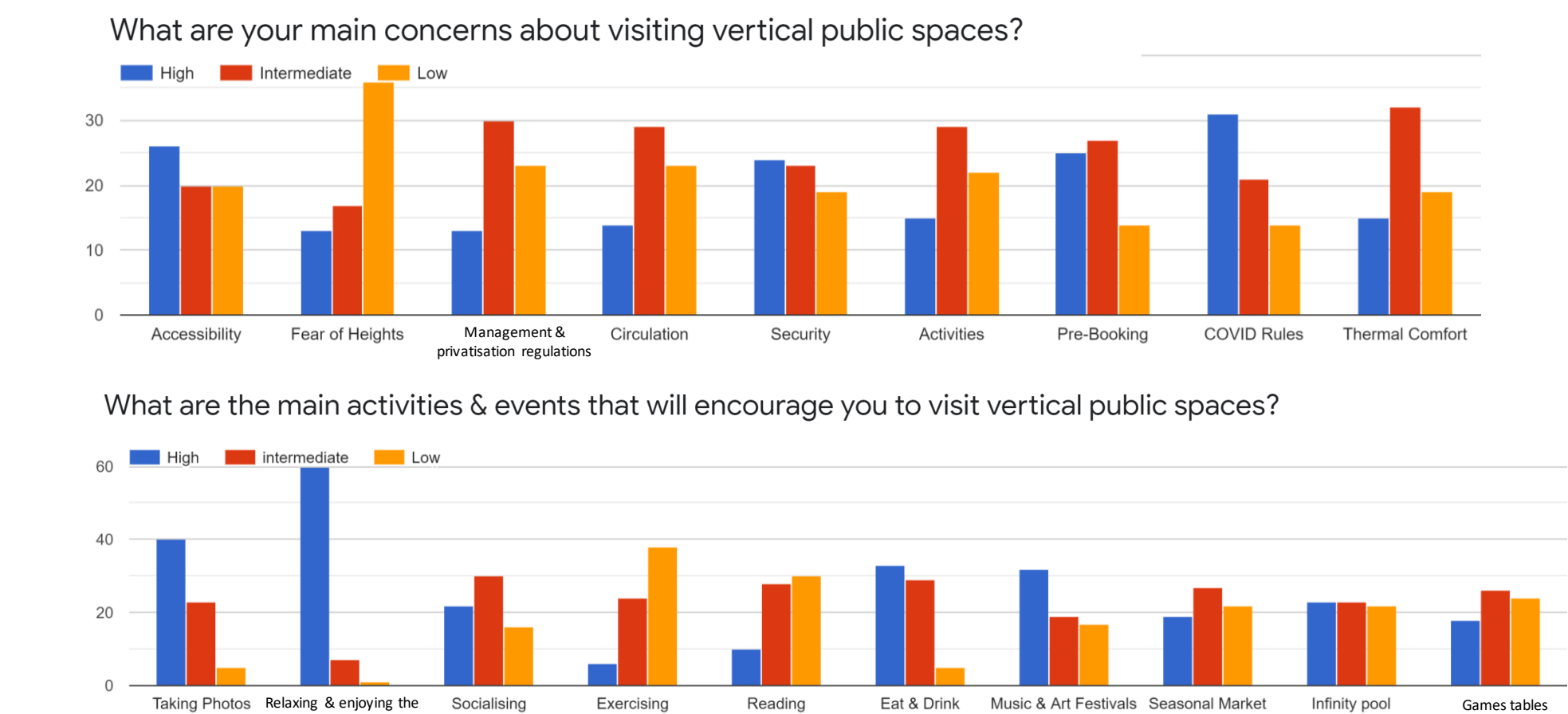
- Objectives :
- To explore the implementation of Virtual reality in the design of vertical urban spaces.
 - To provide a guideline for the adaptability and social resilience of vertical urban spaces
 - To assess the effect of community engagement in the design phase.

4.2 Research Survey (in progress)

The survey study has been reviewed and approved by the Faculty of Engineering Ethics Committee.

- Participants watch a 2 minutes video done by the research team on vertical public life in London before answering the survey.
- Participants fill out a brief questionnaire (previewed time: 5 minutes).

- The survey structure covers:
- The physical experience and social activities in London vertical public spaces.
 - The effects of COVID 19 on the future design of vertical urban spaces.
 - The virtual reality design and experience.

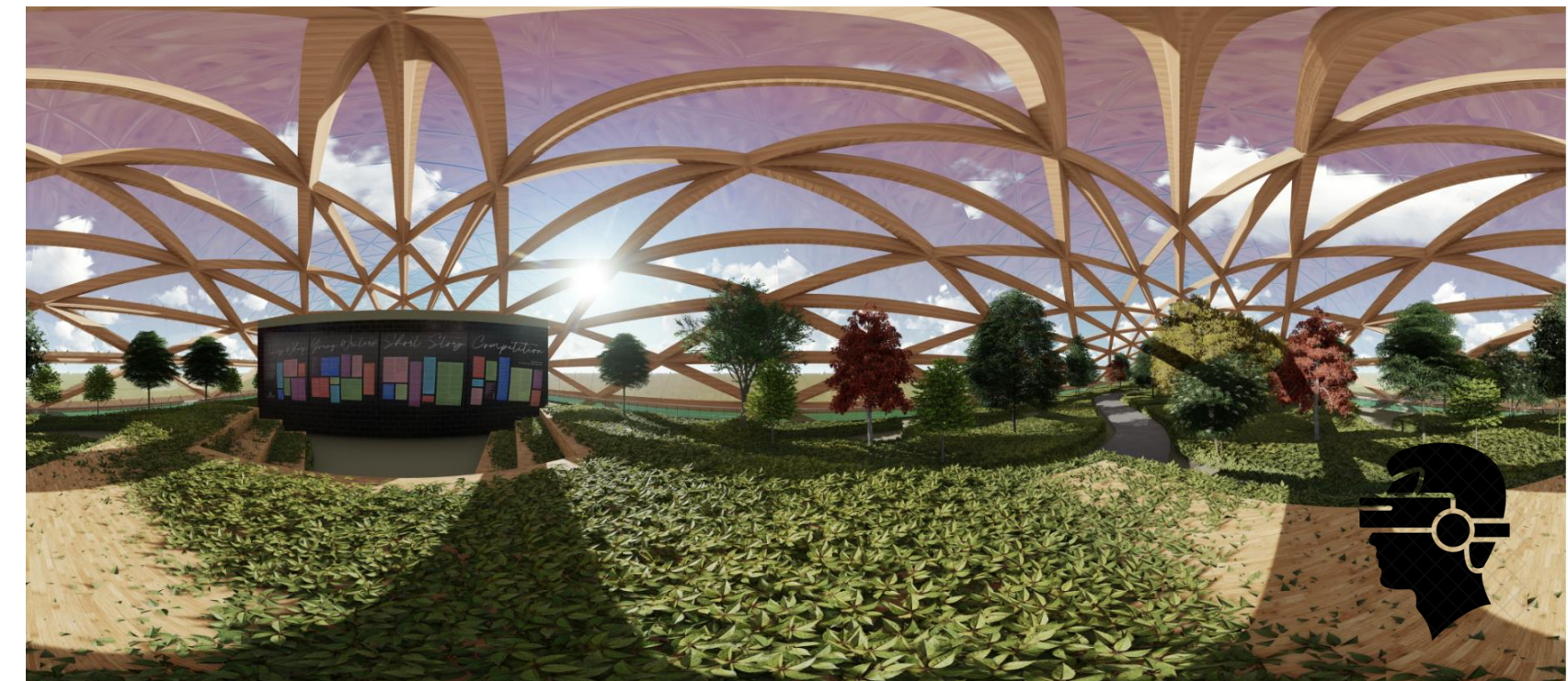


4.3 VR Experiment (in progress)

VR Modelling for the existing condition of the two spaces Sky-Garden & Crossrail place roof garden. The study aim to explore people behaviour and their interaction with the design phase.



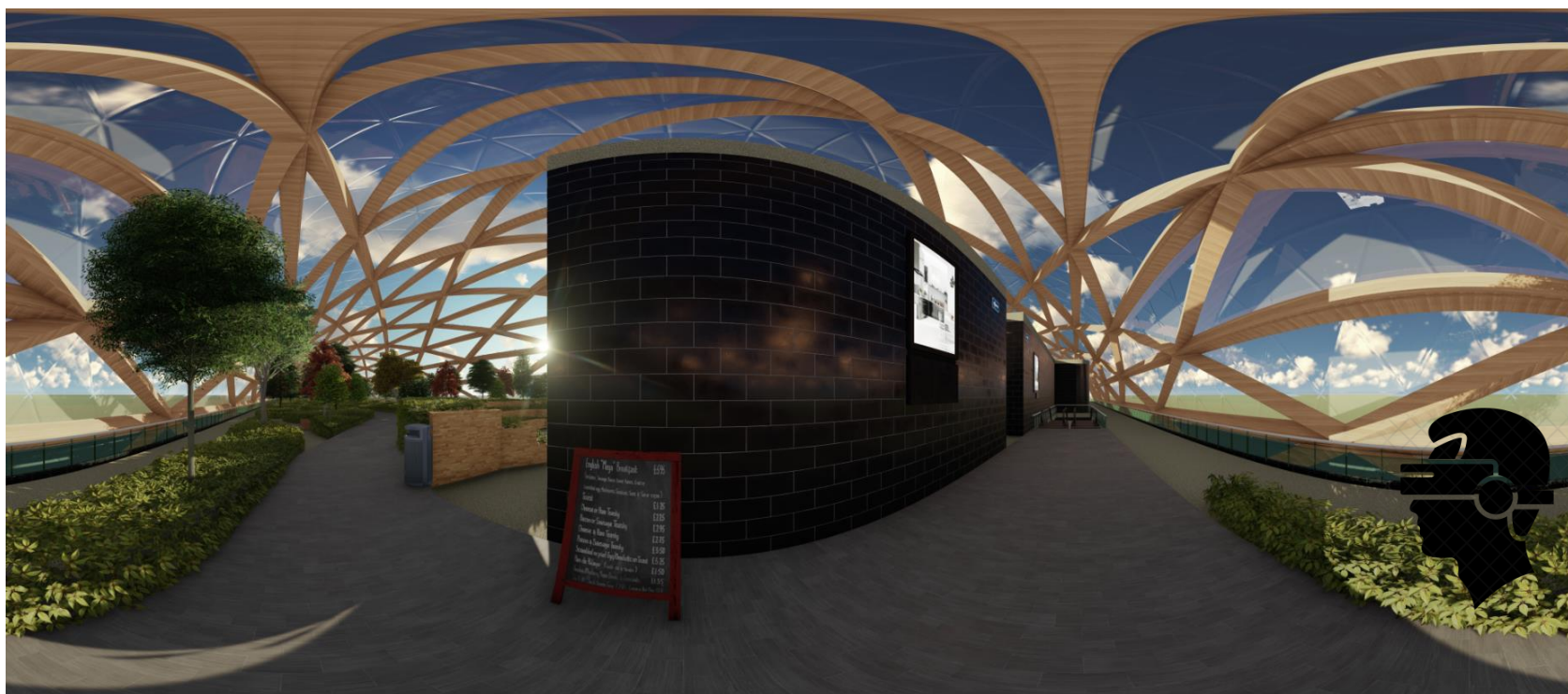
VR Model Sky Garden



VR Model Crossrail Place Roof Garden



VR Model Sky Garden



VR Model Crossrail Place Roof Garden

3-Research Question

How to rethink urban spaces into a more three-dimensional hybrid spaces that can create more opportunities and potentially safer place for people to use within high density urban areas?

How does the increasing desire and need to reduce people movement within cities, partly inspired by COVID-19 related restrictions, could actually affect the future design of vertical social spaces within buildings?

4-Methodology

The research focused on analysing two recent case studies London Sky Garden and Crossrail Place Roof Garden. These spaces were selected according to their different typology, location, size, and management.

- The method used in the study is a mixed approach.
- Direct observation & Pedestrian modelling
 - Research Survey
 - VR Experiment

5- Future Direction

Future studies will investigate how technologies such as Mixed Reality can enhance the design experience and enable community engagement as changing materials and moving objects by using The Blueprints Visual Scripting system in Unreal Engine.

