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# **ABSTRACT**

Recently the Malaysian government has unveiled fresh plans to ensure a resilient socioeconomic growth, mainly by encouraging the populace to adopt a culture of innovation. There is a need to improve the current innovation and idea hubs in Malaysia to be more reflective of society's requirements. Most existing innovation hubs and creative labs are not attuned to the current generation of innovators and entrepreneurs' way of thinking especially among millennials.

Most production-based labs are currently designed more of a vacuum-sealed box, opting corporate dull style architecture, and not as explorative spaceships. With user needs and interests playing second fiddle in their design process, making them out of touch with the consumers. It is understood that environments which emphasise on human interactions, collaboration and common spaces are the main focused areas for innovation and ideation to spark.

Malaysia is home to various young minds and talent eager to create, though may lack experience and guidance. On the other hand, older generations of craftsmen and tinkerers who have mostly grown content and not striving for new ideas and learning new production techniques.

This project aims to establish an urban production-based lab as a human connector between the public, young minds and the seasoned resident craftsmen. The approach is to provide a fun and safe platform to gain useful feedback from real world society, and establish mentoring programs to close the generation gap of new and old thinkers. All the while advertising the product and showcasing innovation culture to the public.

Keywords: Innovation, Social, Lab, Creativity

# INTRODUCTION

The global innovation index 2019 has reported Malaysia ranking 30<sup>th</sup> for innovation capability pillar, and 32<sup>nd</sup> for both infrastructure and ICT adoption. Globally we are fully equipped to properly prosper in the innovation-based industry. Yet since 2018 until 2019 the Global Competitiveness Report shows that Malaysia has not improved consistently, while the new government agenda plan wishes to focus in the innovation market.

According to various Malaysian researchers the current state can be improved by establishing a proper local environment or habitat for innovation to flourish. Currently Malaysia is capitalising on lessons from existing foreign innovative environments and structures. These spaces are unique to their own ecosystems which are not in comparison to our own local surroundings.

# LITERATURE REVIEW

# Global Innovation Index 2019

The Global Innovation Index (GII) is a ranking of world economies based on innovation capabilities. Consisting of roughly 80 indicators, grouped into innovation inputs and outputs, the GII aims to capture the multi-dimensional facets of innovation.

The Global Innovation Index is a leading reference for measuring an economy's innovation performance. Moving into its 12th edition in 2019, the GII has evolved into a valuable benchmarking tool that can facilitate public-private dialogue and where policymakers, business leaders, and other stakeholders can evaluate innovation progress on an annual basis.

The following table shows the rankings of Malaysia over the past three years, noting that data availability and the GII model influence year-on-year comparisons of the GII ranks. The confidence interval for Malaysia's ranking in the GII 2019 is between 34 and 36.

	GII	Innovation	Innovation
		Inputs	Outputs
2019	35	34	39
2018	35	34	39
2017	37	36	39

- Malaysia performs better in Innovation Inputs than Outputs.
- This year Malaysia ranks 34th in Innovation Inputs, the same as last year and better compared to 2017.
- As for Innovation Outputs, Malaysia ranks 39th. This position is the same as last year and compared to 2017.



Malaysia ranks 2nd among the 34 upper middle-income economies.



Malaysia ranks 8th among the 15 economies in South East Asia, East Asia, and Oceania.

Figure 1 | Malaysia's rankings, 2017-2019, source: The Global Innovation Index (GII)

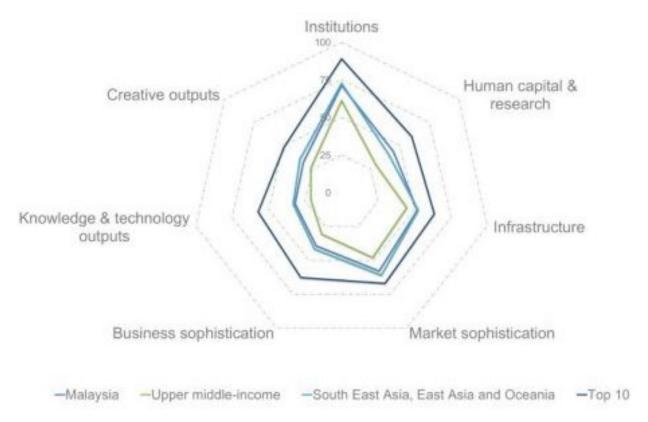


Figure 2 | Malaysia's score in the 7 GII pillars, source: GII report 2019

Upper middle-income economies Malaysia has high scores in all the 7 GII pillars, which are above the average of the upper middle-income group. South East Asia, East Asia, and Oceania Region.

Compared to other economies in South East Asia, East Asia, and Oceania, Malaysia performs above average in 1 out of the 7 GII pillars: Human capital & research. Top ranks are found in sub-pillars Tertiary education, Knowledge absorption, Knowledge impact, Knowledge diffusion, and Creative goods & services where the country ranks in the top 25 worldwide.

Strengths		
Code	Indicator name	Rank
2.2.2	Graduates in science & engineering, %	8
2.3.4	QS university ranking, average score top 3*	17
4.2.1	Ease of protecting minority investors*	2
4.2.2	Market capitalization, % GDP	6
4.3.2	Intensity of local competition'	17
5.2.1	University/industry research collaboration*	8
5.2.2	State of cluster development'	8
5.3.2	High-tech imports, % total trade	3
6.3.2	High-tech net exports, % total trade	1
7.1.4	ICTs & organizational model creation!	17
7.2	Creative goods & services	11
7.2.5	Creative goods exports, % total trade	1

Code	Indicator name	Rank
1.2.3	Cost of redundancy dismissal, salary weeks	100
1.3.1	Ease of starting a business*	94
2.1.3	School life expectancy, years	76
2.1.4	PISA scales in reading, maths & science	58
5.1.2	Firms offering formal training, % firms	77
5.2.3	GERD financed by abroad, %	91
6.1.3	Utility models by origin/bn PPP\$ GDP	48
7.1.1	Trademarks by origin/bn PPP\$ GDP	87
7.1.2	Industrial designs by origin/bn PPP\$ GDP	83
7.2.4	Printing & other media, % manufacturing	72

Figure 3 | Overview of Malaysia's strengths and weaknesses, source: GII report 2019

According to the GII report, Malaysia's weaknesses in the GII are found in five of the seven GII pillars:

- 1. In Institutions (40),
  - a. Cost of redundancy dismissal (100)
  - b. Ease of starting a business (94)
- 2. In Human capital & research (33),
  - a. indicators School life expectancy (76)
  - b. PISA results (58)
- 3. In Business sophistication (36),
  - a. Firms offering formal training (77)
  - b. R&D financed by abroad (91)
- 4. In Knowledge & technology outputs (34)
  - a. Utility models by origin (48)
- 5. In Creative outputs (44),
  - a. Trademarks by origin (87)
  - b. Industrial designs by origin (83)
  - c. Printing & other media (72)

To conclude from the report, Malaysia has a strong factor in Institutions and a good number of talents and knowledge in technology outputs. Though lack in producing creative outputs due to problems in ensuring investors and lack of training in starting a business. As well as creating designs that are locally enriched.

Malaysia must focus on designing facilities to provide the sustainable platform for prototyping and enriching the local market.

# **Urban Living Lab**

Urban living labs are sites devised to design, test and learn from social and technical innovations in real-time. Living labs are generally known as a way to manage innovation processes in an open, inclusive, and collaborative approach in which the innovations are developed by engaging various stakeholders including public organizations, private sectors, universities, and citizens

In the urban living lab, the whole city is viewed as a living laboratory where citizens and other stakeholders are actively involved in the process of designing, developing, implementing, testing, and evaluating an innovation. Accordingly, the aim of an urban living lab is to generate and adopt sustainable innovations and solutions in the urban system in light of the urban sustainability transition.

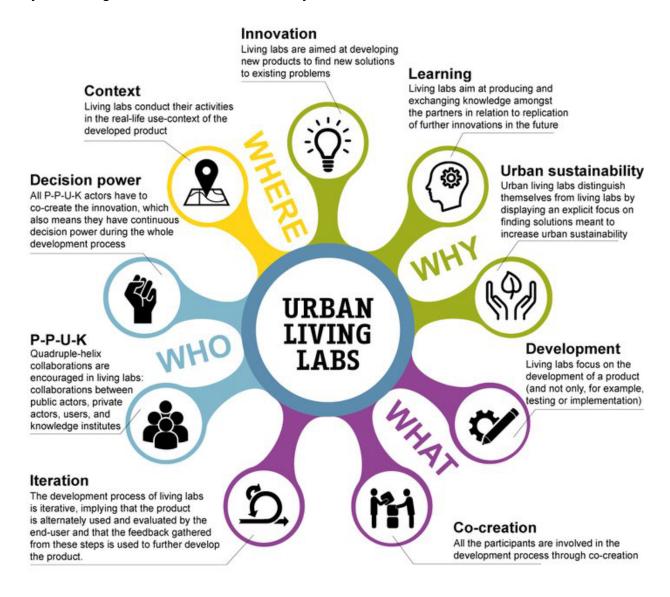


Figure 4 | Urban Living Labs

# Innovations Are Sparks, They Cannot Be Planned

Creativity may be defined as the generation of ideas, insights, or solutions that are both novel and appropriate or useful (Amabile, 1983; Guilford, 1967; Hennessey & Amabile, 2010). Most of the innovations come after emotional creative spurts and most individuals believe that they work better with creative spurts than routine periods of employment.

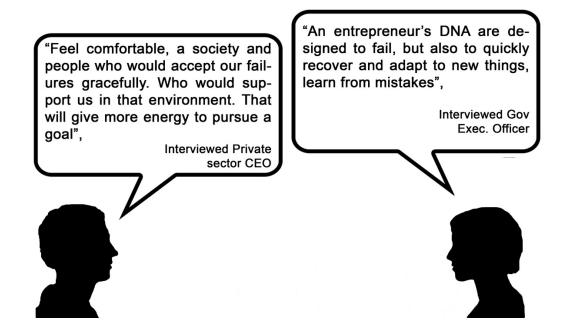
Conventional wisdom is that workplaces with collaborative, informal spaces are now common place due to their ability to help spark ideas. A more accurate picture is that most people work in traditional hierarchical offices that emphasise in individual work.

According to Li, D (2016) spaces of innovation can be identified as the intersection nodes to various main areas of the building, both public and private. It is important that a proper balance of space design between collaborative spaces and private spaces is needed.

# **Embedding Innovation Culture into Malaysians**

One of the challenges mentioned by some of the creative hubs is that the Malaysian public at large does not care about their work (Low, L., Ganesan, J., Syazana, S., Wee, L., 2017). The mindset of the Malaysian public does not seem to put these ventures as important and have been overlooked the many strides these hubs have accomplished. Recognition and advertising are paramount to ensure the sustainability and a long-life span for these hubs.

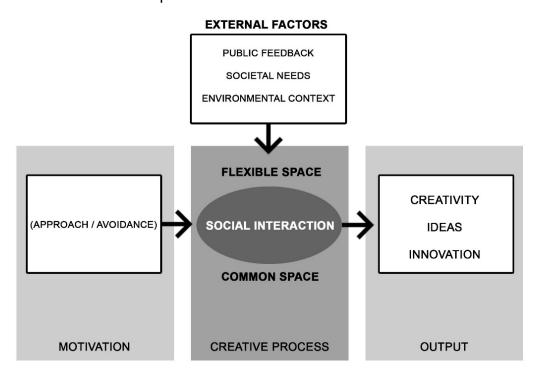
Space is a huge factor for creative hubs, since space affects visibility. When a creative hub holds a physical and visible space, it grows its own public profile. This may affect public perception of not only one creative hubs, but also of the overall local innovation industry at large.



# Flexibility of Space

From research institutes to start-up spaces, architects are applying creative spatial strategies to stimulate both mixing (of people and disciplines) and collaboration (between people and across disciplines) as if it were a seamless act. While it clearly is not, some architects emphasized how physically mixing people in space gives new reasons for people to communicate and connect.

A flexible working environment can influence the innovation process and productivity. The findings of this study will help architects, designers and organizations to better design for innovation in workplace environments.



# Common Space Is Key

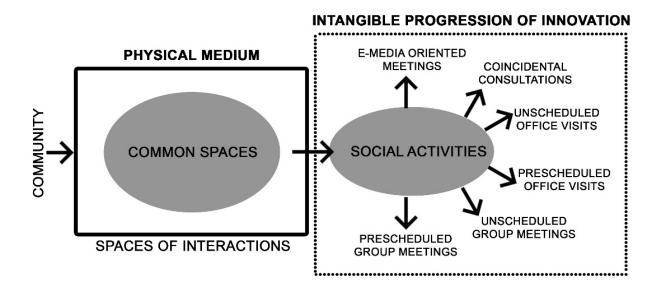
It is understood that environments which emphasize on human interactions such as collaborative space or common spaces are what mainly drives innovation process and ideation. Collaborative space considerations include, visual connections throughout the workspace, group areas for informal brainstorming such as lounges and access to technology and interactive displays throughout the work space.

According to a study of interrelations done by Balkan, O indicates that common spaces provide a comfort zone for social interactions between co-workers. The socio-spatial analysis performed concentrates on interactions between the occupants and the environment. Done via examination of social interactions that affect attributes of social and physical environment and its usage.

The results of the study illustrate that common spaces in the building presents a space for social interactions, generating un-planned consultations that boosts the act of innovation.

It is a fact that these interactions and quality of spaces is a vital architectural factor for innovation-generating buildings. Collaborative spaces in offices and workspaces to create a transparent work dynamic. Whilst intersection nodes such as common grounds to assert spontaneous and un-planned interactions and consultations.

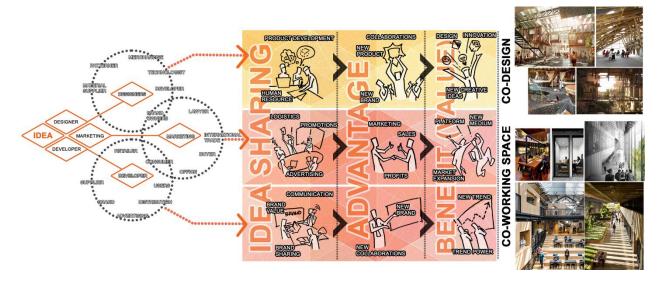
Collaborative and common space designs to consider should include, visual connections throughout the workspace, group areas for informal brainstorming such as lounges and access to technology and interactive displays throughout the work space. Innovation workspace must be open to allow external factors to help influence their progress. Such as local culture, societal perspectives, consumer feedback and even the natural environment itself contributes to a positive factor for innovation.



# **CONCEPT: Urban Living Lab as A Platform**

By providing a platform to gain feedback from the local surroundings, products and innovations will be more aligned to the local needs and market climate. Ensuring a healthier relationship with consumers and creating a sustainable business venture.

This can be achieved by designing collaborative spaces that is suitable for Malaysian innovation ecosystem and climate. Utilising the paradox of collaborative spaces that is not intrusive, designing spaces that gradually alters between public to private. Softened by vegetation that according to researchers can create a calming atmosphere. Connecting the public with the occupants visually and spatially keeps the occupants secured.



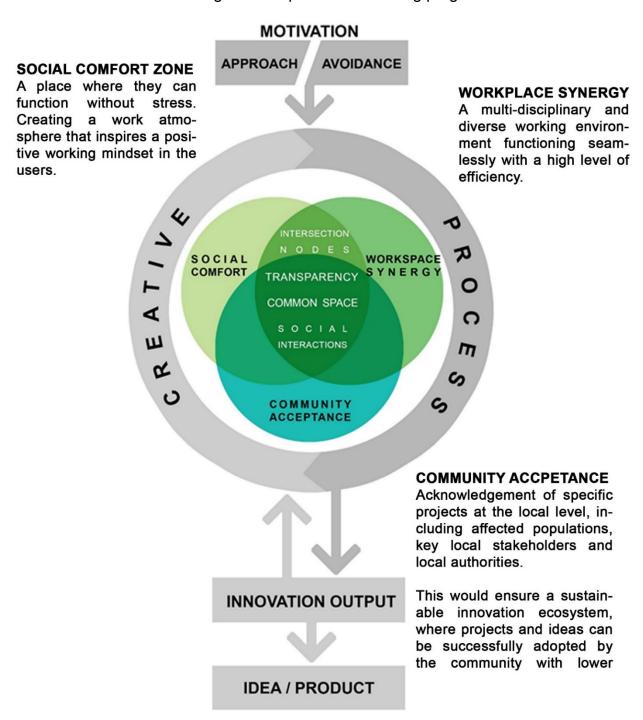
Potential building owners / clients, are to be investors searching for new business projects and fresh talent. Tenants are not owners but are given residence in building to build prototypes and experiment with full use of building's prototyping & production facilities. Products/ business models can then be showcased and presented to investors or the public.



Concept is borrowed from Shark Tank TV show. Where investors provide an international platform for aspiring entrepreneurs to pitch their ideas.

# **Notable Themes to implement**

Based on the literature review, 3 themes stood out as vital for this project. Social comfort, workplace synergy, and community acceptance these 3 themes will be remarked as essential features in the design of the spaces and building programs.



# Choosing Sustainable development Goals

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future. There are 17 sustainable development goals aimed to improve various aspects of promoting human life and the environment.

4 goals are selected as a theme for this project. Based on the literature review, indicating the issues implicated. These chosen goals are to help remedy the dilemma. The goals selected are goal 8 Decent Work and Economy Growth, goal 9 Industries, Innovation & Infrastructure, goal 11 Sustainable cities and communities, and goal 12 Response Consumption & Production.

































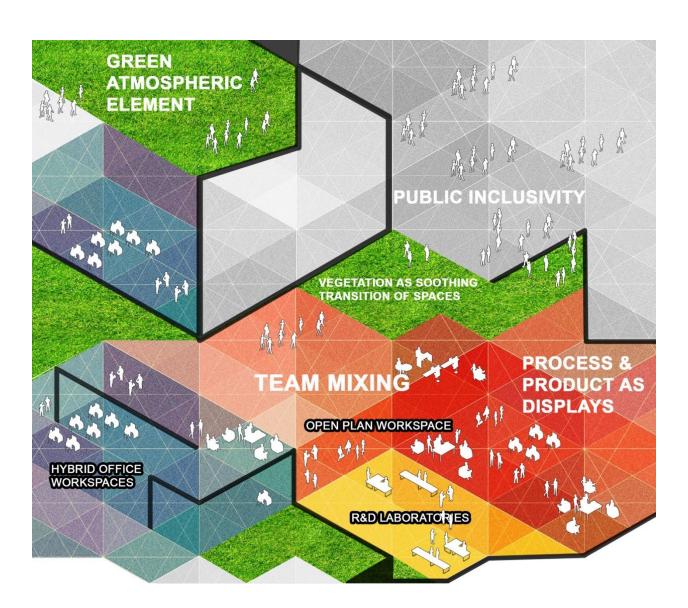


# Space Program

To utilise the paradox of collaborative spaces that is not intrusive. With spaces that gradually alters between public to private. Connecting the public with the occupants visually and spatially keeps the occupants secured.

The spaces are to emphasize how physically mixing people in space gives new reasons for people to communicate and connect. Designed as a type of advertising billboard to the community, by putting the tenant's innovative workspace on display. Transparency is the greatest advertising.

Products can be bought at retails stores located in the building. The products developed by the resident start-ups and prototyping companies residing in the building.



# SPACE HIEARCHY

#### TYPOLOGY:

#### **URBAN LIVING LAB =**

INNOVATION INCUBATOR + RESOURCE CENTRE + ON-SITE PRODUCTION FACILITIES + PUBLIC CONNECTOR

# 1) PRODUCTION + DESIGN

- Work Spaces + Studio Offices (Designing)
- Fabrication + Production floor (Prototyping)
- IT / Software Labs
- R&D Labs
- Workshops
- 3D Printing
- Conference Rooms

# 2) PUBLIC FACILITIES

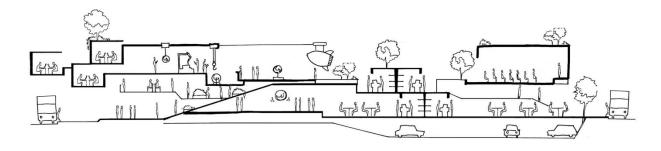
- Auditorium
- Seminar Rooms
- Gallery
- Library
- Demonstration Area (Advertisement)

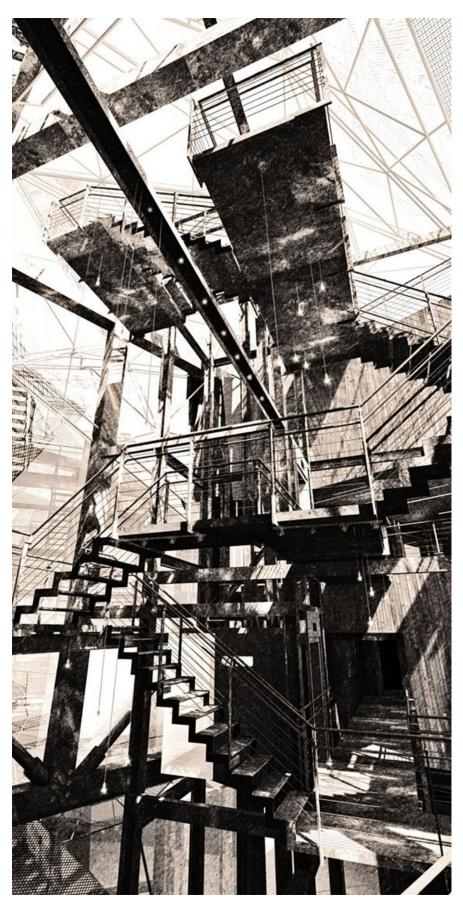
# 3) COMMERCIAL SPACE

- Rentable kiosk space
- Retail stores / Tradeyard
- Food Court (Existing on site)

# 4) TEMPORARY ACCOMODATION

- Rent a Room (hostel / 1 bedroom)





Initial artistic impression of building interior, showcasing transparency of multiple levels connected via walkways & stairs.

Source: Pinterest

# **CASE STUDY: Living Labs & Incubators**

Living labs and incubators in other countries have focused their designs on social interactions and transparency between co-workers. Usually either using large open space, interconnected nodes and atriums, as well as common gathering spots.

# **Precedent Studies**

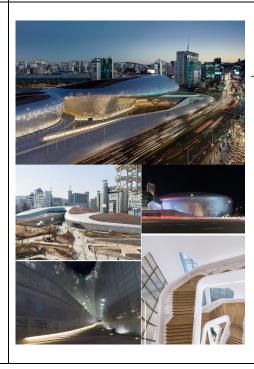
Name	T Hub Business Incubator
Location	Hyderabad, India
Size	7500 sqm
Category	Knowledge   Start-ups   IT
	A self-sustaining and liveable office environment. An energy compliant office building. Located in Hyderabad which is currently one of the largest start-up incubators
	The building is designed as a fresh and contemporary structure that facilitates collaborative workings and creative production of innovative goods and services. Circulation overlooks atrium in the middle and generally more private in office areas. Brick walls with steel structures holding vertical greenery
	Uses FCU air conditioning and the atrium acts as a lightwell for natural day lighting
	ATRILLY.

Name	Dongdaemun Design Plaza
Location	Seoul, South Korea
Size	89574 sqm
Category	Market   Public
	Throughout the design process, every building requirement was considered as a set of inter-related spatial relationships which will define the social interactions and behavioural structure in/around the project. These relationships became the framework of the design, defining how different aspects of the project, such as spatial

The completed façade incorporates a field of pixilation and perforation patterns, which creates dynamic visual effect depending on the lighting conditions and seasonal changes. It will take on different characters as the external condition changes.

organization, programmatic requirements, and engineering come

At night, the building will reflect all the LED lights and neon signs of the surrounding buildings. With the interplay of the built-in façade lighting, the building's appearance will be animated and take on the characteristics of its unique urban settings.



together.



Name	Google HQ   Googleplex
Location	
Location	California, USA
Size	52000 sqm
Category	Knowledge   IT   Start-ups
	Vision of merging a workplace with the experience in an educational environment, to allow the individual to conceive, investigate, and execute.
	A unified Master plan for the entire campus incorporating the language of a university. Accessory functions are placed on the "main street" while workplaces are located further away for privacy.
	The and Spoker  Company View  From the East  From t

Name	BlueCity
Location	Rotterdam, Netherlands
Size	12000 sqm
Category	Innovative Culture   Biotech
	An independent platform for the city of Rotterdam, its entrepreneurs and its inhabitants. To stimulate entrepreneurship and to contribute to the innovative culture in Rotterdam.
	Formerly a swimming pool / aquatic centre the complex is now a circular incubator housing over 30 start-ups, with the concept of 'a city greenhouse'. Start-ups are set up and housed within the building complete with workshops for experimenting.
	@denisguzzo
	AUDITORIUM POOL
	SUPERUSE

Name	Marineterrein Amsterdam Living Lab (MALL)
Location	Marineterrein, Amsterdam
Size	10000 sqm
Category	Innovative Culture   Startups
	Designed to provide a co-innovative setting, in which multiple stakeholders jointly test, develop and create metropolitan solutions.  Designed, with specific plots that can serve as test areas, also known
	as Living Labs. An integrated system of amenities, including ar infrastructural backbone, such as power, data and water, makes setting-up the test areas relatively easy.
	Testing and experimenting 'plug-and-play', in a flexible area. That car provide many possibilities to develop tests and research, in a real-life urban context.
	Concrete Structure building. Timber communal deck facing water front
	OPEN PIER WATER

# Incubators in Malaysia

Name	Reka Scape   Idea Workshop
Location	Cyberjaya, Selangor
Size	0.59 Acres
Category	Start-up   Business   Technology   IT
	Local Context, and because it is not a tech park. Location is isolated, very car dependent to city layout. Rekascape is a platform for start-ups and entrepreneurs to network and collaborate in variety of spaces provided; co-working offices, a gaming hall, a market place, pocket farms, maker's workshop, etc.
	Envisioned as adaptable space for future changes.
	A main permanent structure is arranged as an array of double-truss portal frame to accommodate the flexibility of use. Archetypal house-shaped boxes and voids are included to be the temporary and flexible components of the building.
	Lastly concrete boxes designed for mechanical and electrical rooms. Metal Frame Structure. Metal cladding skin and exposed truss. Open ventilation, requires minimum amount of air conditioning. Full use of natural daylighting via large openings, skylights, and full height glazed windows.
	SESBe SESBe

Name	Cyberview Accelerator Hub
Location	Cyberjaya, Malaysia
Size	-
Category	Knowledge   Technology   IT
	Malaysia' 1st known Living Lab. An accelerator for start-ups, providing coworking spaces and mentorship programs. Large access to local and regional tech ecosystem due to its location in Cyberjaya.  The overall design of the structure is a corporate look, emphasising on the dull grey colour of raw concrete. The structure is not specifically designed as a living lab. The building form is derived from the repetitive and uniformed preconceived designs of various office spaces in Cyberjaya's early development phase.
	CYBERVIEW CYBERV CYBERVIEW CYBERVIEW CYBERVIEW CYBERVIEW CYBERVIEW CYBERVIEW

Marsa	Malaysian Clabal Innavation and Creativity Control MaCIC									
Name	Malaysian Global Innovation and Creativity Centre   MaGIC									
Location	Cyberjaya, Malaysia									
Size	9.11 acres									
Category	Start-up   Knowledge   Technology   IT									
	A landmark government-private sector initiative to drive creativity and innovation to advance business in an intensely competitive globalised environment.									
	MaGIC Cyberjaya Campus Co-Working Space is designed to be a collaborative workspace for the start-up community. The building features various facilities and services catered to new innovation techniques and technology such as 3D printing.									
	Designed as a shared office doubling as a community-driven hangout where entrepreneurs could gather to create, share, and discuss ideas.									
	Lounges and social spaces have been made a more key component. But the overall atmosphere and look is too corporate and rigid. RC structure with glass facades. Window glazing and emphasis on daylighting, mostly active solutions rather than incorporating passive sustainable features.									

Name	Sunway iLabs
Location	Bandar Sunway, Selangor
Size	
Category	Startup Accelerator   R&D
	Sunway iLabs is equipped with a collaborative space and tools catered to help students and entrepreneurs. iLabs Makerspace is located on the Ground Floor of Sunway University and is accessible to students and entrepreneurs.  Production facilities called Student MakerSpace. Provides 3D printers, Laser Cutters, powered workspaces, etc. Corporate VC backed accelerator to help prototyping and testbed projects.
	LABS

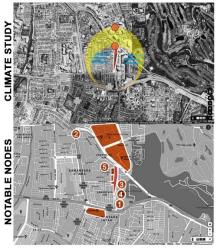
# SITE INVESTIGATION + CONTEXTUAL STUDIES

# Site Selection

3 initial sites were selected for the project. The sites were determined a viable area of development for the living lab project due to meeting various requirements meant for the sustainable lifespan of an urban living lab.

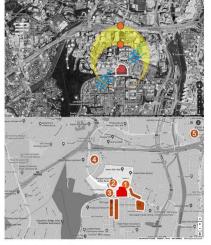
- 1. Diverse cluster of various existing local businesses
- 2. Close proximity of universities or other institutions
- 3. Major Corporations
- 4. Supportive local government (within development structure plans)
- 5. Close proximity of public transportation (trains, busses, etc)
- 6. Various forms of entertainment / events

Jln Damansara, Damansara Kim, **Petaling Jaya** 



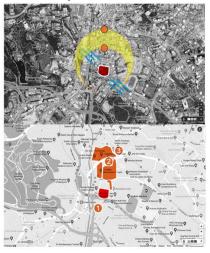
- One Utama (mall): 20min train
- Menara Glomac (Real estate developer); 3min walk Next Academy (Coding & Digital Marketing School) 3min
- KPJ Hospital; 4min walk
- Various shops & restaurants; within walking distance

Jln Kerinchi, Bangsar South, Kuala Lumpur



- The Sphere (mall); 3min walk
- The Vertical (hotel & residence): 5min walk
- Nexus Bangsar South (business centre); 3min walk KL Gateway (mall): 10 min walk
- Various shops & restaurants; within walking distance

JIn Tun H S Lee, City Centre, Kuala Lumpur



- Asia e University (institution); 12min walk
- Petaling Street Market; 10min walk Kompleks Kotaraya; 12min walk
- Various shops & restaurants; within walking distance



- Bus Stop; within site boundary
- TTDI MRT Station; 4min walk Vehicular access through Jln Damansara (Secondary



- Bus Stop; within site boundary
- Universiti LRT Station; 10min walk Kerinchi LRT Station; 16min walk
- (10) Vehicular access through Jln Kerinchi (Primary road)



- LRT Pasar Seni; 4min walk
- Maharajalela LRT Station; 6min walk Kuala Lumpur KTM Station; 13min walk
- Bus Stop: 4min walk
- Vehicular access through Jin Tun h S Lee (Collectorroad)

Site 1 is selected due to meeting the most requirements.

SITE NAME	Jin Damansara	Jln Kerinchi	Jin Tun H S Lee
LAND TYPE	Green Area	Commercial	Commercial
OWNERSHIP	MBPJ	UOA	-
LANDMARK	Menara Glomac	Menara Glomac	Pasar Seni
CURRENT USAGE	Unregistered Business	Worker Village	Parking Lot
SITE ACCESSIBILTY	••••	••••	••••
SURROUNDING ROBUSTNESS		••••	••••
SITE PERMEABILITY	••••	••••	••••
DEVELOPMENT POTENTIAL	••••	••••	••••
ADJACENT BUILDINGS  RESIDENTIAL  COMMERCIAL  OFFICE  SCHOOL  RECREATIONAL			
TRAFFIC CONDITION WEEKDAY WEEKEND	*****	*****	
PUBLIC TRANSPORTATION BUS KTM LRT			
PEDESTRIAN FRIENDLY BIKE FRIENDLY		*****	•••••
HUMAN ACTIVITY	••••	••••	••••
SITE SLECTION	1	2	3

# **Macro Site Analysis**

Site: 3.135703, 101.629474

Jln. SS20/10, Damansara Kim, Bukit Kiara, 46150 Petaling Jaya,

Selangor

# Historical Background

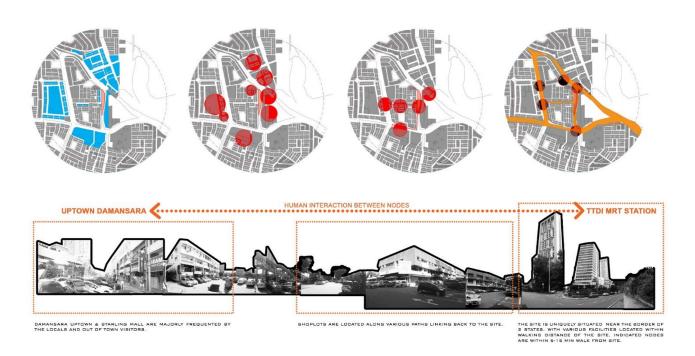
PETALING JAYA a town that was planned to be a satellite town to accommodate the overcrowding in Kuala Lumpur, Petaling Jaya had become a Developed Town in the pursuit of modernization and development.

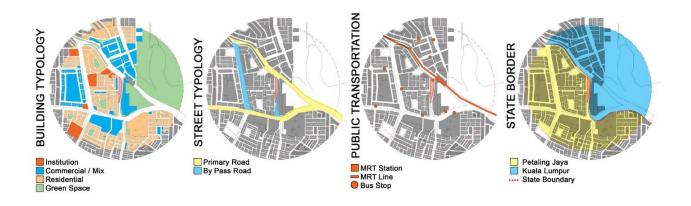
Petaling Jaya City Council (MBPJ) has recently organised the PETALING JAYA STARTUP FESTIVAL 2019. MBPJ has stated in its structure plan to set itself as a strong advocate for innovation culture in Malaysia. While PJ is a relatively affluent city, it also houses many economic migrants from other states. The start-up culture embedded in PJ is currently on the rise, making it a good choice for this project.



The site is surrounded by various nodes that create a link that locals use to navigate during walks. Most popular nodes are mainly commercial such as shop lots and malls. Outside visitors frequent these nodes and travel via the established link of nodes that the locals have been using.

Vehicular entrances are located at certain junctions of the highways surrounding the site. An emphasis on pedestrian flow and facilities over vehicular is recommended to strengthen walking culture. Especially due to an existing walking culture embodied by the locals.





The local demographic of Petaling Jaya. Source: MBPJ Dep. Planning and Development

P	PEMBAHAGIAN PENDUDUK MENGIKUT UMUR UMUR (TAHUN)											YEN >>						
BIL	KAWA SAN	00-	05-09	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	>75	JUMLAI
1.	SEK 1	121	119	167	230	253	250	186	175	300	132	177	133	134	86	99	122	2,684
2.	SEK 1A	21	21	34	41	61	38	32	56	37	50	65	38	42	30	40	59	665
3.	SEK 2	30	41	43	52	74	120	113	65	61	55	62	49	55	31	33	37	918
4.	SEK 3	90	109	124	115	170	178	121	120	141	110	123	98	80	62	66	91	1798
5.	SEK 4	275	306	211	386	535	415	283	195	220	188	222	184	157	117	110	162	3966
в.	SEK 5	371	509	415	435	629	712	623	624	577	612	543	391	519	313	272	362	7907
7.	SEK 6	57	96	114	162	202	182	109	115	118	117	135	123	114	77	79	129	1929
8.	SEK 7	129	239	83	87	102	131	118	49	62	93	94	38	31	23	13	49	1341
9.	SEK 8	70	71	188	180	303	323	266	149	144	137	181	137	99	83	69	109	2509
10.	SEK 9	7	10	16	18	64	41	22	15	23	17	22	23	23	27	16	51	395
11.	SEK 10	27	34	36	42	97	82	83	69	54	71	60	47	44	31	35	66	878
12.	SEK 11	38	37	42	151	657	242	112	99	74	107	100	75	81	61	30	67	1973
13.	SEK 12	111	99	149	188	393	342	224	194	186	256	198	162	160	110	108	193	3073
14.	SEK 13	4	0	1	10	12	11	4	3	1	5	4	2	5	7	1	7	77
15.	SEK 14	388	347	377	587	1294	1245	767	547	514	448	474	478	485	356	336	418	9061
16.	SEK 16	223	1511	89	3065	655	473	304	276	237	315	155	208	188	159	78	153	8089
17.	SEK 17	295	364	375	626	1735	1369	684	501	680	521	463	686	515	461	413	358	10046
18.	SEK 17A	42	39	36	38	200	152	59	36	35	113	50	25	58	19	21	22	945
19.	SEK 18	243	248	277	254	378	405	343	318	248	246	216	165	123	81	69	146	3760
20.	SEK 19	367	257	345	346	935	834	677	389	318	355	329	255	262	184	151	118	6122
21.	SEK 20	21	41	63	190	177	187	135	134	102	111	126	125	387	126	124	135	2184
22.	SEK 21	73	152	158	200	438	500	374	243	268	247	267	292	327	184	251	249	4223
23.	SEK 22	165	188	187	177	282	280	206	233	174	142	141	122	109	75	56	98	2635
24.	SEK 51	27	24	20	26	48	99	52	45	26	36	34	30	28	16	31	43	585
25.	SEK 51A	659	568	456	554	1031	967	596	524	475	392	400	303	212	176	159	120	7592
26.	SEK 52	68	21	93	111	322	229	63	37	54	216	104	123	38	42	15	62	1598
	JUMLAH	3922	5451	4099	8271	11047	9807	6556	5211	5129	5092	4745	4312	4276	2937	2675	3426	8895

According to the information generously given by MBPJ it can be deduced that the local area of Petaling Jaya SS20 has a potential of 2071 users. The full maximum capacity of the building is to be 3000 Pax, including resident innovators, staff and the general public. 200 people to be allowed to reside in the building's rent a room single night accommodation.

	Floor space factors (1)	
	Type of accommodation 🕬	Floor space factor m²/persor
1.	Standing spectator areas, bar areas (within 2m of serving point) similar refreshment areas	0.3
2.	Amusement arcade, assembly hall (including a general purpose place of assembly), bingo hall, club, crush hall, dance floor or hall, venue for pop concert and similar events and bar areas without fixed seating	0.5
3.	Concourse, queuing area or shopping mall (10)	0.7
4.	Committee room, common room, conference room, dining room, licensed betting office (public area), lounge or bar (other than in 1 above), meeting room, reading room, restaurant, staff room or waiting room (9)	1.0
5.	Exhibition hall or studio (film, radio, television, recording)	1.5
6.	Skating rink	2.0
7.	Shop sales area <sup>(7)</sup>	2.0
8.	Art gallery, dormitory, factory production area, museum or workshop	5.0
9.	Office	6.0
10.	Shop sales area ®	7.0
11.	Kitchen or library	7.0
12.	Bedroom or study-bedroom	8.0
13.	Bed-sitting room, billiards or snooker room or hall	10.0
14.	Storage and warehousing	30.0
15.	Car park Two persons	s per parking space

# **Micro Site Analysis**

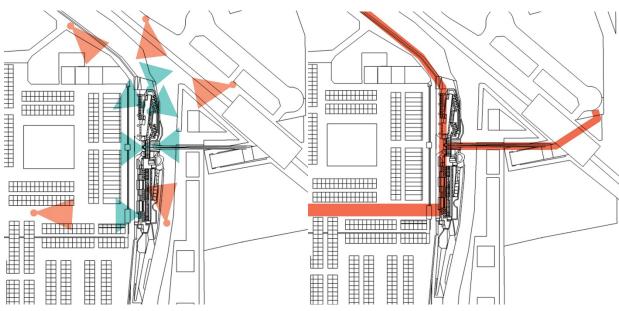
# SITE LEGIBILITY





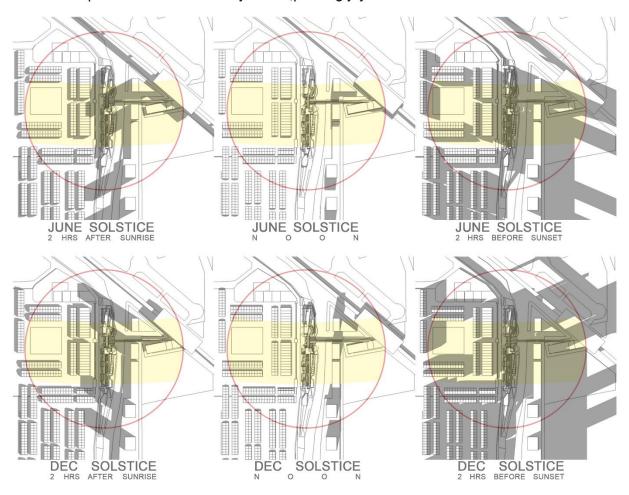






# **SUN PATH & SHADOW STUDY**

Source: http://sun-direction.com/city/39336,petaling-jaya/



The optimal time of day for harvesting solar energy using photovoltaic panels is from 10am - 3pm. From the shadow study a structure that is 20 metres above ground level can avoid the shadows casted by the surrounding local high-rise structures. Enabling the full capacity of solar panels harvesting efficiency.

### **SWOT**

# Strength

- Pre-established linkages that chains local nodes
- Strong local craft culture
- Strong local walk culture
- Popular nodes within walking distance from site (5 15 mins)
- Strong sense of belonging of locals, yet will welcome visitors and outsiders

# Weakness

- Existing local food court (in disrepair) on selected site
- Highways surround site, will cause noise

# **Opportunities**

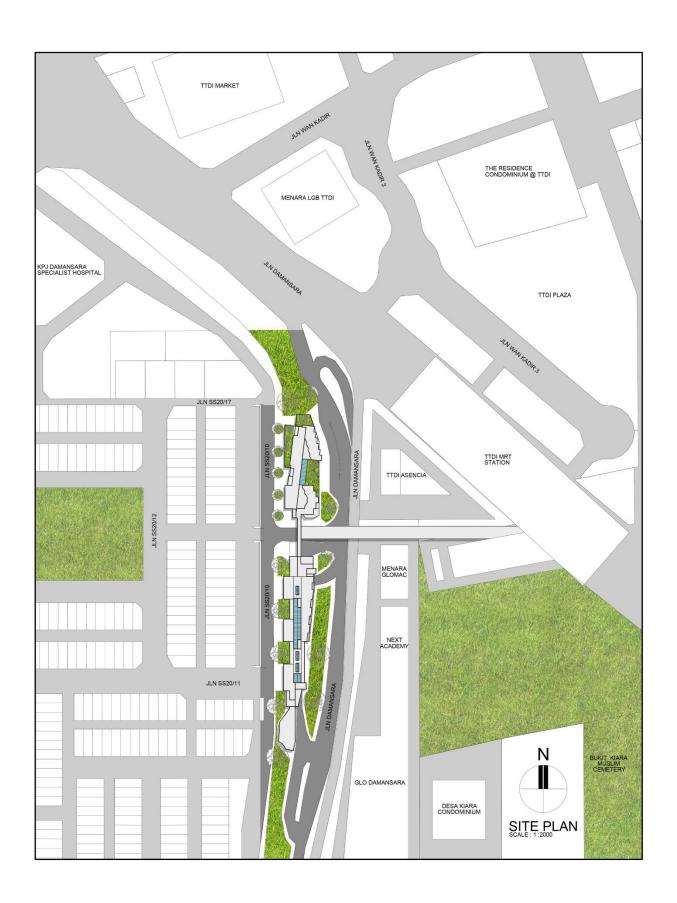
- Close proximity to public transportation nodes (MRT station)
- Existing bus stop located near selected site
- Plenty of trees on site (green lung)

### Threat

- Hilly landscape and slopes can cause problems during rain and wet seasons

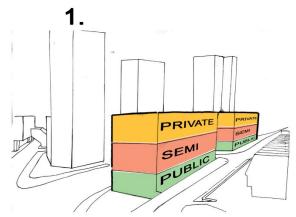
# **Site Synthesis**

- The urban lab will focus pedestrian flow, engage public with links to existing nodes.
- The existing food court will be assimilated into the urban lab design program, (with emphasis on providing for the current owners).
- Include public transport facilities (bus top) in design.
- Save trees on site or relocate rather than cut down.
- Utilise stilt design structure and form to minimise footing and reduce problems due to slope landscape of site.
- The locals do not favour avant-garde architecture designs, and prefer that any new buildings to appreciate the current local elements (trees and vegetation included).



# **DESIGN PROCESS**

# Form Development

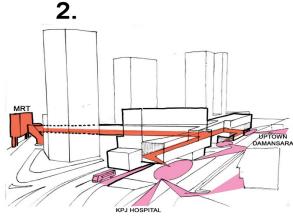


#### **HIERARCHY**

Zoning of space hierachy via height.

Public areas mostly on ground level for easy access.

Private areas located on upper floors yet still be visually connected via atriums.

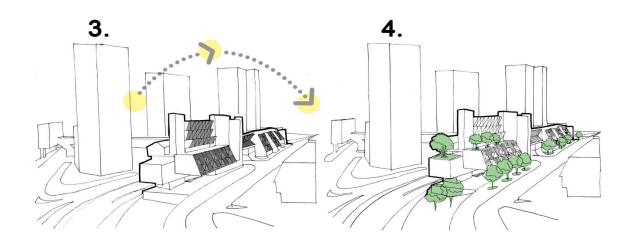


# T.O.D

Pedestrain bridge linking TTDI MRT station to building, to avoid road for safer pedestrian crossing.

Bus stop located on site intergrated into design.

3 large entrances facing local nodes; Shoplots, Uptown Damansara and KPJ Hospital.



# **FACADE**

The skin is perforated steel facade and held up by steel frames. To protect major surface areas of the building.

Solar photovoltaic panels are located above the production block to provide additional power to the facilities.

# **VEGETATION**

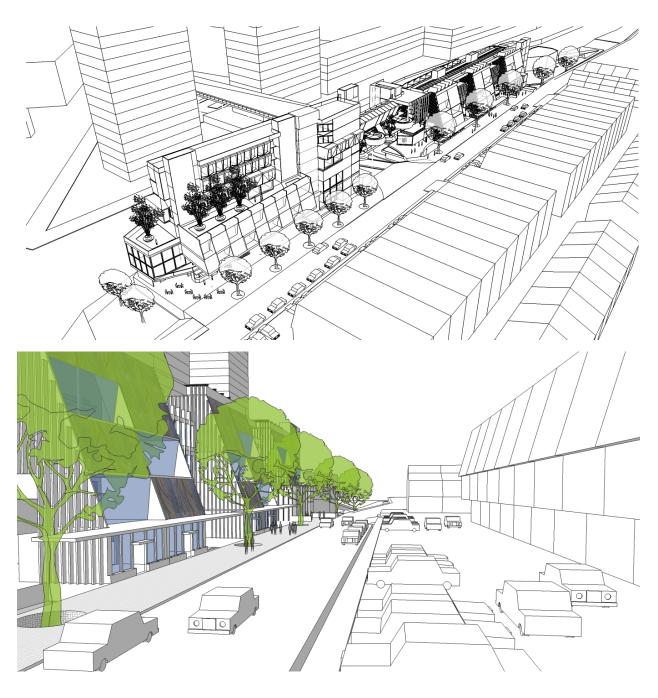
Several existing large trees are to be relocated but not chopped down surrounding the site.

Vegetation and green roofs are to improve various design areas and provide a calm environment.

## Locale Appreciation

The building is to be designed into 2 notable blocks. With the overall form designed to encapsulate the local architecture. Per the request of the local population so as to not create something too alien to their locale.

The façade reflects the form of the adjacent shop-lots, with added differences in the design to establish itself as a its own identity. Yet still recognising the local identity and architecture of the local structures.



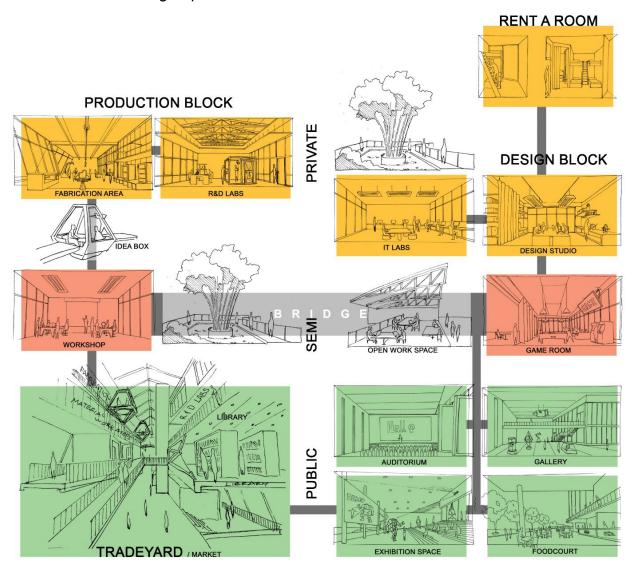
### **Zoning into Blocks**

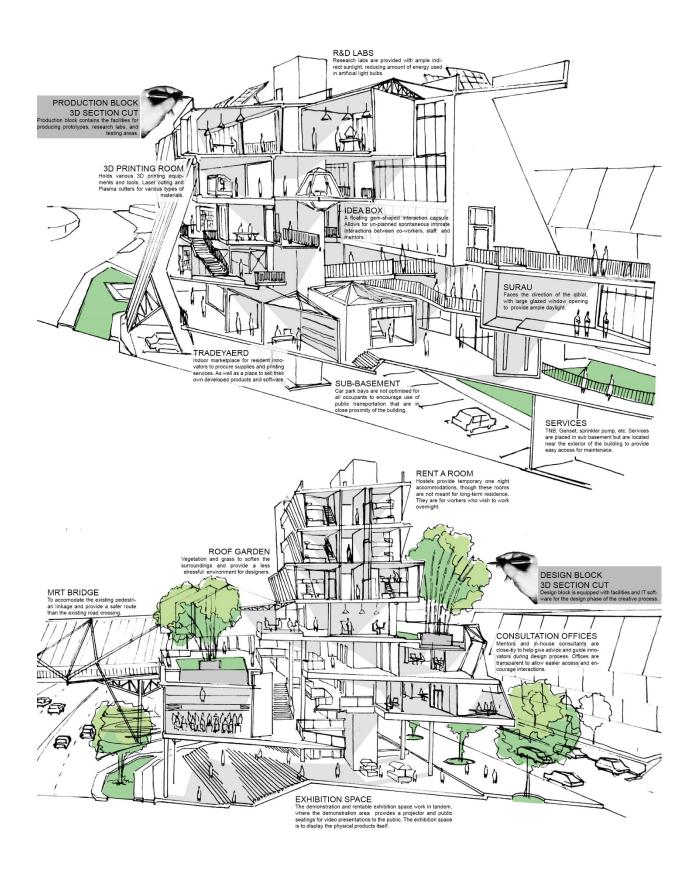
### Design block

Equipped with facilities and IT software for the design phase of the creative process. This area is split form various areas that produces noise and heat. The design block mostly focuses on relaxing and calm surroundings to enhance social comfort.

### Production block

Contains the facilities for producing prototypes, research labs, and testing areas. Fully equipped with 3D printing facilities, metal + woodworking workshops, and plasma cutting tools. Various Gem-like idea boxes are to be used to initiate unplanned multi-project consultations diverse groups.



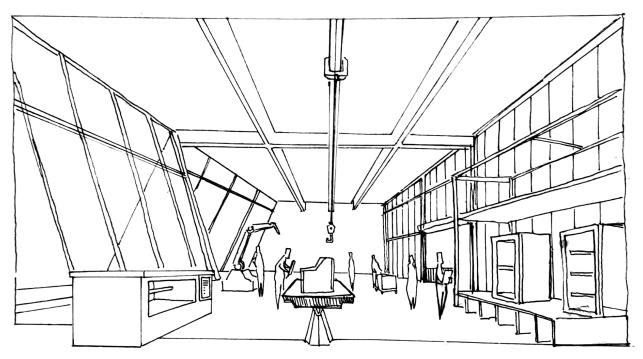


### **Design Intentions**

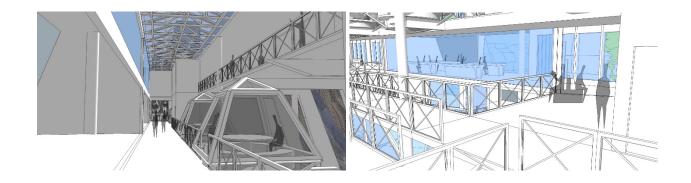
### Workshop + Fabrication Spaces

Main spaces for co-working and design are located above the public areas on the upper floors. This is to avoid physical contact with the public, but still allows the public to view the work via the large atrium.

The production block will hold the large and heavy equipment, Activities in the production block are meant to be loud, noisy, hot, and uncomfortable.

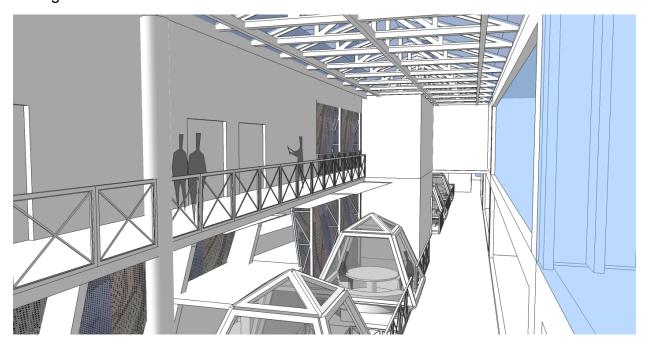


The hallways and main atrium have various nooks and mini lounges to provide users with solace and to relax. Idea boxes shaped as gems (Hidden Gems) are located floating above the atrium, to encourage cross-platform discussions.

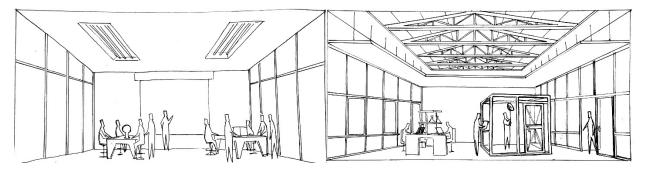


### R&D Labs

Research labs designed to conduct experiments and tests for product research are located near the top section of the production block. These labs are fully equipped with acoustic panels to block and minimise noise to create a sterile environment for optimal testing.



Large window portals and skylights are added to bring In ample natural light to illuminate the spaces. Though if the lab requires it, large artificial light fittings are included if the tests are required to work with non-natural light sources.

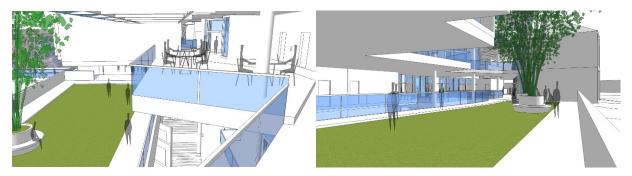


## **Testing Chamber**

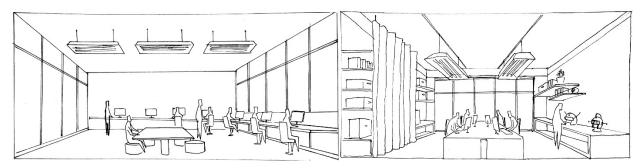
A large spacious room to allow for various experiments and tests on prototypes. Placed at the farthest section of the building away from the populated areas to provide a safer environment during testing.

### Design + IT Software Production Spaces

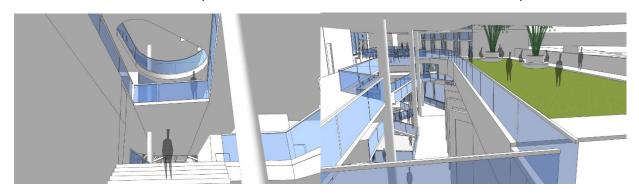
The design block holds spaces meant for digital work and designing process. This area is to maintain a quieter atmosphere so as to help the users focus better. Open work areas are placed near intersection nodes and hallways to encourage interactions and to affirm visual transparency between co-workers.



Tall vegetation and grass are implemented into the design via green roofs and gardens, to soothe and soften various areas of the block. Open work areas are located between major studio clusters to encourage discussions amongst co-workers and other project groups.

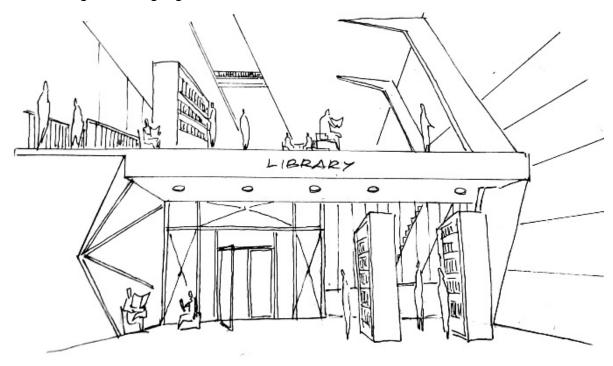


The upper design floors are kept separate from the public yet still retains its visibility; this is to infuse the sense of public acceptance. Where innovators are acknowledged by the visitors of their existence. With the gallery located beside the public linkages that also showcases the works and products of the resident innovators and entrepreneurs.



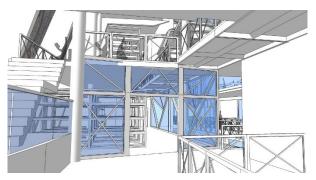
## Library

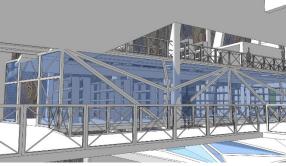
The linear form of the design creates a flow through the entire building, allowing the public and users to view the various design and production spaces within. Areas that are accessible to the public are located on the lower floors. With area like the library placed in between to provide easy access for both resident innovators and public to use. Also, to encourage co-mingling between one another.



The library is split into 2 sections. The enclosed sections is located on the lower level adjacent to the library management office and storage. This area is covered in soundproof glass due to its close proximity to the trade-yard below. This area is air conditioned and provides reading areas complemented with seats to accommodate those who wish for a quiet area to gather information and look up sources.

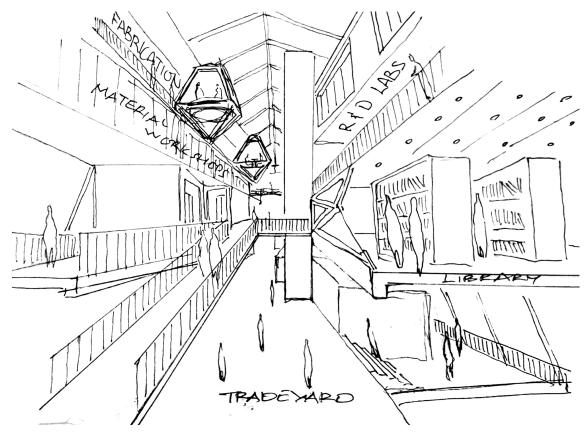
Above the enclosed library is the open section, where it acts less of a library and more of a material gallery. Showcasing data surrounding various materials and its uses for product designs. This area encourages discussions between individuals to interact.





### Trade yard / Market

An indoor marketplace for resident innovators to procure supplies and printing services. As well as a place to sell their own developed products and software.



The retail area is accessible to the public from the western façade. Where not only large entrances are there to accommodate the visitors, but retail shops facing outwards can act as funnels to welcome the consumers further into the building.



## **Demonstration Space**

The design block holds the outdoor exhibition spaces to demonstrate larger designs and products to the public and visitors.



Though indoor exhibition spaces are also included on the higher floors, such as galleries and auditorium. The auditorium includes rotatable louvers that acts either as doors to create an inviting pull to visitors or a barrier to wall of outside disruptions for more privacy.



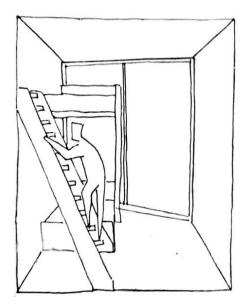
## Food court

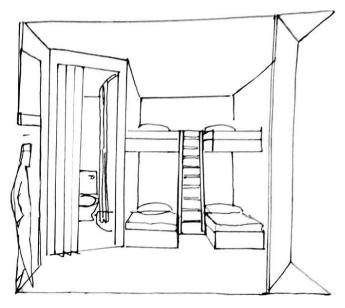
A food court is integrated into the design to respect the existing eateries located on the site. The food court is open to public, designed on top the existing area where the previous eateries and stalls where located. This is so as to not cause a loss of belonging to the locals who frequent these establishments.



### Rent a Room / Hostel

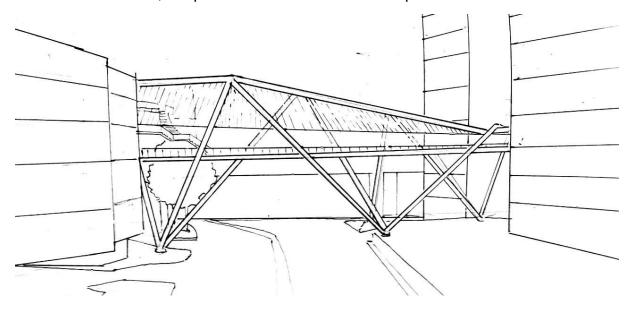
Hostels provide temporary one-night accommodations, though these rooms are not meant for long-term residence. The rooms are for workers who wish to work overnight.

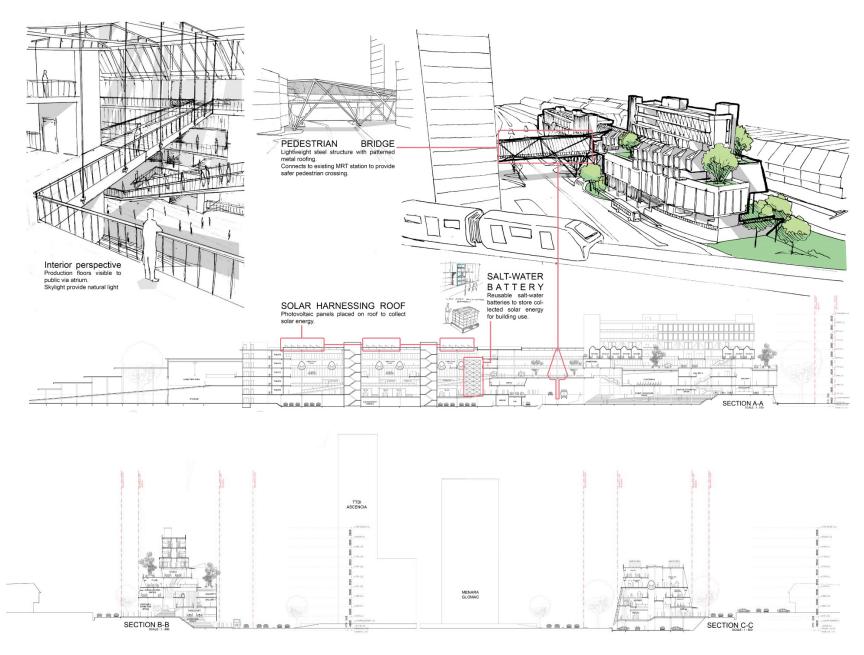




### Pedestrian Bridge

Existing form of crossing Jalan Damansara from the site to TTDI MRT Station is via the road. Though there are no traffic lights to halt traffic, only a zebra crossing. Providing a bridge that connects straight from the station into the building would not only direct public visitor to the structure, but provide a safer alternative for pedestrians as well.





## **Schedule of Accommodations**

GROUND FLOOR LVL	FLOOR AREA (SQM)	NO.	
BUS DROP OFF	81.20	1	81.20
LARGE EVENT SPACE	289.10	1	289.10
LIFT LOBBY	17.75	1	17.75
TNB	40.50	1	40.50
GENSET	40.50	1	40.50
MDF	10.60	1	10.60
MSB	10.60	1	10.60
M&E	10.60	1	10.60
CARPARK	1034.50	1	1034.50
MAIN STORAGE	316.80	1	316.80
UN/LOADING BAY	191.40	1	191.40
FIRE PUMP	22.50	1	22.50
SPRINKLER WATER TANK	38.90	1	38.90
FIRE STAIRCASE	16.90	4	67.60
	TOTAL FLOOR AREA	2161.95	SQM

1ST FLOOR LVL	FLOOR AREA (SQM)	NO.	
FOODCOURT	297.60	1	297.60
KITCHEN STALL	13.20	12	158.40
RENTABLE EXHIBITION SPACE	162.20	1	162.20
LIFT LOBBY	28.70	2	57.40
INTERACTIVE INFO CENTRE	66.80	1	66.80
TOILETS	25.50	3	76.50
RETAIL STORE	41.20	14	576.80
MARKET AREA	780.70	1	780.70
UN/LOADING BAY	48.20	1	48.20
REFUSE CHAMBER	29.80	1	29.80
WATER SUPPLY	10.00	1	10.00
FIRE STAIRCASE	16.90	7	118.30
	TOTAL FLOOR AREA	2382.70	SQM

2ND FLOOR LVL	FLOOR AREA (SQM)	NO.	
INDOOR EXHIBITION SPACE	186.50	1	186.50
GALLERY 1	183.10	1	183.10
AUDITORIUM HALL	230.40	1	230.40
LECTURE ROOM 1	59.70	1	59.70
LIFT LOBBY	39.50	2	79.00
WORKSHOP	41.80	4	167.20
ENCLOSED LIBARY	199.70	1	199.70
OPEN LIBRARY	95.50	1	95.50
LIBRARY OFFICE	125.60	1	125.60
SECURITY CONTROL ROOM	45.90	1	45.90
LARGE TEST AREA	316.80	1	316.80
SURAU	98.20	1	98.20
TOILETS	25.50	3	76.50
FIRE STAIRCASE	16.90	7	118.30
	TOTAL FLOOR AREA	1982.40	SQM

3RD FLOOR LVL	FLOOR AREA (SQM)	NO.	
GALLERY 2	190.20	1	190.20
ADMINISTRATION OFFICE	132.90	1	132.90
MEETING ROOM	15.30	2	15.30
CONSULTANT OFFICE AREA	175.60	1	175.60
LECTURE ROOM 2	59.70	1	59.70
OFFICE STORAGE	10.50	1	10.50
LIFT LOBBY	39.50	2	39.50
OUTDOOR LOUNGE	83.20	1	83.20
MATERIAL WORKSHOP	157.80	3	157.80
STUDY ROOM	27.70	4	27.70
READING AREA	199.70	1	199.70
WORKSHOP STORAGE	41.30	1	41.30
TOILETS	25.50	3	25.50
FIRE STAIRCASE	16.90	7	118.30
	TOTAL FLOOR AREA	1277.20	SOM

4TH FLOOR LVL	FLOOR AREA (SQM)	NO.	
STUDIO WORK OFFICE	35.50	5	177.50
IT LAB	55.60	4	222.40
IT SERVER ROOM	55.10	1	55.10
OPEN WORK AREA	63.60	1	63.60
BRIDGE VIEW DECK	22.10	2	44.20
GAME ROOM	112.60	1	112.60
GREEN AREA	229.50	-	229.50
3D PRINTING ROOM	179.40	1	179.40
FABRICATION AREA	135.40	3	406.20
SEATING SPACE	9.00	6	54.00
FABRICATION OFFICE	53.70	1	53.70
FABRICATION STORAGE	41.80	2	83.60
LIFT LOBBY	39.50	2	79.00
TOILETS	25.50	3	76.50
FIRE STAIRCASE	16.90	7	118.30
	TOTAL FLOOR AREA	1755.60	SQM

5TH FLOOR LVL	FLOOR AREA (SQM)	NO.	
STUDIO WORK OFFICE	35.50	15	532.50
OPEN WORK AREA	85.90	1	85.90
R&D LAB	46.50	7	325.50
GREEN AREA	106.80	-	106.80
LIFT LOBBY	39.50	2	79.00
R&D STORAGE	41.30	1	41.30
TOILETS	25.50	3	76.50
FIRE STAIRCASE	16.90	7	118.30
	TOTAL FLOOR AREA	1365.80	

6TH FLOOR LVL	FLOOR AREA (SQM)	NO.	
HOSTEL ROOM	16.20	19	307.80
REFUSE CHAMBER	5.70	1	5.70
LIFT LOBBY	24.60	1	24.60
STORAGE	3.50	1	3.50
FIRE STAIRCASE	16.90	3	50.70
	TOTAL FLOOR AREA	392.30	SQM

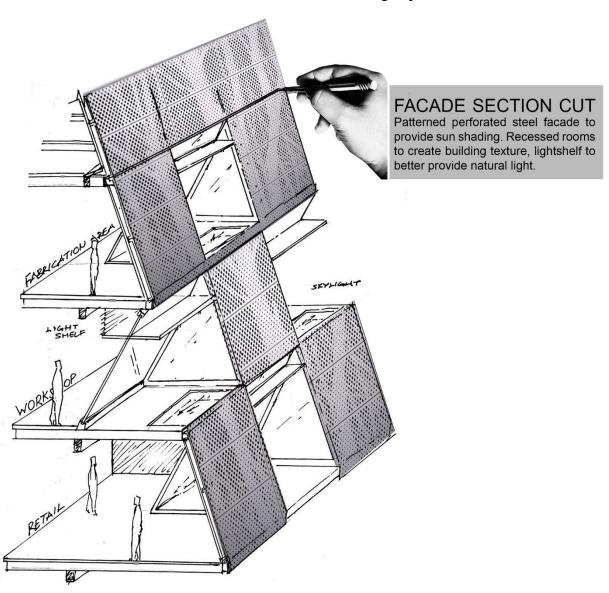
7TH FLOOR LVL	FLOOR AREA (SQM)	NO.	
SINGLE RENT BEDROOM	6.50	29	188.50
PANTRY	9.80	1	9.80
LOUNGE	18.90	1	13.70
REFUSE CHAMBER	5.20	1	5.20
LIFT LOBBY	24.60	1	24.60
STORAGE	6.50	2	13.00
MEN'S COMMUNAL BATHROOM	66.70	1	66.70
FIRE STAIRCASE	16.90	3	50.70
	TOTAL FLOOR AREA	372.20	SQM

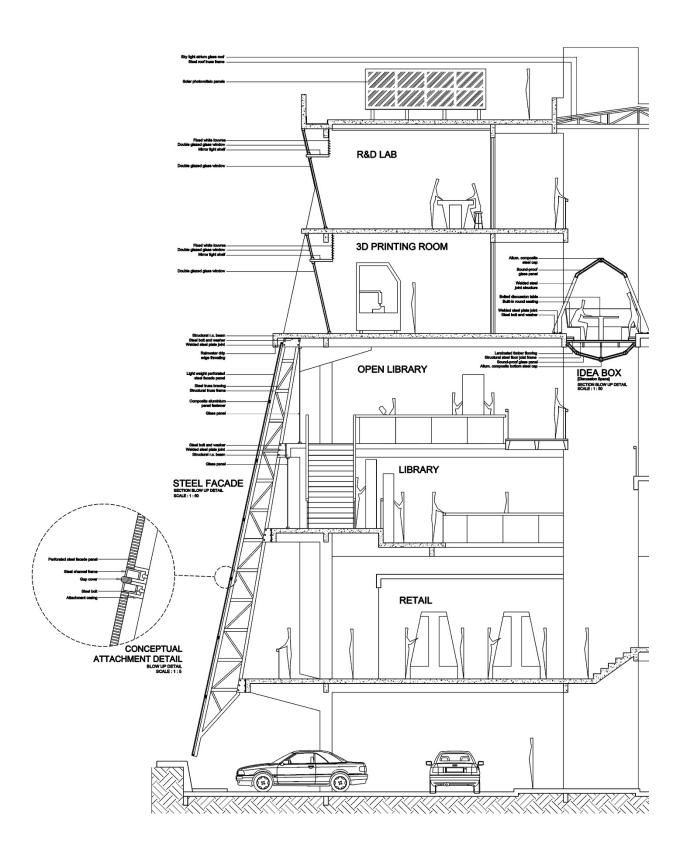
8TH FLOOR LVL	FLOOR AREA (SQM)	NO.	
SINGLE RENT BEDROOM	6.50	29	6.50
PANTRY	9.80	1	9.80
LOUNGE	18.90	1	13.70
REFUSE CHAMBER	5.20	1	5.20
LIFT LOBBY	24.60	1	24.60
STORAGE	6.50	2	13.00
WOMEN'S COMMUNAL BATHROOM	66.70	1	66.70
FIRE STAIRCASE	16.90	3	50.70
	TOTAL FLOOR AREA	372.20	SQM
BUILDING GROSS FLOOR AREA	,	12062.3	5 SQM

## **BUILDING STRATEGIES**

## Sun Shading panels

Due to the shape of the site, the extensive façade of the building is facing east and west. Perforated steel panels are to act as skin to protect the interior of the building from direct sunlight. Several parts of the façade are recessed to provide a viewing portal and still be shaded from the sun, also to add texture to the building façade.

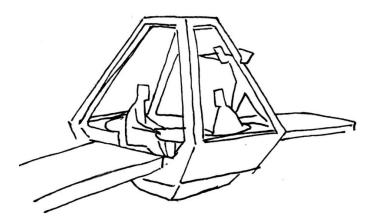




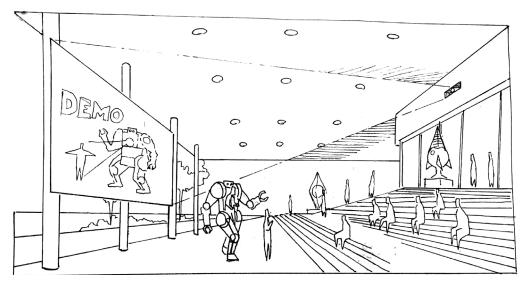
### Acoustics

Most areas in the production block will produce loud noises, which would cause discomfort and disrupt other people in the building. Sound proof foam and vinyl are implemented to reduce the noise transfer within walls ceilings and floors. Reducing the critical frequencies generated from mechanical equipment from the workshops and production areas.

The idea box, a gem-shaped private discussion space utilises sound proofing glass to mitigate the noise based around the production areas.



On the other hand, the demonstration space located on the ground floor of the design block is surrounded by plants and vegetation that acts as a natural sound barrier. This is coupled with artificial sound proofing methods such as the sound proofing reverberation panels hung around the space so as to minimise the external noise whilst enhancing the sound within. The demonstration space requires not only outdoor sound proofing barriers, but sound enhancing features as well to better help in projecting sound during a presentation.



### **Net Zero Building Strategies**

The concept of a Net Zero Energy Building (NZEB), is one which produces as much energy as it uses over the course of a year.

### **Energy Efficiency**

#### Passive:

- Natural daylight:
  - Large areas are open and covered with permeable perforated metal facades. Utilises mostly indirect daylighting to illuminate during the day.
  - Studio and office areas incorporate light shelves to brighten certain areas that require generous amount of light.
- Insulation:
  - Rooms within the building are lined with thermal and acoustic insulation foam and vinyl.
  - Acoustic insulation also doubles as heat insulators. This is to reduce heat transfer between air-conditioned areas. Reducing the amount of cost and workload on air-conditioning.

#### Active:

- Smart meter:
  - In-house servers keep track of energy use, consumption costs and other data in real-time.
  - This is to work in tandem with the automated building management system (BEMS) to allow the consumer to manage their energy, save money and reduce carbon emissions.
- Building energy management system (BEMS):
  - Located in the control room is the automated smart building control system that regulates power and energy usage and building functions within the structure.
  - Functions such as ventilation, air conditioning (HVAC), lighting and security features. As well as managing eco-friendly features of the building such as rainwater harvesting, solar panel rotations, rainwater collection, and power storage.

### Rainwater Harvesting

Included rainwater harvesting features are a requirement set by MBPJ via enacting their new structure plan to further develop Petaling Jaya.

Rainwater will be harvested via roof and rain pipes which will then be stored within the main water tank located in the building. The collected water will be filtered and used mainly for toilets, air conditioning and watering the vegetation.

### Integrated Renewable Energy Resource

To reduce carbon emissions and energy wastage by focusing to collaborate on-site renewable energy resource with recyclable energy storage system.

#### Automated Solar Voltaic Panels - Maximum coverage on roof

Solar energy to provide power mainly for the production block. The harvested energy is to be stored on-site via batteries, reducing the wastage of electrical power.

The solar panels are placed on a rotating platform that will follow the sun on a set time from 10am until 3pm to harvest as much power within the time frame. The building management system will operate the movement of the solar panels with human supervision from the control room located in the production block.

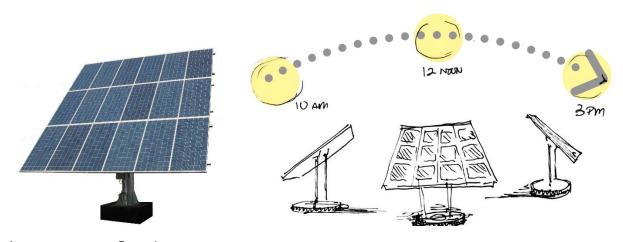


Image source: Google

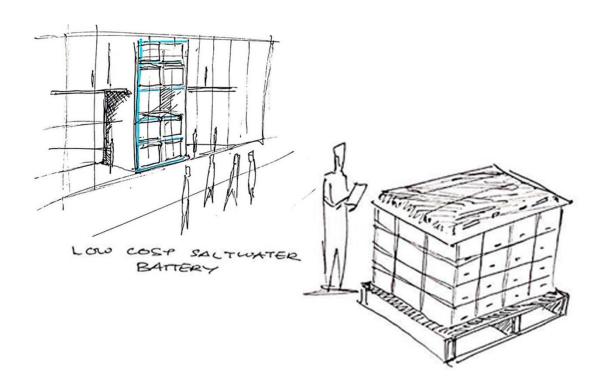
### Buildings as Batteries - saltwater battery electrical storage system

These batteries are unique in that they do not need to be immediately charged once they have been discharged and because they are non-toxic, non-corrosive, and contain no heavy metals, which can be disposed of as ordinary trash.

- Nontoxic no heavy metals | non-flammable
- o Recyclable (Port Klang 33.5km | 40min drive)
- 8 yrs. life span (5yrs warranty)



Located above the TNB and Genset rooms, placed in the trade yard displayed to the public. Advertising to possible consumers wishing to integrate the technology into their lives.



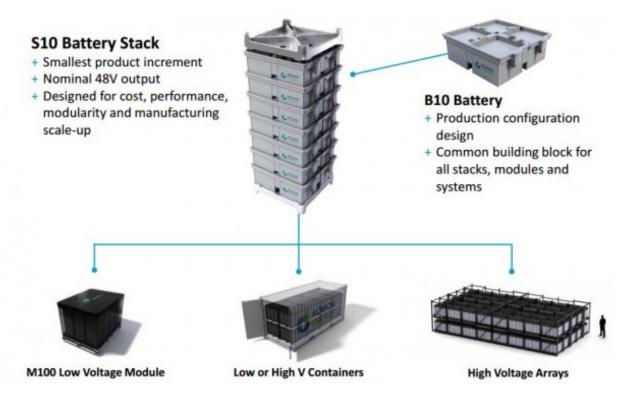
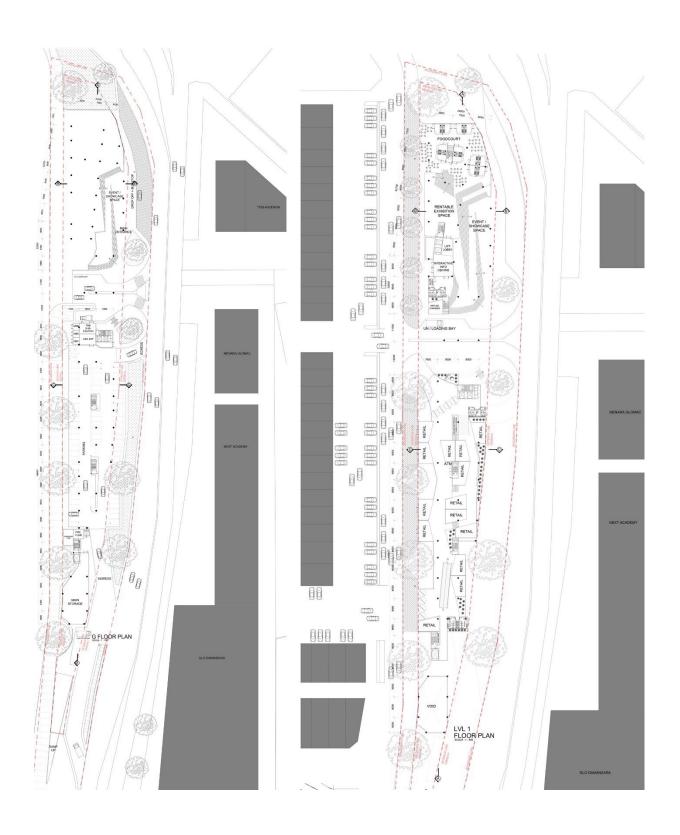
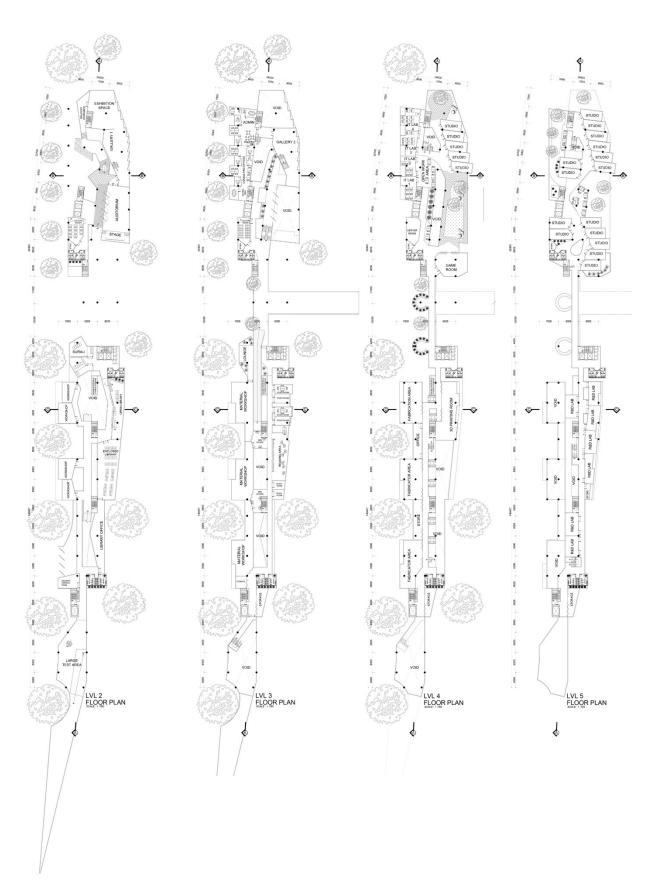


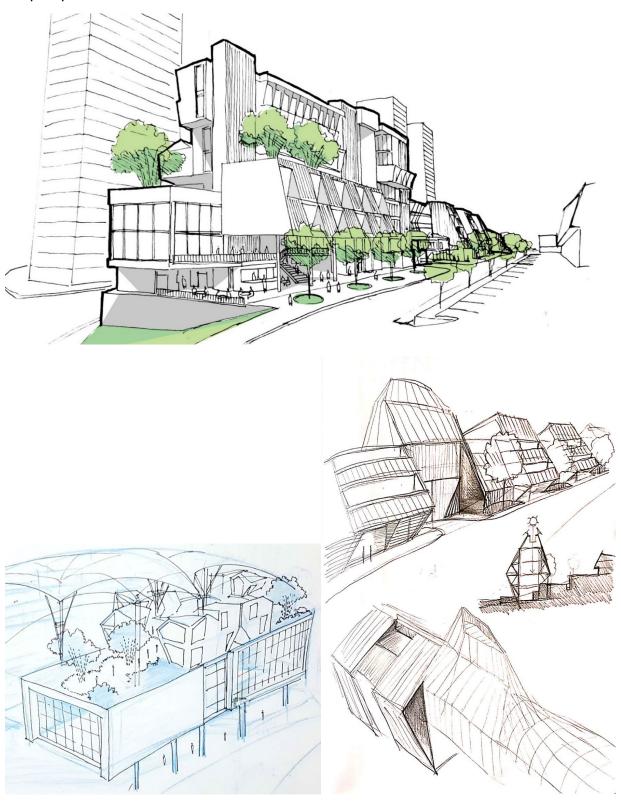
Image source: <a href="https://www.nanalyze.com/2013/11/aquion-energys-saltwater-batteries/">https://www.nanalyze.com/2013/11/aquion-energys-saltwater-batteries/</a>



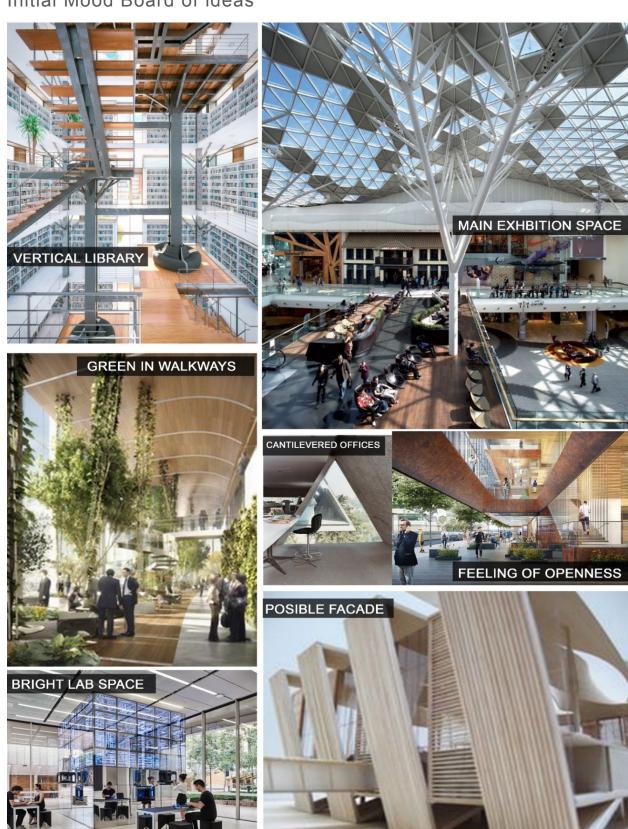




# 3D perspective sketches



## Initial Mood Board of ideas



Initial Physical Model



# Site Massing Models





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