REFUGEE HABITAT

REPORT ON ARCHITECTURAL AND MEDIA STUDIES

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Introduction

Before describing my research into S.M.A.R.T. Environments and my computational strategy, I will give a brief summary about my concept and design strategy of my graduation project. The concept is to design a living environment, a habitat, for refugees, who are granted asylum. This habitat is meant to be a stepping stone in their integration process, in which they learn about Dutch culture, language and prepare to be fully adopted in Dutch society. The location of this centre is in the Europoint-towers in Rotterdam. The open floor plan and good connectivity make it a great location. The towers, which are now partially occupied to house offices, also have a growing amount of vacant space. This vacant space is believed to increase significantly in the near future, possibly resulting in the towers to be completely unused. The goal is to give a new purpose to these towers.

The main purpose of the habitat is to help refugees integrate into Dutch society. The programme will therefore include, study/meeting spaces, lecture halls and an information centre. To bring the refugees in contact with Dutch citizens, a market, inspired by an Islamic 'Souk', will give the opportunity to sell vegetables, fruit, herbs and other food which they can harvest in an integrated (urban) farm.

Because the refugees only live in the habitat for a short time (up to a year), the amounts of people living in it will constantly change. Combined with the many compositions of families, like single people or families with kids, these factors will ask for an environment that is able to adapt to the changes. Dwellings should be custom configurated to fit the spatial and functional needs of each family, while providing the right amount of privacy. Also the dwellings should be able to fit the different grades of western and Islamic customs, and all combinations of those.

Research into SMART-environments

DESIGNING FOR CHANGING CIRCUMSTANCES

When doing research into SMART Environments, I looked at both historic and contemporary ideas about living environments. Écochard imagined the 'habitat evolutif'. In this environment it would be possible to adjust dwellings to match changing demands and improve standards of living. Or, it allows to simultaneously create different types of dwellings for different needs. A built example of this 'habitat evolutif' is La Trame Écochard. It is developed with a planning tool: an urban grid of 8x8 m. This grid should provide a frame for the unknown dynamics of change. Écochard used this tool to design an accommodation that could house temporary dwellings for rural migrants, but could also evolve according to changing needs, capacities and aspirations towards more permanent housing forms (Avermaete, 2010, pp.77-88).

For Écochard working in, for and with other cultures means that one should deal with logics and temporalities. The influence of time will always be there and may need to be considered as one of the most important factors, because even when the building is perfect and in any way possible adapted to a situation at a particular instance, it will not be worth much if it isn't able to adapt to the next instances (Avermaete, 2015, pp.22-29). Shortly put, Écochard strived for an

architecture that can respond to the changing circumstances and parameters of the built environment.

HYPER-MORPHOLOGY

It is interesting to put the ideas of Écochard next to those of people active within Hyperbody. Namely, because factors like time, change and adaptability play an important role in the philosophy of Hyperbody on architecture. Biloria and Chang (2013) are active in a research called 'Hyper-Morphology' to develop insight in creating what could be called the counterpart of the more traditional and often static built environment. They notice that existing architectural spaces are mostly static in nature. This counts for both the physicality of buildings as well as their linear design, construction and operation processes. They address that this static quality can in some cases be problematic: 'These spaces are unable to provide the much needed flexibility as regards functional diversity, user-driven customization of space as well as adaptation within a dynamic context.' Therefore Biloria and Chang (2013) challenge such linear, non-dynamic architecture, by proposing to integrate adaptive behaviour within every component that make up the architectural space and plead for 'a transition towards understanding architecture as a performance driven, real-time adaptive construct.' This process would be driven by data, ranging from direct sensorial input, to gathered sociological information or structural and environmental simulations.

Computational strategy

The strategy behind this process is the computational strategy. Computationally, there are many ways to process all kinds of inputs. To keep things clear, a few goals are chosen to reach with computational tools, which are the most relevant to the concept. In general, these include: infrastructural connection to context, internal infrastructure, zoning of programme, solar optimization, generation of custom dwellings and structural optimizations. I will describe the strategy as an iterative process with feedback loops. To start off, each component of the programme is ranked according to a set of criteria (figure 1). This is done in an Excel sheet. Later, this info is used as input for various grasshopper models.

	Function	Area sq.m.	Daylight needed 0= none 1=daylight 2=sunlight prefered 3=Sunlight	Climate zone (Outside. Inside. Buffer.)	Direction Vertical/Neutral/Horizontal	Public-private (0-3) : Public, Communal, Neigbourshood, Private	Adapt. Freq Days/Weeks/Months/Years	Relations> Visual/Direct/Near	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Entrance hall	**120**	1	I	H	0	Y																		
2	Market/souk	500	1	B	H	0	W		N																
3	Foodbank	200	0	I	N	0	Y		N	N															
4	Clothingbank	150	0	I	N	0	Y		N		D														
5	Info centre	80	1	I	H	0	Y		D		N	N													
6	Farm-outside	500	3	O	H	1	W			D															
7	Farm-glasshouse	300	3	B	V	1	W			N				D											
8	Lecture rooms	400	0	I	V	1	Y						N												
9	Work/study space	400	1	I	N	1	M						N			N									
10	Playgrounds	150	2	B	N	0	Y																		
11	Public Toilets	120	0	I	N	2	Y										N								
12	Laundry	60	0	I	N	2	Y												D						
13	Dwell zone A*	2000	2	I	N	3	D										N		N	N					
14	Dwell zone B**	1500	2	I	N	3	D											V	N	N	N				
15																									
16																									
17																									
	TOTAL	**6480**																							
	With Tarra +/-	7776																							

Figure 1 - Excel sheet with programme and criteria

ZONING, SUN AND INFRASTRUCTURE

The information about square meters, direction, privacy and relations are used to create a 3D bubble diagram. This diagram consists of spheres and lines (figure 2). The spheres describe approximate volumes and location of the components. The lines describe the relation, which can

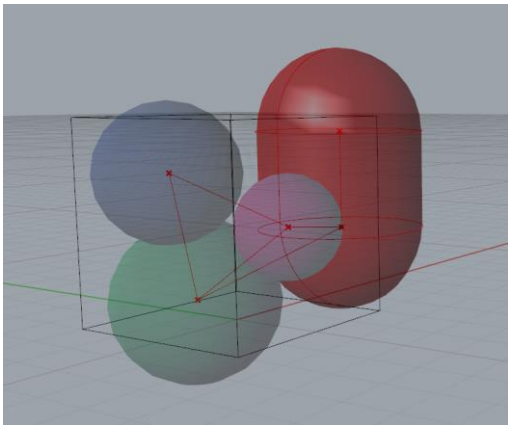


Figure 2 - Diagram of spheres and lines

be either direct or visual. The diagram can be modified while maintaining the determined characteristics. This necessary in the other optimizations, where it will be adjusted iteratively.

In the solar optimization process, existing volume of the building will be removed and the composition of the zoning bubbles will be adjusted so for each programmatic component the lighting is sufficient. Also will be simulated how the light penetrates the indoor zones that are generated, by making the walls partially open (figure 3). It will result in a porous building envelope, with outside space penetrating the existing building volume and new additions sticking out of it. The outside spaces that emerge, together with the site, will be used for urban farming or outdoor meeting spaces.

Both the internal infrastructure its connection to the context will be optimized to create direct and clear connections between facilities inside and outside the building (figure 4). It will also have an interaction with the zoning to create the shortest routes necessary as determined in the bubble diagram. The three factors: zoning, solar-penetration and infrastructure will be optimized back and forth to create a boundary envelope for spaces to be generated in later (figure 5).

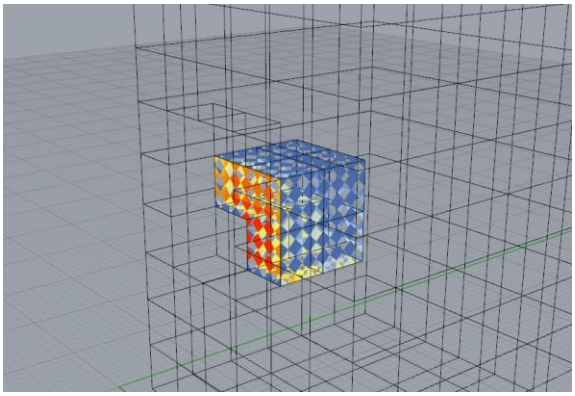
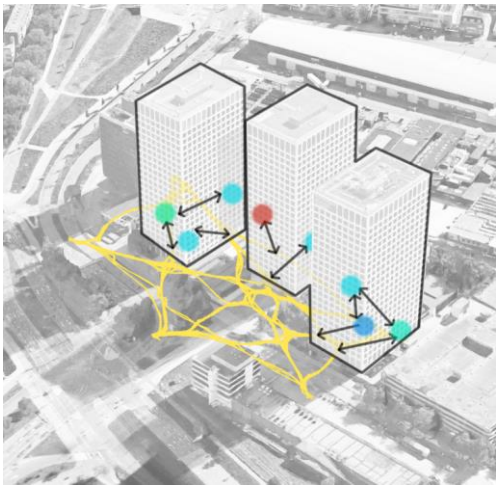


Figure 3 - Solar simulation



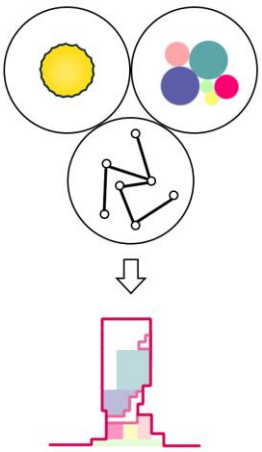


Figure 4 - < Diagram Infrastructure

Figure 5 - > Optimization to building envelope

DWELLING ZONE

Many of the programmatic components have a low frequency of adaptation, meaning they only have to change in a matter of months or years. The dwelling zone on the other hand is very

dynamic. The amounts and types of dwellings could change every day or week. The goal is to create a system that configures the dwellings inside this zone efficiently.

By analysing the free space that's left, a new dwelling will be generated that fits in this space, closely to the existing dwellings. The dwellings are composed of personal units (red) and boundary layers (blue) (figure 6). The personal units are volumes consisting of a bed and storage. Also they contain pieces of furniture that is needed for the entire family. These are distributed amongst the personal units. The boundary layers offer an adjustable amount of privacy and can open up to the space around the dwellings. The outline of the layers is based on the area the family occupies.

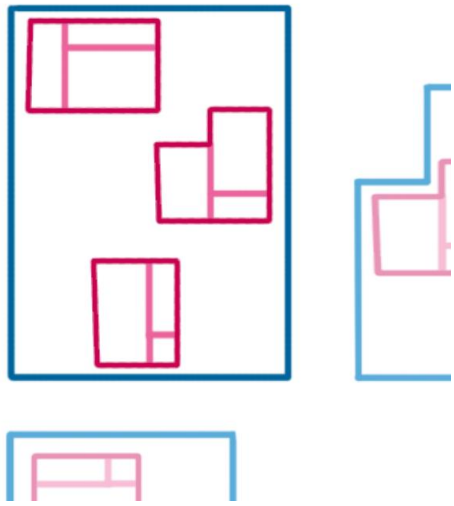


Figure 6 - Schematic spatial lay-out of dwellings

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