| Personal information |

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| Studio |

Graduation studio: Explore Lab  
Studio tutors: Robert Nottrot, John Heintz  
Topic: Evolutionary resilience in post disaster informal settlements  

Choice of studio: The possibility to turn my personal fascination into a graduation thesis quickly made me decide to join the explore lab studio. Over the past decade I have begun to form a growing interest in informal communities. One of the characteristics we often observe is the development of these localities within hazardous circumstances. The necessity to improve the living conditions of these residents is often restricted due to the high risk of the occurrence of a disaster. Since their focus lies predominantly at survival, it is vital to consider an approach that primarily focuses on risk reduction. Only then can a community progress further at a physical, social and economical level. A particular personal concern is whether we are aware of the position we should take as an architect. This issue will form the leading directory in which I try to attempt to explore the potential role of an architect in slum upgrading processes.  

Tutors: Prof. Dick van Gameren (Design mentor)  
Diego Sepulveda Carmona (Research mentor)  
Ype Cuperus (Building technology)  

Title: Evolutionary resilience: An approach to risk reduction in Cerro La Cruz, Valparaiso, Chile  

Keywords: risk reduction | hazards | evolutionary resilience | informal settlement upgrading | Valparaiso, Chile  

| Relevance |

Relevance: Most of our student projects are pointed towards wealthy clients leading to the design of for example a private studio (BSc 1), extensions of a faculty (BSc 4) or the transformation of a church (MSc 1). Keeping in mind that “architects only affect about 2 to 5 per cent of all that gets built” [...] “too many architects are skilled at designing museums and mansions and too few are able to work with indigent people and communities in need of basic housing,
sanitation and security” (Bell and Wakeford, 2008, p.10). According to Mike Davis in his book *Planet of Slums*, “hazardous, health-threatening location is the geographical definition of the typical squatter’s settlement” (2006, p.122). It is therefore essential to look at the formula of risk = probability of hazard x vulnerability. With the search for a suitable contribution of an architect within this challengeable topic of risk in informal settlements, I believe this thesis can join the debate of the potential role of an architect within slum upgrading processes.

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Back in 2008, the quantity of urban residents surpassed the number of rural inhabitants meaning that the majority of us are now living in cities worldwide (UNFPA, 2014). This immense shift from rural to urban is now mainly occurring within developing countries. Most of these cities are not able to cope with this vast demand of affordable housing. Therefore, what we perceive as one of the most visible outcomes of poverty urbanization is the explosion of slums (hereinafter referred as informal settlements) (Davis, 2006, p.17). Households in rural settings seeking for a better economic life in cities often cannot afford the city standard living conditions and are forced to enter through its back door. Apart from the main characteristics like inadequate housing, high densities and the lack of basic service provisions like sanitation, infrastructure and access to safe water, informal settlements tend to appear to have another similarity (Un-Habitat, 2003). They are often settled within hazardous situations. Due to the continuous threat of the possible occurrence of a disaster, countless communities are restrained from the ability of physical, social and economical improvements. I therefore think it is essential to confront this topic of risk reduction before continuing with general amendments for the community. My project will attempt to address the potential role of the architect in settlement upgrading processes that centers primarily on the reduction of risk levels. The case of Cerro La Cruz, in Valparaiso, Chile is predominantly chosen because of its recent misfortune that took place in April 2014. Rapid poverty urbanization has also struck on the steep slopes around the city of Valparaiso causing informal settlements to perch on precarious land. Due to its geography, landslides, earthquakes and wildfires are a common natural disaster that might contribute to the disturbance of transforming an existing informal settlement into a safe and secure neighborhood. On April 14th, wildfires have consumed more than 2,900 homes, leaving around 12,000 people homeless (UNDP, 2014). A notable remark is that this was not the first calamity that came to their shores. In fact, there was a similar wildfire back in 2008 and in 2013 that struck on the same hills of Cerro La Cruz. With the former
residents already commencing to reconstruct their homes on the ashen hills of Cerro La Cruz, it is important to prevent them from entering in the same recurring cycle of a disaster prone area with vulnerable communities. The object of this study is to examine the concept of evolutionary resilience and apply this to the formula of risk = probability of hazard x vulnerability.

Research question
How can evolutionary resilience be used to reduce large impact of upcoming hazards and provide for new opportunities for the residents on the hills of Cerro La Cruz in Valparaiso, Chile?

Sub questions
What is evolutionary resilience?

How can you reduce levels of vulnerability of the residents?

Research objective
1. To compare existing methodologies concerning the settlement upgrading processes

2. To assess the concept of evolutionary resilience in a post disaster situation

3. To gain additional knowledge on the formula of risk = probability of hazard x vulnerability

Project goal
“It turns out that great public spaces are even more important to places like Nairobi’s Kibera and Mumbai’s Dharavi, because they allow many issues to be addressed at once (PPS, 2012)”. Governments often fail to acknowledge the permanency of informal settlements (Davis, 2006, p.39). Slum upgrading processes that focuses exclusively on the construction of new housing schemes often result in creating non-affordable housing for the poor. According to an article in the Habitat International, it would be “more cost-effective to upgrade the substandard housing environment, rather than to demolish and renew or to relocate its residents (Weseka et al. 2011)”. What is often undervalued is that informal settlements can be places of intense trade and exchange (Neuwirth, 2012, p.33). By making these communities more resilient to future disasters, their main goal will not merely be that of survival. They will become less restrained and more encouraged to focus on physical, social and economical improvements. My design process will be subdivided into two parts. First, by reducing the level of vulnerability of the residents towards forthcoming hazards and second, by using this deficit to take the opportunity to work in a tabula rasa, though in very complex urban structure, constituting new windows of opportunity to improve from prior living conditions.
Design question
What architectural elements are needed to minimize the impact of upcoming large shock of wildfires, landslides and earthquakes on the hills of Cerro La Cruz?

Sub questions
How can architecture be involved within the formula of risk = probability of hazard x vulnerability?

What are the different levels of vulnerability?

How can a crisis be turned into an opportunity for the future residents of Cerro La Cruz?

Design objective
1. To assess risk reduction measures in a disaster prone area through the implementation of architectural elements

2. To design a spatial intervention that addresses the topics of vulnerability and opportunity in various scales.

Process
Method description
This thesis consists of a thorough literature study with corresponding case studies, mapping and a site analysis. My objectives of the theoretical framework are twofold. My first objective will be to understand the global phenomenon of informal settlements. My aim is to look specifically at the hazardous settings in which many communities are frequently found. Through the study of the concept of evolutionary resilience, I hope to achieve a better understanding of the complexity of risk reduction methods within informal settlements. My second objective is to get an in depth understanding of the specific case of Valparaiso, Chile. Through mapping its growth over time and creating an extensive analysis, with two prior disasters as case studies, I hope to achieve a better understanding of the specific potentialities within this small-scaled community. A crucial step into the design phase is to take a position within the studied literature. Devoting an explanatory paragraph on my design proposal within a post disaster situation is therefore indispensable. After my P2 presentation, I will travel to Valparaiso. Apart from observations and site visits, I will have the opportunity to interview residents and local experts that will help me become familiar with the city of Valparaiso and the exact design location. A crucial last step within this process is the evaluation of the design to see whether there is a possible level of replicability to be applied in similar post disaster situations.
| Literature
Over the length of my thesis I will be referring to the following sources:


UN-Habitat, 2011, “Building urban safety through slum upgrading”. Nairobi: UN-Habitat

Time planning

09.06.2014 – 20.06.2014  P2 presentations
23.06.2014 – 04.07.2014  conclusions of case studies
07.07.2014 – 18.07.2014  start analysis of site, select specific site
21.07.2014 – 01.08.2014  design part 01 / materials, construction
04.08.2014 – 15.08.2014  design part 02 / program, function

Site visit to Valparaiso

29.09.2014 – 10.10.2014  P3 presentations
13.10.2014 – 24.10.2014  reflect on design choices, finish research
27.10.2014 – 07.11.2014  processing final design
10.11.2014 – 21.11.2014  elaborate materials, details and construction

22.12.2014 – 02.01.2015  additional perspectives | model
05.01.2015 – 16.01.2015  prepare presentation | model
19.01.2015 – 30.01.2015  P5 presentations
Attention
Since my project deals with the issue of risk reduction measures, in particular designing within a wildfire, landslide and earthquake prone area, it is of great importance to explore different systems, materials and construction methods. This will be under the guidance of my building technology tutor, Ype Cuperus.


