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Position Paper: A Self-assessment on Research Methods
AR3A160 Lecture Series Research Methods
6 December 2018

Nature defending itself ⁹: Designing from an ecological and circular approach towards a sustainable future

I Introduction

In relation to my design project and research paper, this self-reflective paper is developed to critically reflect on the methodological applications to architectural design. During the research, the personal vision is the common thread. The Lecture Series Research Methods made me more aware of the importance of the position I inhabit as an architect and it made me more conscious about the methodologies to achieve this vision within my research and design. With these methods you form a way to position your own approaches within and to architectural knowledge systems. Research is an active and systematic investigation into a subject in order to discover facts, theories or applications. The methodologies are the tools and methods we use to develop our knowledge¹. It is important to choose a well-grounded approach, look at the methodologies that support this approach and explore a way to create an input that eventually will be a toolbox for the design. The collected data form a meaningful input with valid decisions for the architectural implementation within the design project. My role as an architect is to respond to the historical architectural tradition and translate this into present practice from the position I take within the field of architectural engineering.²

"If innovation is the answer, what is the question?" is the slogan of the Architectural Engineering Chair which I chose. This chair is focused on the synergy between design and technology to solve societal issues. We started with a problem statement, vision towards this problem and a personal fascination and from this point of view we try to find solutions within the context. The Harvest studio within this chair is collaborated with Landscape architecture, an opportunity to work within an interdisciplinary team of students. The contextual site of this project is located in Parkstad, a region in the south of Limburg, the Netherlands. The main reason for choosing the Architectural Engineering Harvest studio was that it provides me the freedom to investigate my fascination for mycelium, bio-based materials and the circular economy on a larger scale. This has given me the opportunity to think outside of the box and gives me the feeling to contribute to a sustainable future.

Climate change and waste pollution are due to our current way of living harming our planet and its inhabitants. There is a need to change the way we produce into a sustainable circular economy where waste doesn't exist but is seen as valuable building material. When we look at nature, waste doesn't exist. Looking at nature is an appropriate method to understand circularity. In nature, mycelium plays an important role in different ecosystems by decomposing plant material which become nutrients for the soil which in turn creates a huge network within the soil. This process fascinates me, and has made me think of integrating this beautiful ecological system into architectural design. My research is focused on mycelium and how it can be used as a binding factor and beneficial within different scales, in order to achieve circularity. Starting with visualizing my approach within a mind-map (see figure 1) I asked myself the following question: *How do you translate circularity within an integral design and what methods are suitable to achieve this?*

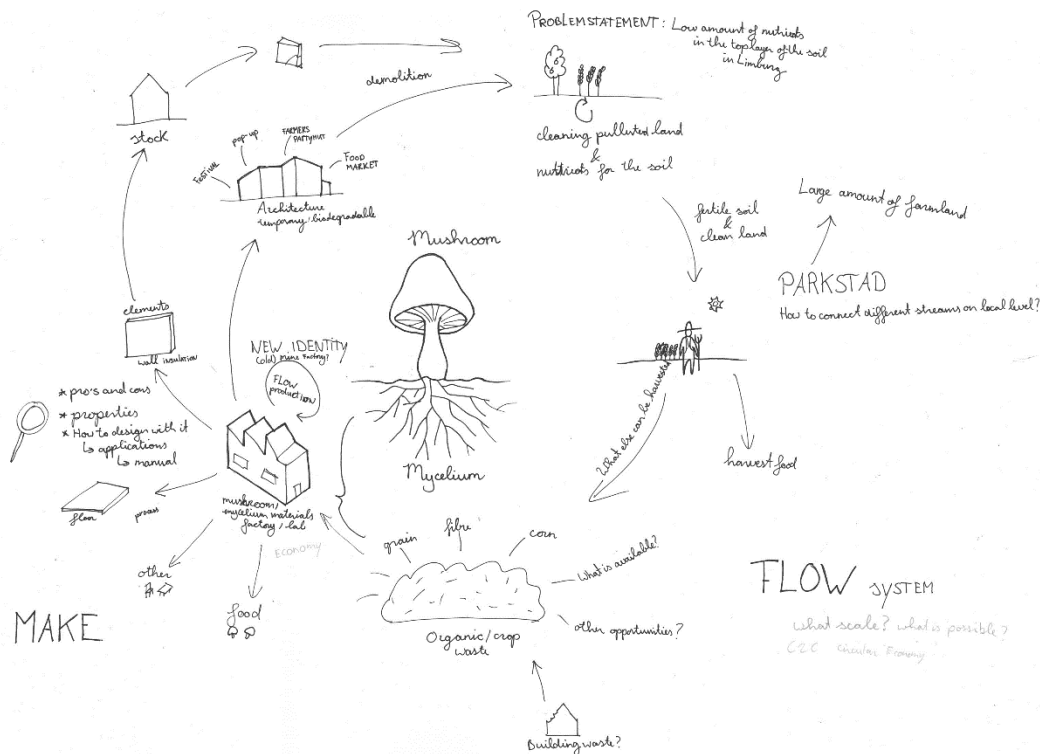


Figure 1: Hypothesis in the form of a mind map in the early research phase. Own image.

II Circularity as an integral approach

Circularity is the main goal I strive to incorporate within my design. By choosing a holistic approach, namely incorporating different scales, from the regional, to building, component and material, in the analysis previous to my design, I try to safeguard this circularity and pay attention to all the complexities my design will come to deal with within the environment. As showed in figure 2, all aspects from technological, environmental, social, economic, stakeholders, processes and design are important to be integrated though these different scales.³ Within this holistic approach, all multiple scales and domains are visualized as interacting, having an impact on each other and as of major importance to the whole circular implementation of the context. To establish this circularity, I started from technological aspects of mycelium, understanding their relation and implications in different scale levels, and eventually the implementation of mycelium in relation to the design and socio-economic dynamic.

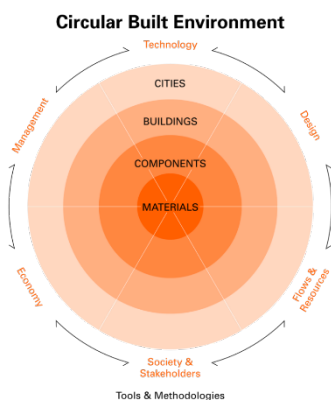


Figure 2: Approaching the research and design through different scales and aspects.³

The context of region Parkstad requires an investigation of the territorial scales.⁴ Within the complexity of the contextual site, challenges and opportunities are embedded within these elements. Visualisation of the site is a method to discover this knowledge. Thinking processes by doing mapping analysis, transforming different data sources into visual maps, is a form of research itself. Mapping is a way to make the landscape and urban plan with its dynamics and materials visible. Framing and selecting the themes that guides the research in the desired direction. The general layers of the infrastructure, history, land use, soil, water, energy, buildings society give insight within the site in order to find synergies. Starting from circularity and the technical implementation of mycelium composite, the data of the metabolism of the region, material flows and stakeholder mapping are crucial to find useful waste resources for substrate and stakeholders in order to close waste circles as a source for new circular building materials and guiding the design process.

The main goal is to find synchronisation in time, space, technology and interests. This integral approach is also relevant within the method of Hooimeijer.⁴ In her lecture she explained her research method within three phases (see figure 3): starting from technologies, understanding their relation and implications in space, and eventually building a vision in which the implementation of technologies are related to socio-economic dynamics.⁵ She approached design as an integral between natural and technology systems that deliver shared benefits at different scales. By consciously thinking about the step between technology to the design. Looking at these complex topics, it is important to visualise data into a common shared language. These drawings propose the “*step between analyses and design*” as an important design thinking element.⁴

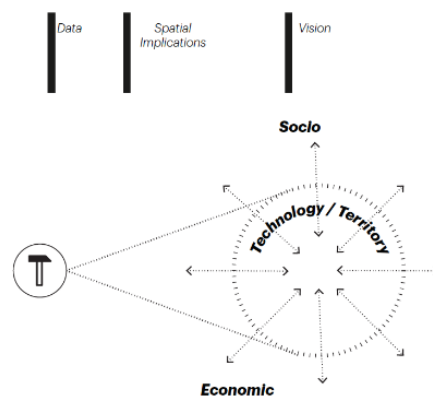


Figure 3: Methodology of territorial scale by F. Hooimeijer⁵.

Simultaneously with the large scale, the exploration of the material on the small scale is from major importance. Although these scales are strongly related to each other, the method of material culture is used. In her lecture Schreurs describes the material culture as a method that “*centres upon objects, their properties, and the materials that they are made of, and the ways in which these material facets are central to an understanding of culture and social relation*”.⁶ Likewise I incorporate this method to explore the origin of material, embodied emission, the way it is build, how materials are used and how materials end up after the use, have a huge influence on the environment within the contextual site or elsewhere. This knowledge is collected by doing literature studies, case studies and visiting labs or material tests, to get insight in the material, its production process, pros and cons, properties and applications. After structuring all the collected data, I made visualisations in the form of infographics and maps in order to communicate the context, make comparisons and connections. In this way I could make analysis, interpretations and came up with creative solutions towards a toolbox for a spatial design within the contextual site.

Not only within the architectural field but also the biological, building technical, social and economic are important aspects to approach this material. Especially the ecological knowledge in relation to this material. Mycelium composites and designing with this living organism is a relatively new approach in the design field, there is still a lot to explore and a lot of research is going on at the moment. Within my research and design the whole circular ecosystem and production processes of

the materials are investigated, not just the present use but also the origin and the process after its use. Similar to this method is the theory “*Cradle to Cradle*” of Braungart & McDonough, they incorporate circularity within the material production process. Their vision is to design with materials that always can be returned to the technical or biological cycles.⁷

III Developments towards a sustainable future

Sustainability and with this the integral and ecological design approach have developed over the last few decades. Since the Brundtland-rapport in 1987 we are aware of the damaging impact humanity has had on the planet and have since then been looking for sustainable developments “*that meet[s] the needs of the present without compromising the ability of future generations to meet their own needs*”. However, we are finding ourselves on quite new grounds in trying to find methods for architectural design that are based on a truly integral and circular approach toward the environment.

For a far too long time we haven't been aware or have been escaping from the awareness of the damaging impact that human activities have on the environment. According to Haraway⁸ and other philosophers and scientists, we have been living in a timescape, the Holocene, that was quite stable and in which civilization seemed to develop. But since then we have entered a new timescape which asks of us the ability to adapt ourselves and our designs in service of not only humans but all other living beings. This is the position Haraway inhabits while distinguishing three crucial geological timescapes: the Anthropocene, the Capitalocene and the Chthulucene. We have entered the Anthropocene or “the age of humans” which refers to the dramatical effects of human activities on the planet and the singular focus on humans in all scientific and technological activity.⁸

Within this timescape humanity has been the central focus in literature, science and all other endeavors, including architectural design. It is therefore a logical conclusion that from this man centered position no integral and including approach was developed for a long time. We also see this back in architecture which has mainly been focused on what fits the human need. An even better way to name this era of man is the Capitalocene, which describes more accurately how man has taken advantage of the environment. Bruno Latour describes the Capitalocene as “*a swift way to ascribe this responsibility to whom and to where it belongs*”. It is the revolt against pathological deformation of capitalism, initiating a process of enlightenment among those involved.⁸

Against these man and capitol centred views Haraway poses a third timescape, the one from which I position myself while creating my design: the Chthulucene. The Chthulucene much better fits our current times wherein we are becoming more aware of the ways we are entangled by and bound by nature. This view inhabits a vision or morale on how humanity will respond to earth systems. As an answer to the Anthropocene and Capitalocene, the Chthulucene: “*a time where we live with and die with each other*” is a timescape in which the boundlessness of all living beings comes to the fore. Human beings aren't the only important actors that should be envisioned when, in the architectural sphere, designing. From this radically entangled view wherein all species and they're environments have to become together; the biotic and abiotic powers of this earth are the main story or main focus point for which I design.⁸

Trying to incorporate this philosophy of togetherness with nature and other beings, this philosophy an even deeper value which has to be incorporated within my design, the necessary ethics of what Haraway calls “*Response-ability*”: *the skilled capacities for survival on a damaged planet that incorporate the practice of justice and sustainable belonging*.⁸ Within this Chthulucene: ‘*We are all responsible to and for shaping conditions for multispecies flourishing in the face of terrible histories, and sometimes joyful histories too, but we are not all response-able in the same way. The differences matter – in ecologies, economies, species, lives*’. From this point of view, we are not fighting for nature, but we are nature defending itself.⁹ Humans are a component within a sympoiesis, a collective-producing system that do not have self-defined special or temporal boundaries.⁸

Boehnert also tries to incorporate practically the philosophy of a Chthulucene and thereby argues for an Ecocene.⁹ Designing from this point of view ask for a cognition, perception and ethic

from an ecological thought: *“The practice of ecological design must be applied to the larger systems of politics, law and economics to design social systems that work with, not against, natural processes.”*⁹

Design can facilitate towards a social and technical change when it helps to transform these current systems. Instead of telling people what to do which can feel like blaming, design is an efficient way to make change because it is a different way to communicate and enable people to see the value in new ways of doing while offering new tools or techniques. To influence their behaviour, design can expose ecological relations and create new sustainable alternatives. It is the task of the designers to make the ecologically engaged way of knowing towards a sustainable future not only possible but also desirable. A method to achieve is the approach of the Transition Design (Gideon Kossoff): *“A design process that requires a vision, the integration of knowledge, and the need to think and act at different levels of scale, and that is also highly contextual (relationships, connections, and place).”*¹⁰

The Chthulucene or Ecocene is a position I can develop further with. Within my research and design, I literally tried to incorporate the ecology within my architectural design. By implementing living organisms within the materials and live with and die with. Historically seen, Parkstad with its history of the mining industry is a perfect example of the Anthropocene and a perfect context to introduce an alternative. The Chthulucene/Ecocene approach can be an answer to the problems of the Anthropocene and are endeavours to take on responsibility or *“Response-ability”* as Haraway would say.

IV My architectural position towards of the future

Circularity, is in my opinion an approach that every architect or designer should aim for. Our generation, with all the knowledge we have about climate change and other socio-economic problems, is denying their responsibility when still designing in a linear way. As an architect or designer, we must be aware of the consequences the things we create have on their environments and elsewhere on the planet. We should research the impact and process of the materials as a circular whole. We should thereby not only focus on the impacts a design has during its use but also be aware of this during the phases before and after its use. We need to research and design the building phase, the user's phase and the demolishing phase like an ecological ecosystem and consider the impact that the materials have by critically looking where material sources came from and where it goes off to. By doing this we bear intergenerational responsibility by making a connection between with ecological science and design.

Instead of trying to invent the wheel again, ecological ecosystems are forming a valuable source for inspiration on which we can build and incorporate ideas from within the architectural design by choosing an integral research methodology that includes these ecological systems with all its species and within different scales. We must remind ourselves that every aspect is part of a large ecosystem which is all related to each other and therefore also related to us. The methods I use try to incorporate this *“response-ability”* for a sustainable belonging within the architectural design so that it can be beneficial not just for everyone but for every specie, critter and earthling.⁸

Within this paper I have tried to show you how I have answered the question relating to my position within architectural engineering namely: *How do you translate circularity within an integral design and what methods are suitable to achieve this?* To translate circularity within an integral design I started from technological aspects of mycelium, understanding their relation and implications in different scale levels, and eventually the implementation of mycelium in relation to the design and socio-economic dynamic. I also did this by visualizing the environment and its dynamics and materials and merging natural and man-made systems within the design. Making maps and infographics of the collected data is a way to really understand the knowledge behind the material and form your own position towards these findings. By using these methods, I have tried to understand mycelium and to imagine it as a machine hereby not distinguishing between nature and technology but to see these as a holistic integral ecological system. Visualisations are a manner to translate the complex systems into a common shared language that can be understood across different fields and sectors.

I am aware that I am not a biologist nor a building technologist, so it will be hard to improve the material itself. But as an architect the challenge is to discover how mycelium can be implemented in the build environment and even more important how to add social, biological and economic value. An architectural design can facilitate as a medium to make people conscious of our coexistence with other species. It is the role of the architect to make sustainability not only possible, but also attractive. Like Braungart & McDonough said: “We see a world of abundance, not limits. In the midst of a great deal of talk about reducing the human ecological footprint, we offer a different vision. What if humans designed products and system that celebrate an abundance of human creativity, culture, and productivity? That are so intelligent and safe, our species leaves an ecological footprint to delight in, not lament?”⁷

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