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HYBRID ENVIRONMENTS

A Timeline of Exploratory Nature Based Approaches in Spatial Practices

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ABSTRACT

The increasing complexity that we, as a species and civilization, are facing, ethically, socially and environmentally, require layered and complex solutions that are better achieved in and through transdisciplinary processes.

In this paper, we will showcase and analyse a timeline of spatial practices focused on transdisciplinary methodologies and biophilic design and research to expose how spatial practices research has been increasingly powered by the inspiration and potential of nature. This approach, combined with the potential of digital technologies and more-than-human thinking, is creating transdisciplinary research fields and hybrid outcomes that are acting as an important step for the ecological sustainability of spatial practices and urban systems.

The timeline unlocks a critical narrative about the importance of nature as inspiration and matter for spatial design and how technological development is merging spatial practices and natural sciences. This transdisciplinary collaboration is creating a meaningful and ontologically relevant impact towards healthier and sustainable spatial practices and built environments.

1. INTRODUCTION

The activation of transdisciplinarity in architecture is a mandatory step towards innovative spatial production and research, as well as upbringing new solutions and spatial typologies for urban contexts (Doucet & Janssens, 2011; Woiseth & Nilsson, 2011; Lawrence & Després, 2004). The set of relations architecture promoted with different knowledge fields has been changing throughout history accompanying different cultural backgrounds and its technological power, while providing solutions for the time's agency (Young, 2019; Gonçalves et al, 2018).

In this paper we will focus on new ecology urban planning, more-than-human thinking, and hybrid environments. This will be done by showcasing and analysing a timeline of spatial practices focused in transdisciplinary methodologies and biophilic design and research. This mapping exposes how the shift from mechanical to digital software enhanced research powered by the inspiration and potential of nature, creating transdisciplinary research fields, practices and hybrid environments

The timeline unlocks a critical narrative about the importance of nature as inspiration and matter for spatial design and how technological developments are merging spatial practices and natural sciences. This transdisciplinary collaboration is creating relevant impact towards healthier and sustainable spatial practices and built environments and exposes how spatial practices research has been increasingly powered by the inspiration and potential of nature.

2. METHODOLOGY

The paper will be divided in 3 parts: (1) literature review; (2) research method explanation and exposition; (3) findings and conclusions.

In the first part, we will present a literature review about the origin, definition and importance of transdisciplinarity and approach digital architecture as an inherently transdisciplinary practice.

We will show how new urban planning and spatial practices demands socially and environmentally engaged practices, presenting a literature review about more-than-human thinking (Jon, 2020; Maller, 2018; Latour, 1999), and its connection with hybrid spatial practices through Biophilia, Biophilic Design (Chayaamor-Heil, Vitalis, 2020; Oxman, 2014; Menges, 2007; Kellert & Wilson, 1993). The literature review will show how transdisciplinary spatial practices are working with

ontologically relevant questions of the practice and society, analysing its positive aspects to deal with complexity problems (Bernstein, 2015; Burry&Cutler, 2009; Young; 2019; Wilson, 1996).

In the second part, research, we will showcase a timeline of experimental spatial production and technological developments. The timeline maps the 1960-2020 period and is split in two main branches: (1) art and architecture production; (2) digital technology developments; and two secondary: transdisciplinary research centres; concepts and authors. This mapping exposes how digital technologies enhanced spatial practices and research powered by the inspiration and potential of nature, leading spatial practices towards transdisciplinary processes and hybrid outcomes.

In the third part, we will share our final conclusions.

2.1 LITERATURE REVIEW

The activation of transdisciplinary architecture is a mandatory step towards innovative spatial production and research, as well as upbringing new solutions and spatial typologies for urban contexts (Doucet & Janssens, 2011; Woiseth & Nilsson, 2011; Lawrence & Després, 2004). The set of relations architecture promotes with different knowledge fields is changing throughout history accompanying different cultural backgrounds and its technological power, while providing solutions for the time's agency (Young, 2019; Gonçalves et al, 2018).

Applying More -than-Human and New Ecologies approaches by “recognising non-humans actors such as plants, animals and technologies” (Maller, 2018, p. 19), and questioning to which species we can be designing for, should be regarded not as a selfless gesture, but as a methodology to achieve ecologically sustainable urban systems and spatial practices.

Spatial practices are now, through exploratory research, asserting the human need to be in touch and in symbiotic relation with nature (Kellert & Wilson, 1993; Maller, Wilson & Townsend, 2009), discovering how to embed nature in the artificial environments we inhabit.

The mapping of Nature-Based Solutions and biotechnologies in spatial practices and the development of a correlation analyses between the practice, research and technological developments allows for a critical narrative about the increasing importance of embedding nature in the multiple scales of spatial practices, methodologies and our built environments.

2.2 RESEARCH: TIMELINE ANALYSIS

Climate change is demanding the adequacy urban territories to the current crisis and effects we are already feeling. Nature, “rather than being discounted as an inanimate background that merely hosts human affairs, is now considered an active agent that influences how we design and plan for a city” (Jon, 2020, p. 392).

This context is increasingly merging spatial production with natural sciences and potentiating digital technology application, expanding architecture’s field of action, with emergent hybrid practices based in transdisciplinary approaches (Vidler, 2004; Kak, 2007). Nature-based solutions and the inclusion of biotechnologies in spatial research, digital fabrication, materials and hybrid environments, that merge natural and artificial systems, can contribute to change contemporary spatial production and develop projects that are “acknowledging our material dependency on and interconnectedness with non-human critters” (Jon, 2020, p. 392).

The XIX century industrial shift can be used as an example of how spatial practices took advantage of the new available technologies: pre-fabrication and modularity were the basis of an exploratory approach to design and building that also relied on the new transport systems. The Expositions Universelles can be pinpointed as more exploratory research and application of the new technological possibilities provided by the industrial revolution. This exploratory phase can be traced as the basis of modernist movement, pre-fabrication and modularity, and the overall access to dwelling in urban territories. At the same time, authors, such as William Morris, and the eco-socialist movement were carefully analysing the impact of the new production system and economic growth, from a small, yet established, economy and social scale.

Nowadays, spatial practices are dealing with highly layered contexts, in which space cannot be detached from politics and economy, and also from the impact spatial production, and all the choices that are involved in its process, can have in our environment and nature.

The analysis starts with Buckminster Fuller’s proclamation of the World Science Decade, at the 7th International Symposium of Architecture, by the International Union of Architects, held in Mexico. The event was chosen as a starting point due to its inherent transdisciplinary nature, that challenged practitioners to overcome structurally compartmentalized thinking processes and engage in research that could change the relationship between world resources and human needs (Fuller & McHale, 1964).

In the macro urban scale, spatial practices should have in consideration the uniqueness of the specific environment of the interventions: the ecological systems, the flora and fauna, and its current state of health, local materials and resources.

In the micro project, scale, the potential of digital technology, and the increasing role of research in spatial design are changing the practice and the building industry towards transdisciplinarity and hybridity of building technologies, materials and environments. This paradigm was also favored by the shift from mechanical to digital technology, that had a profound impact in spatial practices

In the 2000-2020 period of analysis, scientific and artistic practices and research denote an overall tendency to inquire about our relationship with nature and its redefinition. Nature is being regarded as media.

These tracks and approaches are developing:

Building technologies, based in digital fabrication and robotic construction, vernacular structures and materials, exploring the potential of parametrization and digital fabrication;

Biobased and circular materials research;

new spatial conceptions and typologies developing new spatiality-promoting new possibilities of uses for public space and plural social interactions in urban spaces;

Adaptive and evolutionary structures and spaces, feedback and real time data processing to enable reactive solutions and informative devices.

These tendencies are responding to climate change and the necessity to create resilient practices and territories. Spatial practices, architecture, urban and product design must now, urgently, have in consideration a bigger scope of analyses regarding their environmental impact.

The analyses, or framework, should have in consideration micro and macro perspectives and regard local and global scale. This should be achieved from the point of view of spatial quality and social welfare (also from economical perspective - what kind of economy and politics is the space promoting and supporting), and the relation with local and external natural systems.

3. FINDINGS AND CONCLUSIONS

The conception and analysis of the timeline enables the development of a critical narrative about experimental architecture, urbanism, and the evolution of nature-based solutions in spatial practices. The intersection of art, science and technology (based in the analysis of natural structures, their performance, behavior and feedback), is becoming a fruitful research field for meaningful spatial research and production. Regarding nature as matter and inspiration is expanding architecture's field of action, possible contributions, and contributors.

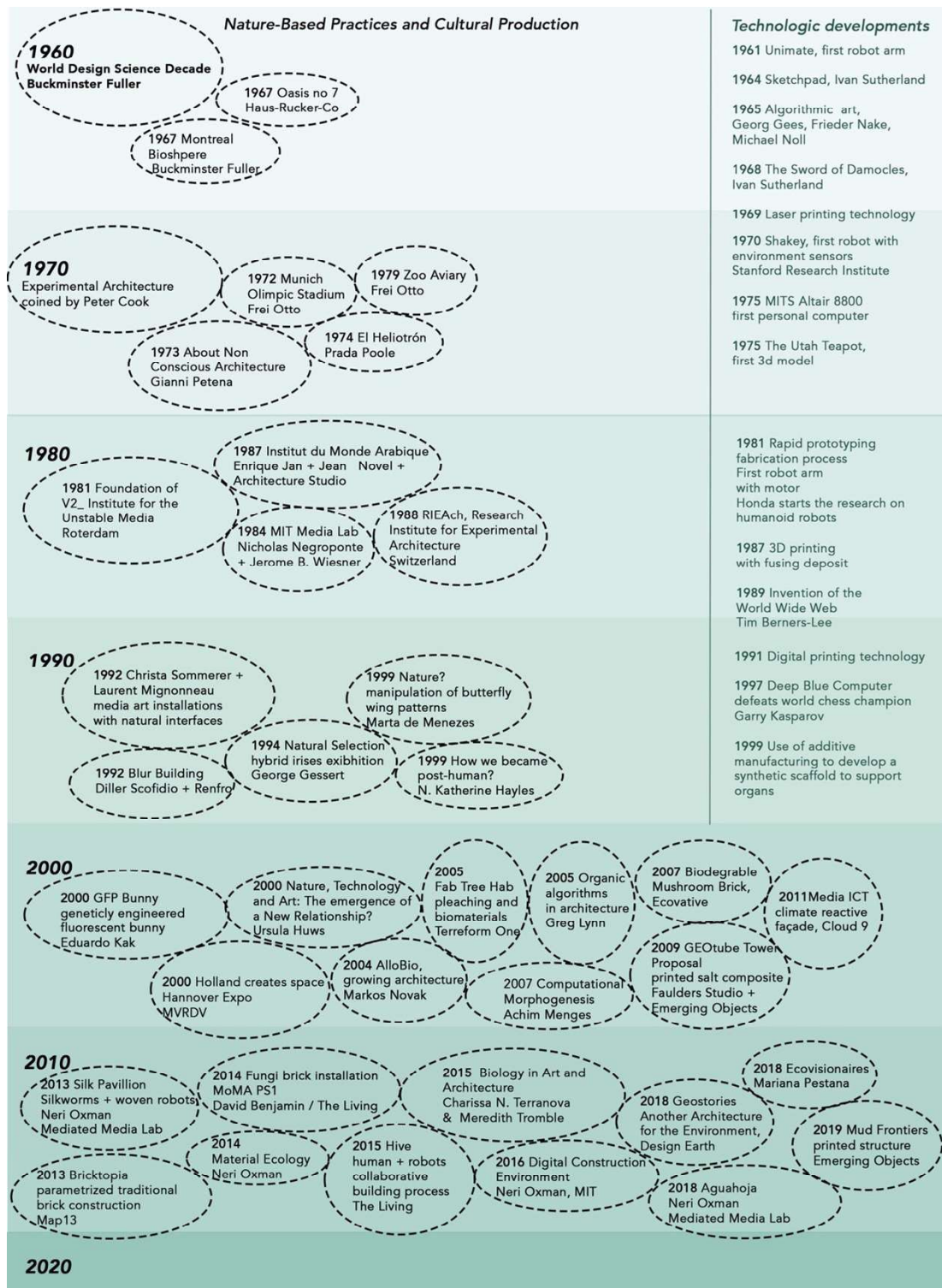


Figure 1:
NBS Cultural production in
the 1960-2020 period.

The hybridization of spatial practices and built environments, with intertwined artificial and natural systems, can fulfil “the biophilia hypothesis (...) of a biologically based, inherent human need to affiliate with life and lifelike processes” (Wilson, 1984, p.1.) and the suggestion that human identity and personal fulfilment somehow depend on our relationship to nature (Kellert&Wilson, 1993). Instead of distancing society from its main provider -externalizing nature from our productive systems and cities (Latour, 1999), new urban design should and can allow humans to be placed in and depend on nature, in a direct and noticeable way.

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