POST-ANTHROPOCENE:

The Design after the Human Centered Design Age

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Abstract. The paper exemplifies possible traces of transition towards Post-Anthropocene that is envisioned as non-hierachical system. It is taking Morton's discussion on 'hyperobjectivity' further into multi-layered codesign performed in real time and real life across bio-digital agents, including humans. Though our planet might be recently experiencing drastic times and one catastrophic scenario follows the other, a natural succession often comes after most disasters.

Keywords. Post-Anthropocene; Systemic Design; Hyperobjects; CoDesign; Bio-Digital Design.

1. Introduction

'There cannot be a post-Anthropocenic "politics" in any recognizable, normative sense - a "politics" predicated on the self-regard of the human subject mapping [her] himself as a coherent agent within a stable historical unfolding. It's just not possible to distinguish between what is an existential risk and what is an absolute invention, and what is both at once, and mobilize "positions" accordingly. So mobilization must go on without that distinction. To govern-that is, to account for the general economy of decay and creation with some nominal degree of authorship-something else is required.' (Bratton, 2013)

The paper unfolds the transition from the design for 'Anthropocene Mass Extinction' (Dirzo et al., 2014) towards designing within bio-technological synergetic landscapes of cross-species co-living, following non-hierarchical models. This co-living involves human species in shared co-existence and contribution amongst the other ones. Although technology-related involvement of other-than-human species in co-creation and co-living in systemic balance might rise eco-environmental systemic as well as ethical issues, so has been tangibly rising their avoidance. The latter neglection is increasingly presented as the main cause of disturbance for the ecosystem causing major catastrophic incidents at a global scale, as some argue that we have recently started to witness what was once described as apocalyptic visions about our planet.

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Alternative pathways are sought in transitioning towards the Post-Anthropocene era. This involves realizing that nonhumans are installed at profound levels of the human, not just biologically and socially but in the very structure of thought and logic. Coexisting with these nonhumans is ecological thought, art, ethics, and politics, the ecognosis (Morton, 2016). This non-human centred design approach sets a new culture by which to readdress our sense of wellbeing as the main urgency of our times: a culture that even though it includes humans, it does not place human activity at the epicentre concerning global existence. Human activity is valued by its responsibility to minimize its environmental footprint as meanwhile, to live to the detriment of others including any other part that makes the world ecosystem may no longer be acceptable. Further to this idea, alternative views were explored in depth by pioneers of eco-systemic design thinking of the late-modern era (Doxiadis & Papaioannou, 1964; Tyrwhitt, 1978), to become relevant again recently as those early systemic attempts have been rethought under the computational design context (Zavoleas, 2014).

The paradigm transition suggests nature and its bio/geo-systemic operations as the primary reference model for computing. The results nature presents are rethought for example not merely as superficial testimonies of visual beauty to copy or to imitate, but as dynamic outputs of never-ending processes of exceptional rigour and wisdom continuously readdressed through iterations, recursive trial-and-error testing and feedback learning by which nature's 'designs' adapt, mutate, respond and evolve by being integrated into different contexts. In this model, highly sophisticated natural processes are 'computed' so to speak, by being set within a comprehensive spectrum of external and internal constraints in dynamic reciprocity and energy exchange, one that supersedes humanity and one that humans cannot but work along with and within it, as they must constantly try to understand, praise the vitality of its instances with regards to the whole and act accordingly in subtler also considerate and non-hierarchical manners, as the only way for the ecosystem's viability.

Recently, there has been some outstanding evidence of nature-driven operations highly supported by new technologies related to computing. For example, as a recent review (Heinrich et al., 2019) suggests, the study of bio-hybrid robotic architectures has been a rising field. The outstanding work of Terreform ONE has established a distinctive design tactic that investigates projects and prototypes through the regenerative use of natural materials, science, and the emergent field of socio-ecological design (Joachim & Aiolova, 2019) or Rewild My Street Team (Moxon, 2019). However, for the transition to happen there needs to be significant debating as to how changes might affect each of the various stakeholders that set the production workflows. Since the turn of this century, along with the evolution of computing the design projects have become far more complex for example with regards to size, contextual factors, regulations, linking with various specialisations, sustainability, resilience and energy performance. In effect, new computational design methods and the emerging digital technologies are incorporated into production from start to the real-life endless process to constantly advance performance. It has been clear that what might have seemed as a spontaneous digital updating sporadically affecting specifically targeted user groups or reductionist goals only, now involves many more other areas than those groups and fields directly being targeted in the production pipeline (Sevaldson, 2018); that is, any of the living and non-living beings (i.e. 'resources') well-beyond human's direct influence, benefit, and impact, have an ability to control and play roles as active agencies within the global production system being infinite, also subject to constant negotiation, adaptation and improvement. Consequently, only a nature-driven model as one that is inherently flexible and in a constant state of openness and readiness towards change could possibly set the basis for a task that even with the most advanced computational tools is beyond humans to fully grasp, yet it incites the necessary shift of human's mind towards a better for the planet and biosphere's future.

2. The Post-Human-Centred CoDesign Model

Next, the above framework is proposed alongside some research-by-design examples. As explained, these projects of otherwise very different scope are linked by the hypothesis of a synergetic landscape resulting from a post-human-centred codesign model set by eco-social real-life parameters and performances, integrating bio-computational processes, targeting the highest possible complexity unachievable solely by humans or by any individual master designer alone. The presented 'hyperobjective' (Morton, 2013) 'prototypical interventions' (Doherty, 2005) unfold the interactions with larger systems through minor physical objects suggesting the 'designs for transitions' (Irwin, 2015). The related processes describe dynamic exchanging of matter, energy and data that is only possible through a cross-bio-technological co-design model. The three projects are:

- Hyperobjective co-design through engaging with ecosystem, new habitants and artificial intelligence - Villa Sophia (Davidová, Pánek, & Pánková, 2018; Pánek & Davidová, 2018);
- Enacting the circular economy and lifecycle of structures other than for humans: Bio-shelters design proposal for artificial coral reefs at the Sydney Harbour (Zavoleas & Heausler, 2017; Dunn, Haeusler, Zavoleas, & Bishop, 2019);
- Engaging with socio-ecosystemic networks and iterative DIY (Davidová, 2019; Davidová & Zímová, 2018)

Though different in their nature, all presented models are process-based and are being cocreated in real life and in real time, within so called 'real life codesign laboratory'. They are therefore 'allopoietic', means they are autonomous, though dependent on an exchange with its environment (Dekkers, 2015)

2.1. HYPEROBJECTIVE CODESIGN THROUGH ENGAGING WITH ECOSYSTEM, NEW HABITANTS AND ARTIFICIAL INTELLIGENCE - VILLA SOPHIA

Villa Sophia (see Figure 1 and Figure 2) has been codesigned by Collaborative Collective with its natural environment, the clients and artificial intelligence system based on machine learning called Sysloop. This is occurring in real life and real time whilst the family is inhabiting the work in progress prototype in so called 'real life codesign laboratory' (Davidová, Pánek, & Pánková, 2018). The local ecosystem and landscape driven initial design has been cocreated during its building process by new habitats on the roof and in its pond (the grass and algae water lands) and in the interior (the clients). Further on, its performance is real time cogenerated through the machine learning of Sysloop AI. From the initial input data, sensorial system, multilingual contextual library interpretations and its internet search and typical daily operations such as door lock, natural ventilation or self-playing piano interactions, the system collects, analyses and recognises various human and non-human users' behaviours, their preferences and restrictions.

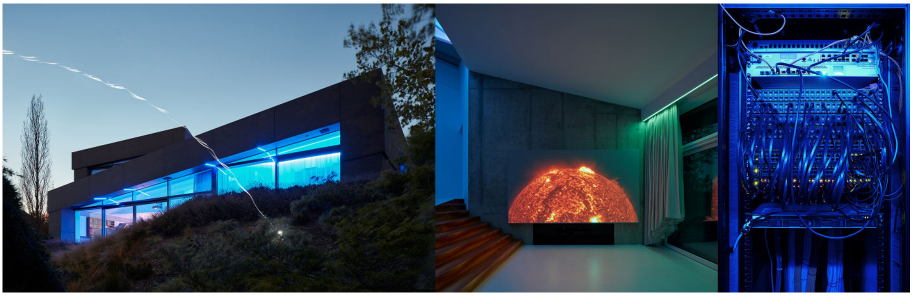

Figure 1. Villa Sophia operated with Sysloop from left to right: a) fitted into terrain the spiralling roof volume is an expansion of the grass land; b) a living room screen that next to video gaming and film screening enables communication with the Sysloop; c) one of the Sysloop's racks (photos: Boys Play Nice 2019).

Figure 2. Living spaces of Villa Sophia with 'self-playing' piano (Left and right photo: Boys Play Nice 2019; central photo: Birke 2018).

For the future, the system is to be fully scalable and should be connected to the large city/state security and services smart systems (Pánek & Davidová, 2018) (see Figure 3). It is on a way to include industrial growing massproduction and other life crucial services. Therefore, the house is largely hyperobjective on multiple levels. Dependent on multiple past and real time criteria, parameters, actions and restrictions, performances and occurrences, the house can improve your and other environment's living conditions, spoil you and many other species and matters, save your or others life as well as it can decide to kill you when deciding on preferring life of someone else (non-human or human).

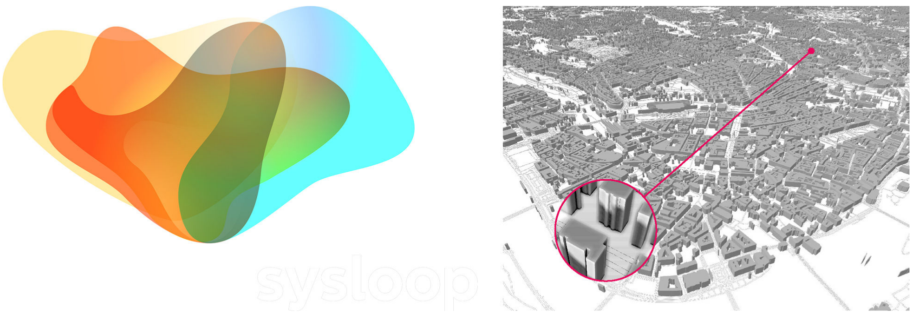

Figure 3. From left to right: a) sysloop logo representing the multiple interactive layers (Malík 2016) b) Element maps rendering within proposed system testing environment and its scalability (illustrative diagram: Davidová 2018, generative model: Pánek 2017) .

2.2. ENACTING THE CIRCULAR ECONOMY AND LIFECYCLE OF STRUCTURES OTHER THAN FOR HUMANS: BIO-SHELTERS DESIGN PROPOSAL FOR ARTIFICIAL CORAL REEFS AT THE SYDNEY HARBOUR

Figure 4. Micro features of Bio-Shelters with regards to temperature, tide and sun exposure as data-driven design inputs loaded in the script to produce alternative schemes (Zavoleas 2017).

The Bio-Shelters project applies advanced computational methods to design green coastal landscape infrastructure intended for threatened marine ecosystems. It aims to enhance the abundances of native habitat-forming organisms, which are often missing or found in low numbers due to environmental degrading (Zavoleas & Haeusler, 2017). The project claims its original character by its key point to employ nature's dynamic also context-framed logic of growth then to adapt it to artificial habitats of marine species. As they are first developed and installed into their intended site, the artificial structures may continue to grow as they are populated. As the physical structure is being populated by new marine species, nature takes over the design and co-evolves the initial scheme. The coming species manifest their water filtering function consequently cleaning the seawater and attracting more life and the cycle is restored. In effect, the growing structure alters the material, chemical, natural and life consistency of the urban coastline (see Figure 4, Figure 5 and Figure 6).

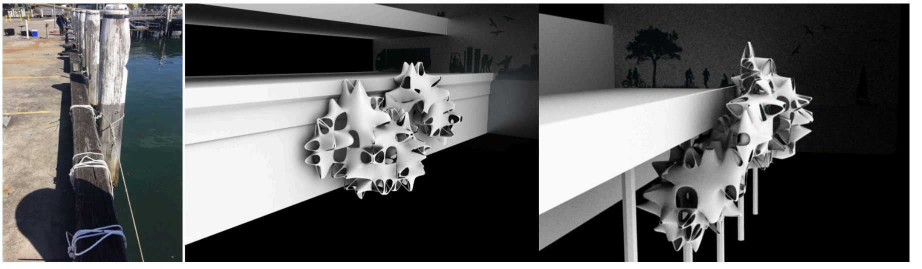

Figure 5. Indicative site (left: Yu 2019) and tests of the script adapted to different locations producing alternative results (middle and right: Zavoleas 2019).

Figure 6. Hybrid material composite samples made of concrete and crushed discarded oyster shells then used for the large prototype piece (Dunn 2019).

A series of alternative schemes are developed for different sites, set by the different environmental factors. Operational criteria described by the biologists of the research team are combined with the parameters and the specific values that describe nature's functions at each location. Such a dynamically informed approach drives design activity by natural constraints to fully integrate the resulting schemes with the lifecycle of oceanic systems. Moreover, integrating with the natural lifecycle entails that each of the results is seen as an infrastructure upon which life will build its further instances to the point that the initial structure is totally covered and is gradually superseded by the natural one. The outputs, produced out of the former marine life from the onsite fish market, due to their topological shape, typological resemblance and material consistency being similar to natural corals are sought as the sub terrain upon which marine life will find a suitable spot to build new habitats (Dunn, Haeusler, Zavoleas, & Bishop, 2016). To better support this co-evolutionary process, the initial structure ought to be fully compatible with nature's preferred design modes as a fluid structure rather than one that resists natural pressures; then, it should emerge as a site-specific solution; last, its material behaviour needs to be fully compatible with natural operations.

2.3. ENGAGING WITH SOCIO-ECOSYSTEMIC NETWORKS AND ITERATIVE DIY

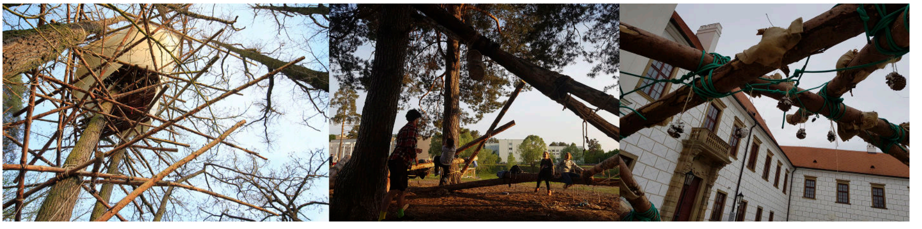

Figure 7. Spiral Projects that are exposed to human and nonhuman interaction, extending edible and habitable landscape (left photo: Zapletal 2013, middle and right photo: Davidová 2018 and 19 respectively).

Figure 8. TreeHugger insect hotels projects (photos: Davidová from left to right 2019 and 2018).

The COLridor projects (see Figure 7 and Figure 8) by Collaborative Collective are codesigned with human and non-human local communities, supporting edible and habitable landscapes trough prototypical interventions in cultural environments for their cross-related synergy. They are designed to generate biotops on biocorridors across cultural, often urban, landscapes. Those prototypical interventions are hyperobjective as they are interacting with the related ecosystemic habitats and food webs of i.e. algae, moss, early blooming plants, insects, bats and birds, providing a ground to live in and grow on as well as they are nutrients generators through their inhabitation (Davidová & Zímová, 2018). The interventions are to be scalable, parasiting or being integrated in new designs of existing and future infrastructures of dwellings, urban spaces and other landscapes. They are also hyperobjective because they provide recipes for their DIY (Do It Yourself) iterations accessible through QR codes that are engraved in them and presented at specific fairs (see Figure 9). This hyperobjectivity also covers an engagement with the community of makers of its Grasshopper plug in for Rhino users that releases it in its news (Davidová, 2019). It also covers specifically designed social events that often provide educational programs on how to support cultural landscape ecosystems. Therefore, the codesign here is performed through multiple iterations and real life modifications and redesigns as well as the interventions were codesigned with local communities themselves in their initial stage. At this moment, the project is expanding into larger Synergetic Landscapes project (discussed in a separate paper at this conference). Synergetic Landscapes project is integrating the above concepts with those of circular ecosystemic life cycle economy operated by blockchain to be codesigned by local communities from the 'bottom up'. It is asking the questions on if bats can buy an insect hotel that is their fast food restaurant or if we can pay the insects for their pollination of our community garden for which they could buy their homes, etc.

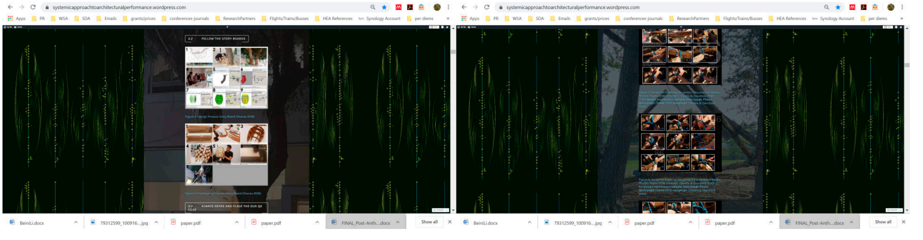

Figure 9. DIY recipes on Systemic Approach to Architectural Performance site (Davidová, 2019).

3. Nature-Driven Design: CoComputing with Humans and Nature

The post-human centred framework proposed and exemplified above assumes following extended bio-computational real life and real time codesign approaches throughout the creative course. Its main scope is not only to question the authorship and 'who' or 'what' might be the author or 'what' the outcome might look like, but to rethink the final state of design addressed through the endless interactive and iterative codesign dynamic processes that are hyperlinked and cross-related to multiple networks and interactive input flows across the biosphere. Capra (2002) states that our academic disciplines have been organised in such a way that the natural sciences deal with material structures while the social sciences deal with social structures, which are understood to be, essentially, rules of behaviour. However, Capra continues, in the future the strict division will no longer be possible because the key challenge will be to build ecologically sustainable communities, designed in such a way that their technologies and social institutions - their material and social structures - do not interfere with nature's inherent ability to sustain life. This research framework searches for synergy amongst such systems for a 'flourishing' (Ehrenfeld & Hoffman, 2013) togetherness, as well as one being inseparable.

In a typical computational approach, measurable data may enter the design scene to influence related decisions. As such, computational design may be compared with nature-driven operations, the idea being that measurable data is linked back to quantifiable information and so adding scientific flavour and validity to design strategies and the form being created. As data inputs describe natural phenomena, in a similar manner analysis and synthesis may be linked dynamically to each other. Computational models are information sources of objects (Carpo, 2011), allowing effortless data tweaks, modifications and trial-and-error experimenting as ways to carry out iterations, familiarise with the design constraints and techniques and gradually refine a design scheme. Since the 1990s, real-time simulation tools have supported dynamic occurrences on the screen such as forces, fields of attraction and repulsion, fixed and movable parts, dependencies, breaking points, and material behaviour, applied upon topological geometric shapes, which they transform. Due to their topological definition, these shapes are malleable and flexible and so they respond to any change of inputs that is registered respectively as a continuous adaptation of form to these changes happening along the design's course, in a way that simulates physical interactions in real life.

The 'real life codesign laboratory' (Davidová et al., 2018) methodological approach examined above proposes a transition of focus from a design that is purely driven by aesthetic and functional standards to one that is 'verified' / cocreated by its real time compatibility with ecosystems' life cycles. The notion of ecosystem refers to a totality of performances managed wisely by its operations and every instance of it is a manifestation of its principles, which with the synergy of multiple social systems and advanced computing may to some extent be studied, approximated and transferred to human-made interactions towards the Post-Anthropocene era. In other words, in the post-human-centered codesign model, computing becomes a collaborative agency within nature's complexity and cross-species social networks being an offer of often greater value of networking or compositional performance: an action by which humans as well as computers may surrender their control over a scheme's future, as the moment it is completed, it is when it also starts to colive on, coevolve, cogrow and cointegrate with nature. Bratton states that if the Anthropocene proves more a fleeting geopolitical instant than a slow geological era - waves of apes maniacally excavating ancient carbon and drawing loops on maps - then whatever comes 'next' would be formed not by the same anthropos but by something literally post-, un-, in-'human', for better or worse' (Bratton, 2019). Such a transition may however also happen through post-apocalyptic synergetic landscapes that are evidencing their natural succession, moving to ones of cocreation, coexperience and coliving.

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