INTELLIGENT INFORMED LANDSCAPES

The Eco-Systemic Prototypical Interventions' Generative and Iterative Co-Designing Co-Performances, Agencies and Processes

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Abstract. The work fights for a shift from Anthropocene in urban environment through both, analogue and digital eco-systemic prototypical urban interventions, mixing biological as well as digital performances of post-digital landscape. It directly engages with the local human and non-human communities as well as it offers its online recipes and codes for DIY local iterations tagged in public space. Such intelligent and informed cultural landscape therefore covers several multi-layered generative and iterative agencies for its self-development.

Keywords. Systemic Approach to Architectural Performance; Intelligent Informed Landscapes; Post-Anthropocene; Eco-Systemic Prototypical Urban Interventions; DIY.

1. Introduction

The paper discusses generative and iterative processes of two selected key designs from broader field of Systemic Approach to Architectural Performance: 1) the SpiralTreeHouse (see Figure 1), a treehouse that co-lives with trees and offers habitation to other species and 2) the TreeHugger, a responsive solid wood insect hotel, serving as well as a fast food restaurant for bats and birds (see Figure 5). The two have several prototypical iterations entering the public spaces' eco-systems with support of mediamix of low-tech biological and embedded digital technologies, thus generating the 'Intelligent Informed Landscapes'. This research by design is presented from a first person 'reflective practitioner' (Schön, 1982) perspective.

At the start of millennium, the prototypical urban interventions were introduced by CHORA office (CHORA, 2017). These represented a critique of master planning, suggesting that small input in an urban environment can generate large change through its public interaction (Doherty, 2005). Local specific fruitful synergy between technology development and community building that 'resemble various forms of indigenous and even pre-modern forms of knowledge creation and practice' was discussed by Kera (Kera, 2012). Sensible or not, culture has developed and was tested in context of local environment over generations and it often evolves in sustainable and well performing strategies that are easily

accepted by particular communities (Davidová, 2016; Davidová & Raková, 2018; Davidová & Uygan, 2017). Emotions have an impact on public desire and will (McIntyre-Mills, 2014) and digital design is powerful political process (Bratteteig, Wagner, Morrison, Stuedahl, & Mörtberg, 2010). Therefore this post-digital design-research not only suggests local specific examples but also 'schools of thoughts' (Hensel, 2015) for local specific adaptations addressing global problems reachable through DIY (do it yourself).

Our collaborative co-designed research by design synergises these agendas further as follows: 1) The interventions are trans-disciplinarily co-designed with the local community, therefore generated bottom up from the local input. 2) Their performance is co-designed with the local eco-system, including the human and the non-human community. 3) The prototypes are attached to related cultural events, to engage the interest of the human community and related professionals. 4) The complexity of the design process, the eco-systemic relations and speculations of the development are exhibited in the form of GIGA-map, the visual diagramming of complexity (Sevaldson, 2011). 5) The prototypes, the tangible interfaces, are marked with QR codes. The QR codes are leading to our site with recipes and grasshopper codes for DIY. Therefore, they are offering tangible processes experience for adjustments to local specific settings by other communities with Creative Commons Non-Commercial Use Licence (Creative Commons, 2017). 6) This site is promoted on related fairs and sites to reach the prototype's iterations, i.e. Maker Faire Prague (Kera, 2018) or Rhino News (related software news blog that appears to every user when starting the software). 7) The project updates itself based on its long lasting performance and generative development observations. It therefore follows third order cybernetics principle when the designer is time-to-time within and time-to-time outside of the system as well as it goes hand in hand with Joachim's justification of designers' foreseeing of better futures (Joachim, 2015).

2. Iterative and Generative Co-Performing Prototypical Design Cases - The Intelligent Landscapes

The following selected design cases focus on cross-species co-living, whilst engaging local human and non-human, living and non-living communities, offering interaction, exchange, transfer, nutrients and habitation. The prototypical iterations of two key concepts are built of wood from local forests, using its hygroscopic properties for material performance that generates suitable microclimate for different species' comfort for micro biotop habitats, material, food and genetic production and distribution on important bio-corridors across variety of cultural landscapes, updating them with collective cross- biotic and abiotic intelligence. They are therefore generating a multiple agency oriented 'rights to ground' (Hensel 2019).

2.1. SPIRALTREEHOUSE CASES

The initial project of SpiralTreeHouse led into several iterations, all adapted to its local environments, generating co-living and co-performing landscapes.

- SpiralTreeHouse, Cholín Forests, Czechia (2010)

Figure 1. SpiralTreeHouse for co-living with trees / Moss growing on the SpiralTreeHouse's platform • Authors: Davidová , Závada • Building Team: Závada, Davidová, Peterková, Závadová, Dioszegi, Vedral, Hradilek (photos: Zapletal 2014 / Davidová 2012) .

SpiralTreeHouse was built in the forest on top of the original Celtic settlement above a dam and its nearby village that is today covering mainly recreational character. It is an along oak trees sweeping structure (see Figure 1) and it uses the material from over densified pine forest from communist regime to support the eco-system. The structure offers co-habitation of different species that co-create and benefit from its performance (Davidová, 2017). I.e. the moss living on the platform benefits from the hygroscopicity of wood, receiving moist even in today so common draughts (see Figure 1). Being in touristic neighbourhood nearby the city of Prague, the concept getting spread for DIY.

- Co-oCo-oNest - Slavutych, Ukraine (2018)

Figure 2. Chernobyl urban environment taken over by the eco-system / CooCooNest co-builders and co-designers testing the structure - 86' Festival's Workshop (Slavutych, Ukraine 2018) • Workshop Tutors: Davidová, Prokop • Workshop Participants: Neshevets, Rezen, Dimitrishina, Zabolotnyi, Slavutych local community (photos: Davidová 2018).

Within the framework of the first international workshop series, organised by 86' International Ukrainian Film Festival, Collaborative Collective, Ukrainian trans-disciplinary workshop participants and the local community of Slavutych co-designed baby of SpiralTreeHouse, the Co-oCo-oNest (Davidová & Neshevets,

2018). The project builds on that due to the disaster in 1986, the Exclusion Zone of Chernobyl gave rise to an exclusive eco-system (Deryabina et al., 2015) that turned the nuclear zone into natural tourist destination (see Figure 2). This leads to the question of such adaptation of the local society and their built environment. In the time when we discuss about 80% of biodiversity or biomass loss in Western and Central Europe, this place is truly unique. Our workshop program claimed that the community needs to take an advantage of such local specificity and develop their cross-species co-living and co-habitation skills. These are advanced through community 'co-design and co-creation' (Sanders & Stappers, 2008). Many locals helped on the building site and local kids co-designed the structure when playing during the construction time. The participants photographed and draw the local references while seek for their relations (Davidová, 2018). While doing so, they co-designed eco-systemic prototypical urban interventions and their fusion of resting and social space in the trees as well as monkey bars was physically co-prototyped (see Figure 2), than also re-designed and iterated.

- SpiralMonkeyBars - Prague, Czechia (2018)

Iterated by second author of the STH, SpiralMonkeyBars is a climbing construction for kids made of local hazel branches with discarded firefighter's fire hoses. It is a villa like area community project in the only potential public social space in the neighbourhood - a little forest in its centre (see Figure 3).

- COLridor II, Třebíč, Czechia (2018)

Figure 3. SpiralMonkeyBars • Author: Závada • Building Team: Závada, Závada, Vavrda / COLridor II - The spiral structure on a square between park and city's eco-system • Design and Realisation Lead: Davidová, Zímová, Michálek, Zatloukal, Gazdová, Gönulf, David • Building Team: Stasiak, Čapková, Čapka, Nejedlý, Viceník, Belán, Novotný, Větrovec, Veselý, Herzán • Client - Exhibition Theme and Concept: Horák Goryczka (photos: Závada / Davidová 2018).

COLridor II (see Figure 3 and 4) has been built as an architectural solution by Collaborative Collective for Czech National Heritage Association's exhibition on wood building constructors' lineage Herzan (Davidová, Zímová, & Horák Goryczka, 2019). The project is to support bio-corridorial relations of an adjacent park and city's eco-system. Constructed and kept updated with local scouts, the structure holds, insulate and hydrates onions of blossoming plants to feed pollinators in very early spring's very first sun and holds local specific seeds for

birds. The interior part will invade the gallery space with an indoor eco-system and offer bird food to visitors for dissemination (see Figure 4).

Figure 4. COLridor II - Edible properties of the outdoor spiral structure covering sprout of blossoming plants and bird food and the living indoor extension of the generated micro bio-top • see caption of Figure 3 for authorship (photos: Zímová 2018).

2.2. TREEHUGGER CASES

TreeHugger concept is a prototypical intervention to support edible and habitable landscape within cities' bio-corridors. It serves as a dwelling for insects and algae and as a fast-food restaurant for bats and birds. TreeHugger's are applying responsive wood concept for generating a desirable microclimate for its internal chambers to be inhabited by insects and a desirably moist ground for algae. Cut in tangential section, its panels warp or narrow down based on the combination of relative humidity, temperature and the position of their origin in the log. Combining the last quality and world axis orientation, the prototypes generate various microclimates preferred by diverse insect species. Thanks to the hygroscopicity of the material, moisture is retained. Therefore, algae that would not otherwise survive in sunny, therefore dry, locations can inhabit the prototypes along all world axis orientations (Davidová & Prokop, 2018; Davidová & Zímová, 2017, 2018).

- TreeHugger CZ, Prague, Czechia (2017)

Figure 5. TreeHugger CZ Prototype in Prague after Nine Months of Co-Performance with the Local Eco-System. Please, note also the algae habitation. • Authors: Davidová, Prokop, Zímová, Michálek, Horák Goryczka, Hanzlík, Trgala, Oberhofnerová, the Local Biotic and Abiotic Community of Prague 2 District - Co-Design (photo: Davidová 2018).

TreeHugger CZ was the first prototype of its kind, built within joint co-design COLridor I project led by - Collaborative Collective and CooLAND NGOs. The project is to generate a bio-top on a bio-corridor passing through city centre of Prague. It is built for Central European climate, protecting from cool weather and high humidity, while generating ventilation flow in hot dry weather (see Figure 5).

- TreeHugger CY, Nicosia, Cyprus (2018)

Figure 6. View on United Nations Buffer Zone in Nicosia from Greek side / TreeHugger CY • Workshop Tutors: Davidová, Prokop • 6th eCAADe RIS Organisation: Kontovourkis • Site Analysis for Tree Pre-Selection and Permission Negotiation: Konatzii, Psaras • Prototyping Worksop Participants: Konatzii, Psaras, Kyprianou, Vucic, the Local Biotic and Abiotic Community of Nicosia Centre (Co-Design) (photos: Davidová 2018).

TreeHugger CY was built as a workshop result at 6th eCAADe RIS lead by Collaborative Collective. It is a Cypriot adaptation of the first concept, built for Mediterranean climate. Being placed few meters from United Nations Buffer Zone in Nicosia, it extends its non-human species' bio-corridor in city centre (see Figure 6). Contrary to the first prototype, the panels are placed to air the structure in humid and cold weather. As the high humidity and high temperature is the prevailing climate, the solution supports that the humidity does not concentrate inside (Davidová 2018).

3. Iterative and Generative Prototypical Agency - The Informed Landscapes

The prototypes' recipes and parametric codes are simultaneously placed on Systemic Approach to Architectural Performance blog for their local specific adaptation through communities' DIY under Creative Commons NonCommercial 4. International Attribution (Davidová, 2018). Based on the processes needed, it includes project's explanations, animations, Grasshopper 3D (Davidson, 2017) parametric code and storyboards, explaining different steps or manipulations of the parameters (see Figure 7). The site is therefore distributing the 'schools of thoughts' (Hensel, 2015) for generation of its local specific informed iterations. Such blog is further distributed through various analogue and online digital publicly accessible landscapes.

Figure 7. The On-Line Recipe with a Grasshopper Code for DIY (website: Davidová , manual: Psaras 2018).

3.1. TAGGING THE PUBLIC SPACE

Figure 8. Ondřej Michálek attaching the QR code to TreeHugger CZ / Non-Anthropocentric Refreshments at Maker Faire (photos: Davidová / Horák Goryczka 2018).

For each of such project's post there is generated a QR code leading to the web site. These are lasered into- or attached to- prototypes (see Figure 8). Therefore, the prototype, being always placed in public space, serves also as an advert to disseminate its iterations. This has been extended by Non-Anthropocentric Refreshments event at 'Maker Faire Prague' (Kera, 2018). Besides preparing a seed bombing picnicking cuisine with honey species, a QR code mapping game leading to our fast food oriented prototypes' recipes was installed for the makers (see Figure 8). Such concepts are embedding information generative and self-iterative agendas into urban landscapes with very low-tech technologies, parasitizing on individuals' personal devices and internet connection. To my knowledge, first of similar experiments of linking performance of mobile devices with architectural spaces were done by Ocean North in project project Intencities in 2000 through SMS or WAP in Finland, that time targeting sound generative interaction (Sotamaa, katastro.fi 2000).When linking to internet, the amount of

site visits is local specific, either very low or very high based on the community's digital culture. More local specific strategies need to be investigated.

3.2. TARGETING MEDIA

Besides other popular sites, to engage the digital prototyping community, the prototypes with links to recipes are published on Rhino News (Davidová 2018). Such posts are for certain time period displayed to every Rhinoceros program user when starting the software (see Figure 9). Taking the advantage of that such users often know the tool well, according to page statistics, the Grasshopper code is often downloaded by these web site visitors. Therefore the work is targeting two types of communities, a) the local specific neighbourhoods communities' tinkering and b) the digital fabrication makers.
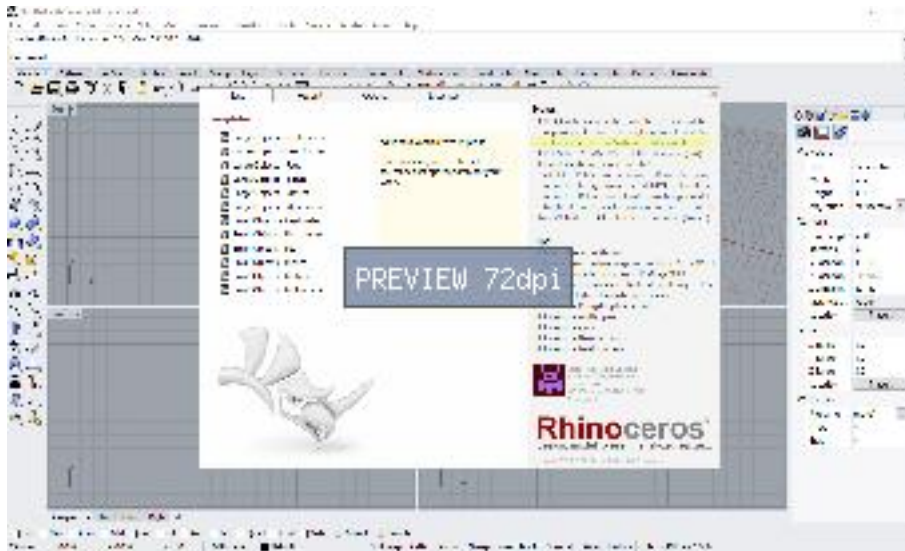

Figure 9. Starting of Rhinoceros program displaying TreeHuggers article with a link to DIY recipe (screenshot: Davidová 2018).

4. Discussion and Conclusions

Morrison and Chisin discuss in multi-species design context the importance of both design that generates thinking and design that generates functional objects both developed and scaled to local context (Morrison & Chisin, 2017), means also generating intelligent and informed landscapes. I would add to it the importance of cross-species co-design that generates interaction, agency, performance and its own iterations, means an active bio-digital intelligent informed landscape. These qualities always have to be adapted and in adapting dialogue with natural, social and cultural environment in a form of a 'real life laboratory'. Such 'speculative design' (Dunne & Raby, 2013) is to motivate bottom up

actions through interactions. The discussed 'non-anthropocentric architecture' (Hensel, 2013) is hands on speculating on the shift from Anthropocene in urban environment through twofold layers: a) it intervenes and interacts locally through environmentally co-designed prototypes; b) it offers recipes and parametric codes for local adaptations across the world. This post-digital 'Ecological Urbanism' (Mostafavi & Doherty, 2016) is approached both: a) locally, by tagging the public landscape with our online information (a low-cost and low-tech way of ubiquitous computing), b) it is spread through advertising targeted on relevant communities (accessible to whoever with internet connection across the globe). The research is not only targeted on motivating but also on giving the guidance and recipes to several design cases for the public to support climate change adaptation and biodiversity loss mitigation. Therefore, the originality is in its hybrid targeting on wider spectrum of application through diverse audience. It represents both a research by design itself but also a design manual for a DIY approach for an engagement and increase of urban biodiversity. At one point, the work discusses the theories generated through practice that we do not only need to dwell in the cities, but also eat. On the other hand it offers hands on recipes and codes in order to achieve this. It publishes the research open access so it can reach communities, future generations of professionals, practice, academy even from the locations that experience scarcity. Therefore, the work supports lowering instability in the world and fights climate change through its shared applicable content, fusing social and environmental justice. It is empowering the communities even at the places where finances are scarce, as long as there is an access to basic natural resources and internet. Such multi-layered urban design agenda is co-defining the new emerging design field of Systemic Approach to Architectural Performance.

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