



# World Building: Responsive Architectural Environments in the Context of Interdisciplinary Collaboration

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## INTRODUCTION

Ideas relating to issues of ecology have recently resurfaced as a topic of inquiry within the architectural discipline, and few contemporary research trajectories are better suited to address them than interactive and responsive environments. From the collection of data from sensors for evaluation, to the custom-developed “brains” that interpret this data, to the actuators that then respond to the instigated decisions, all of these technologies, including hardware, software, and the result of bridging the two, lend themselves to the advanced development of constantly evolving, ecological, architectural environments. In fact, it could be argued that the development of these technologies within the discipline over the past 20 years has been the driving force behind the reemergence of ecology as a topic of study within architecture; their use has uncovered formerly unknown areas of potential and possibility for these previously explored conceptual positions. In many ways, we aren’t simply exploring a new line of inquiry based on previous conversations, but instead witnessing the evolution of these conversations as an established branch of architectural investigation.<sup>1</sup>

Much has been written and presented on both the

novel technologies and affect-driven results of these responsive environments, and many of their images have been published in the recent explosion of catalogs, periodicals, and books on the subject. But simultaneous to all of these architecturally specific developments has been the parallel evolution of a huge array of interdisciplinary collaborations between an equally large assortment of non-architectural professionals working in immediate proximity to architects and designers alike. Unfortunately, the extremely successful conversation surrounding the responsive technologies and their results has seemingly missed these collaborations and the interdisciplinary worlds that have increasingly come to inform digital technologies and their relation to architecture and design.

In addition, running parallel to these developments is an equally interesting series of new questions about the constitution of ecologies and collaborations. For quite some time, the basic notion of non-reductive, systemic approaches to understanding assemblages set forth in the 18th century has been distilled out of the natural materials of the meadow and applied to disciplines ranging from the social, to the industrial, to the political.<sup>2</sup> But giv-

*Blue Eyed Sailor –  
Environment One*



Vivarium –  
Fast Biomass



en this broad ranging applicability, why is the default understanding of both ecologies and interdisciplinary collaboration that of self-stabilization and naturalization?<sup>3</sup> If we are to truly begin to imagine building architectural worlds within which ecologies and collaborations exist in a consequential way, we must begin to challenge this default condition with out-of-equilibrium states.

#### VIVARIUM

In 2010, our firm set out to explore this position through an installation at the Southern California Institute of Architecture titled “Vivarium.” Until that point, the most common condition of ecology had been that of “holistic” approaches that attempted to focus on the “organization and internal/external relational dynamics of wholes or assemblages”—an approach that looked to continuous “interconnectivity” and stability as a means of understanding complex systems as they exist in equilibrium or near-equilibrium states.<sup>4</sup> The benefit of this approach was that it allowed for a fairly clear, complete picture of a complex system to emerge regardless of the turbulence, extremes, or singularities that exist within as anomalies. The work of 18th century landscape designers such as William Kent, Lancelot Brown, and Humphry Repton are clear examples where the desire to move away from reductive ideas of ornamentation led to the translation of ideas about natural processes into immediately self-stable landscapes—landscapes,

not accidentally, composed of equilibrium (climax) species.<sup>5</sup> This approach was continued in the late 20th and early 21st centuries in the form of certain approaches to biomimetics, where idealized versions of ecological conditions or aspects were translated to stable architectural constructs minus any potential disruptive extremities. Our interpretation of this was that the effort to create romanticized changelessness within architecture undermines the complexity inherent to an ecology, be it part or whole, natural or artificial.

Vivarium attempted to challenge this long-held normative condition through a series of collaborations that injected constantly evolving extremes and singularities into both the installation itself and the architectural space that surrounded it. Materially, organic substances worked with inorganic processes: insects were hatching while sensors converted their movement into data streams; water turned brackish, after which, machines would introduce freshwater; biomass created humidity that geometry and materials attempted to control and evacuate. Computationally, data streams collected within Vivarium from hardware (microphones and movement, temperature, humidity, and salinity sensors) worked with custom written software to evolve a series of decision-making processes which could make changes to the physical environment of the installation—changes in the soundscape, changes in temperature, etc. The continuous evolution that was created through these processes working simultaneously embedded the dynamics of an ecology into the architectural space itself, which created an alternative position to the idea of simply indexing one formally.

This position was made possible through collaborating with Rise Industries and Nicholas Pisca to develop the custom synthesizers, software, and hardware that worked to collect, analyze, interpret, and deploy the previously mentioned physical changes. As the collaboration evolved, so, too, did Vivarium—only instead of the relationships and project becoming more stable as things progressed, they became more extreme. Each collaborator worked to develop aspects that would influence additional portions of the project, which would also influence the other members. If the inner robotics added too much fresh water, for example, it would completely change the humidity profile, the geometry needed to control it, and the soundscape that was responding to it. This created a constant feedback loop that never attempted to find full resolution. Vivarium’s deployment was, therefore, never able to achieve any kind of constant equilibrium. During its existence, parts failed due to this condition—insects died, speakers blew, and software froze. In the end, Vivarium existed as a responsive environment not simply because of its software and robotics, but also because of the separation, death, and destruction that it produced in and around the world it created for itself.



Fast Biomass and  
Media Sensors





*Flood Stains – Autopsy of the Monolith*

### FLOOD STAINS

Continuing this exploration further was Flood Stains, which was conceived as a standalone project meant to route latent and shadowed aspects of Vivarium into a performance that transformed the common de-installation process of a gallery piece into an opportunity for creation and evolution. It was delivered as a live broadcast and chronicled in a single-take film, scored with a “Bacterial Opera” composed and performed live by No Wave legend Lydia Lunch (Teenage Jesus and the Jerks). The raw material for the piece was mined out of specific components of Vivarium: sound samples from its interior (natural and digital), corpses of insects as preserved by the high salt content of the environment, and physical debris made from the disassembly of the structure and skin of the built work. Both biotic and abiotic material, usable and unusable components, as well as rarely compatible human interactions transformed the collaborative performance into an ecological world within which stability only existed as a point of departure.

Particularly important to this piece was the complex circulation of human interactants. While Lydia Lunch performed her opera, others were moving through the gallery and creating constantly evolving environments that she would then be forced to adapt her performance to. The opening and motion of the main Vivarium structure propelled her into one area while the distribution of salt and other organic matter drove her into another. The video feed and film attempted to trace both aspects, working as a foregrounding device simultaneously for the performance as well as the disassembly. The constantly changing movement patterns and material interactions also had a destabilizing effect on the surrounding environment—temperature, humidity, and light levels varied based on what was happening and where at any given moment, which had additional effects on Lunch’s area of operation.

The complex and constantly changing interactive conditions that were created during Flood Stains caused an emergent, ecological condition that was at once both a conventional responsive environment and a postdigital architectural event.<sup>6</sup> Responsiveness in this case is used

in the traditional sense of simple cause and effect where environmental changes led to occupancy adaptation. The reframing of digital and material interactions from Vivarium towards the sustained human interchanges in Flood Stains established the ground from which a conception of postdigital affects can be understood as developing out of digitally and materially driven environments.

### BLUE EYED SAILOR

Blue Eyed Sailor was designed to evolve the relationship of ecology and collaboration through the concept of an alternative, estranged nature and its imaginary envelope of time through a short film/music video. The project attempted to readjust both foreground and background through visual camouflage, duplications, and abstractions, which, in turn, provoked visual difference and non-equilibrium. Mia Maestro, the writer and performer of the video’s song, continually materialized from, and dematerialized back into, familiar architectural flora patterns. These patterns (which are based on the art of Cecilia Paredes), as well as Maestro’s interactions with them, worked to explore this estrangement and the potential embedded in embracing it.

Collaborating with Academy Award winning cinematographer Guillermo Navarro transformed the pre-

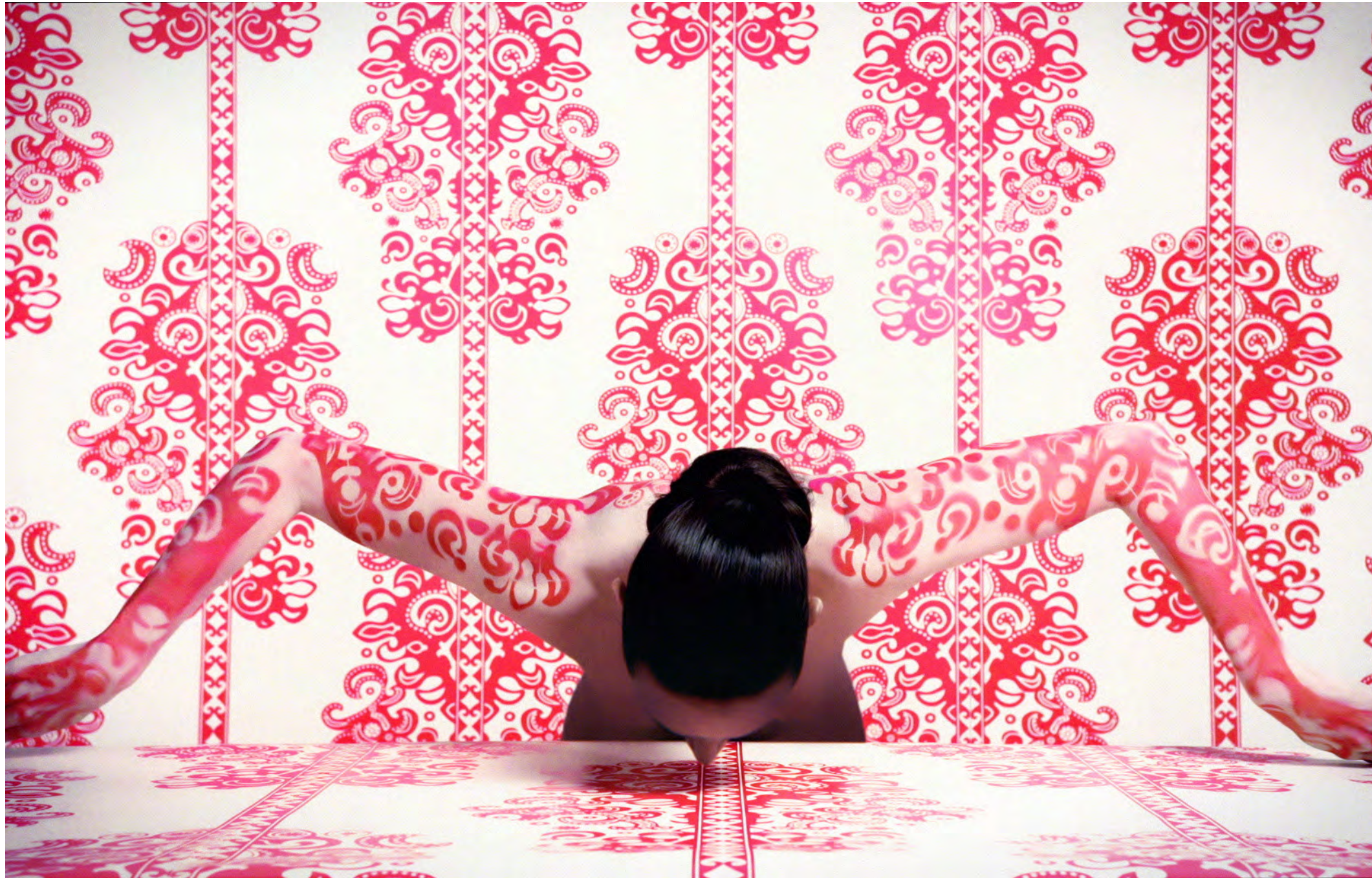
vious experience with Lydia Lunch from a single-take, continuous ecological experience to a multi-take, constructed one. Each day, Maestro spent nine hours in makeup prep in order to produce the material affects necessary to create the resultant visual effects, which led to the project becoming a multi-day collaborative event. During this time period, weather changed, the movement of bodies changed, backgrounds changed, and the interaction between them all evolved through circadian fragmentation. Every moment of the event was an act of anticipation and adaptation, and the end result is an estrangement from the understanding of ecology that is typical of continuous, self-stabilizing concepts of nature and naturalization.

The very essence of the project was that of variance and divorce, moving from one scene to another with alternate makeup constructions and different backgrounds that responded to interaction in different ways. Nature was removed from its life cycle and then reanimated through a foreign body—new ecological cycles of actuality were created through which the relationship between architecture and nature could be reexamined and redefined. An alternative world was created through which fragmentation and singularity were the defining conditions for existence.

*Blue Eyed Sailor – Environment Three*







### CONCLUSION

While these projects embrace the contemporary condition of creating technologically informed responsive environments, they challenge this concept to move beyond the simplistic notion of systems in equilibrium. They do not merely attempt to unite multiple visions and environments under a singular, holistic, and stable image, but rather frame the very contradiction of such an assertion through the development of its inverse. Architecture as an

out-of-equilibrium state opens up the field of potential to include not just what is designed and controlled, but also what is disorderly and uncontrollable. Interdisciplinary collaboration has the ability to assist in driving architecture towards these unstable states, creating a potential far beyond that of the typical design vacuum. This potential is crucial to the discipline beginning to embed, actualize, and expand ecological thought and its relationship to architecture—crucial to it being able to build worlds.

*Blue Eyed Sailor –  
Environment Two*

### ENDNOTES

1. Look to the proceedings of ACSA 101: New Constellations/New Ecologies for this ongoing conversation.
2. Morton, *Ecology Without Nature*, 2-4.
3. Skender and Solander, "Naturalizing Architecture – Beauty Becoming Beast."
4. Goodbun, "Gregory Bateson's Ecological Aesthetics," 35-36.
5. McHarg, "Ecology for the Evolution of Planning and Design," 239-240.
6. For a detailed conversation regarding the postdigital in architecture, see Neil Spiller's "Plectic Architecture: Towards a Theory of the Post-digital in Architecture."

### REFERENCES

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### IMAGE CREDITS

All photos by MTTR MGMT.