

## **Structured growth and grown structures**

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Anything living or growing – from spore, to fruit, to soil, to compost – experiences constant pressure to transform. Similarly, the will to improve our living conditions, extend our lives, or even create a piece of music, involves coercing certain changes in the environment. Technology currently meets this pressure through a pattern of obsolescence and incremental upgrades, guided by a logic of novelty and reinvention. In contrast to living systems, our technological growth rarely involves cyclical processes; new technologies don't often feed on the detritus of the obsolete.

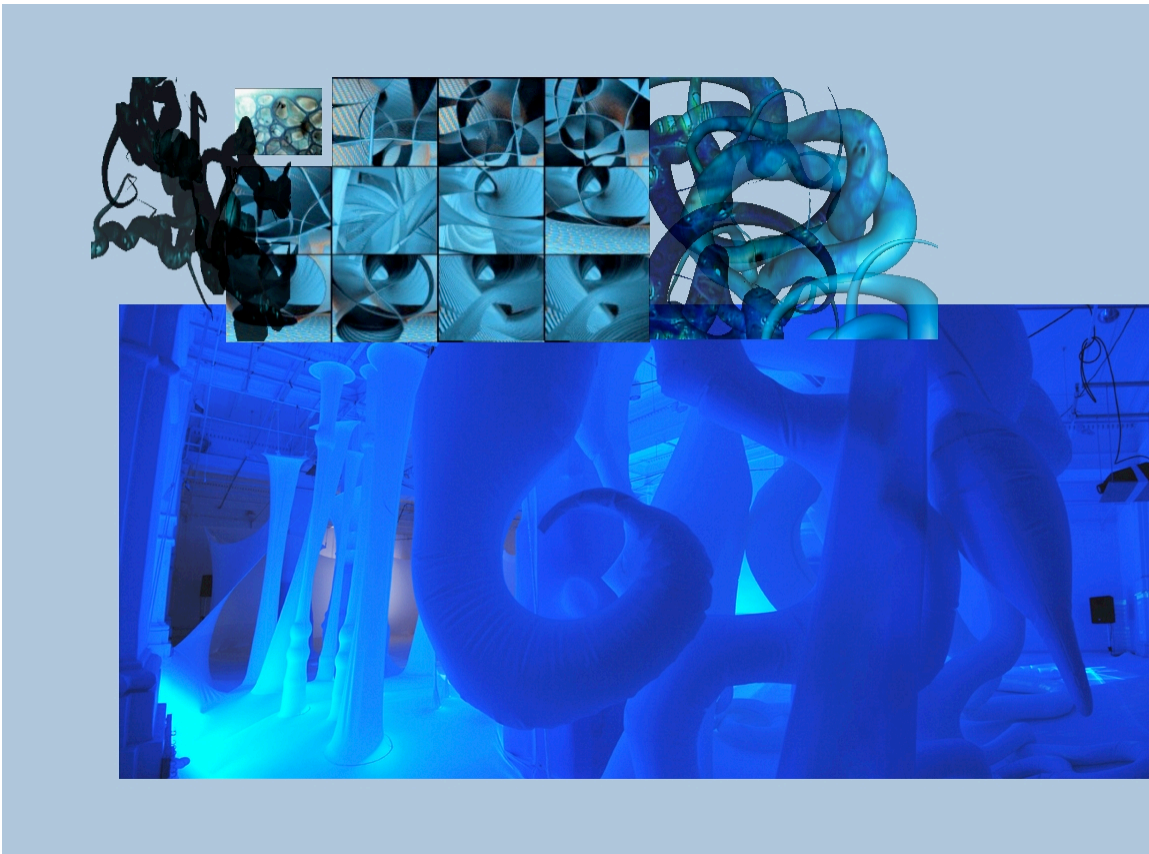
As people living in highly technological societies, it is our responsibility to maintain a balance between the needs of living environments and the requirements of their 'cultured' inhabitants. This can include improving the condition of the environment, developing 'greener' technologies, adapting our lifestyles to minimise environmental impact, or affecting people's perceptions by raising awareness through engaging media and art works (from film to games to graffiti).

We attempt to maintain this balance between nature and culture by propagating grown structures and encouraging structured growth, blending the biological with the artificial and simulated. Grown structures can be seen in the patches of wilderness on the periphery of ruined or abandoned architecture, or even architecture that is still inhabited, but kept slightly unsterile. These structures thrive in such quiet spaces and, over time, come to overtake them. The structuring of growth, on the other hand, pulls such wilderness back toward intentionally built forms like arches, domes and gardens. Structured growth consists of pushing, twisting, tangling and untangling the active and the potential, rarely attempting to control and restrict, but rather to influence and guide.

### *Transformation and responsivity*

Aspects of FoAM's research address the capacity for growth and transformation in natural and artificial worlds. As part of our exploration into these processes, we construct situations, often categorised as 'responsive environments'. By this, we refer to technologically enhanced spaces, which facilitate playful explorations of physical and digital surroundings as well as fluid dialogues between people, materials and media. In such environments, transformation occurs in both digital media and physical structures in response to activities occurring within or around them. We contrast the aesthetics of the designed with the often surprising, at times monstrous, beauty of the grown. Sometimes this growth is simulated, sprayed across buildings and other forms of architecture as computer generated images and sounds. Other times we grow biological environments, looking for favorable technological or artistic symbionts.

Whether natural or simulated, responsive systems grow and change over time, influenced by their internal processes and interactions with their inhabitants. Designing for such systems or environments is closely linked with issues of influence and control, intentionality and co-creation. Designers may have significant influence on the initial forms, but the ways the worlds morph depend on myriad factors which can never be fully predicted, shifting the emphasis of design from objects to processes. It is this sense of surprise and spontaneity we seek in our works. We can never be certain if these spaces will descend into meaningless chaos, become mere wall-paper, or give rise to bizarre jungles of incomprehensible forms.



*Entangled growth in a responsive environment (photo by Damjan Svarc)*

What influence does an environment have on the morphology of its forms? What conditions are required for a responsive space to grow in interesting ways and how can it gracefully decay? How can people's actions be translated into processes able to change an environment? Such questions demand real-world tests, technological and architectural models, as well as committed human participants. In an attempt to find some answers, we have developed two parallel, yet interconnected initiatives: the  $t^*$  series and *groWorld*.

*t\* series*

*t\* series* (2000-2005) involved creating and publicly experimenting with three distinct groups of responsive environments: *TGarden*, *txOom* and *trg*. These environments were immersive hybrid realities presented as fictional play-spaces. They were designed for the full-body interaction of human participants with 'irreal' responsive worlds. Movements were translated into changes in the environment's media. Discrete gestures, for instance, would cause local 'disturbances'; the accumulated actions of larger groups would over time cause slow changes in the atmosphere. As in a natural eco-system, localised events may have an effect on wider growth patterns.

The explicit transformations inside these spaces are primarily simulated, guided by the dynamics of mutating visual, sonic and tactile stimuli defined by the software and hardware. We designed several models to guide these dynamics, ranging from a state-space to a simplex model with explicitly inscribed 'scenes' to an implicit model of dynamic forces. In testing these models during public presentations, the simplest seemed to behave best. However, we have not yet been able to set up the environments for an extended period, where we expect the more intricate models would become more interesting.

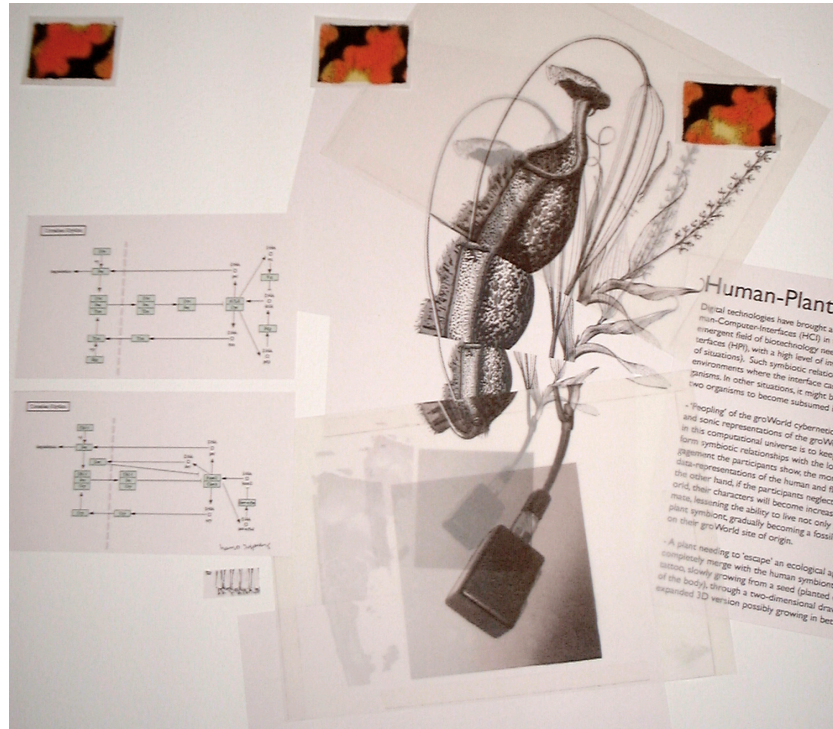
The changes in social atmosphere during an experience – an individual explorer playing the space as an instrument; or a small group of friends rushing through the space, flooding it with speckled light; or children digging through patterns of sound, telling unexpected stories – implicitly change the environment, often in unexpected ways. We found that both explicit and hinted transformations are required for a responsive environment to feel 'life-like'.



*trg environment*

## GroWorld: Sym-Bio-Sys

Although similarly motivated by a tension between the constructed and the evolved, *groWorld* (2000- ) takes a different approach. It focuses on biological growth, which occurs slightly out of reach of human control, able to inspire more responsive (and perhaps responsible) forms of design, engineering and social organisation. More specifically, with its three strands, 'Sym', 'Bio', and 'Sys', *groWorld* attempts to introduce its seeds into media arts and technologies, tackling environmental issues from biological, cultural, and technological angles.



*groWorld's speculative HPI (human-plant interface)*

The 'Sym-' strand, inspired by the robustness and sustainability of eco-systems, attempts to translate the adaptive, diverse, and charismatic qualities of ecological forms and processes into the design of materials, media and architecture. The '-Bio-' strand plants its seeds in the form of tiny urban gardens. Following Masanobu Fukuoka's principles of natural farming ('seedballing'), native seeds are planted in the cracks between built forms – de-activated spaces, empty lots, unused alleyways, rooftops, waste-dumps. In a few years, we should see the beginnings of a network of public gardens in which we can dwell, eat, study, play, or perform. '-Sys' looks at reducing the ecological footprint of existing and emerging technologies without losing the advantages they provide. We are interested in the development of sustainable or self-sufficient technologies able to power, sense, or activate our surroundings. With Sys, we aim to develop machines that are more life-like, rather than reducing life to a mechanised existence.



Seedballing

As a long term initiative, we hope the guiding principles of *groWorld* will help create ideas applicable to both natural and artificial environments.

#### Conclusion

Seeing growth and transformation as an essential part of the creative process may change methods of producing, presenting and reflecting on art, influencing not only the artists and technologists involved, but also having a strong effect on the audiences. As artistic endeavours move away from producing immutable objects toward becoming dynamic, fluid worlds, experiencing them necessarily moves from observation to participation. With participation comes responsibility, communication, as well as the understanding of people's mutual influence on each other and their surroundings.

#### Related papers

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#### Project pages

<http://fo.am/trg/>

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