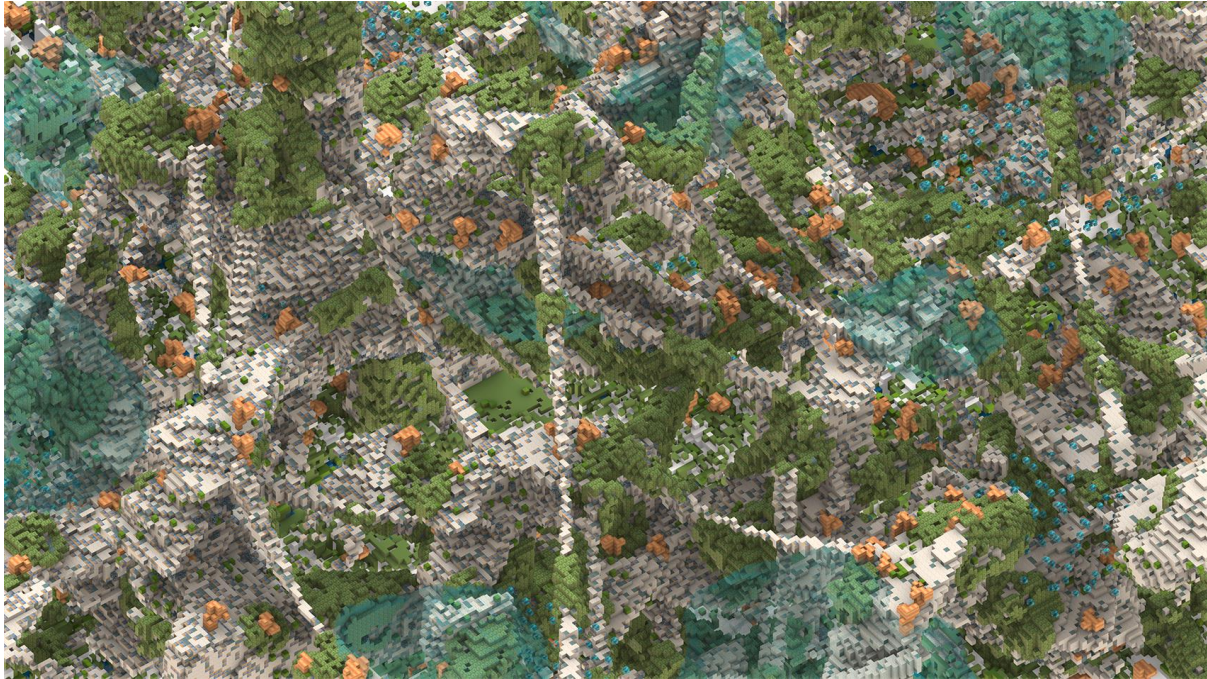




The BioHouse

Part of the Biotopia project
Studio Maas at CTU Prague - Autumn 2023



Preamble

From a biological perspective, nothing is unnatural...

Biology enables, culture forbids.

Sapiens, Yuval Noel Harari.

In 1969, three years before the Club of Rome published their “Limits of Growth”, whose dire predictions startled audiences globally, Ian McHarg had revived in his book “Design with Nature” the hope for a better world, by means of establishing a healthier relationship between humans and nature. In 1973, psychoanalyst Erich Fromm coined the term biophilia in his book “The Anatomy of Human Destructiveness”, pointing out the idea that humans possess an innate tendency to seek connections with nature and other forms of life. The biophilia hypothesis was later explored by biologist Edward O. Wilson in his work “Biophilia” (1984), which proposed that the tendency of humans to focus on and to affiliate with nature and other life forms has, in part, a genetic basis.

Was this the beginning of an age of biology? Unfortunately, no: when reviewing these publications, one remains shocked at witnessing how more than 50 years of scientific,

technical, or philosophical progress of our civilization could not put an end to the belief in endless growth which led to the 'polluted, bulldozed, machine-dominated, dehumanised, explosion-threatened world that is disintegrating and disappearing before our eyes'.

We grow; we consume more; we waste more. Until when? Until resources are fully depleted? Until sweetwater, soil or energy come to an end?... It is appalling how mankind disconnected itself from all forms of biological balance to the extent that we are running out not only of resources but also of time.

Today, the current state of seemingly immediate apocalypse requires a decisive change of paradigm at the very epicentre of urbanisation: we must understand the planet as a single city of 8 or more billion human bodies and a myriad of other living creatures who need to be treated as individual agents with specific needs and capacities.

As moving out of the planet seems to be a solution limited to just a privileged few, we will need to face the challenges instead of ignoring them and act before it becomes too late. We can only survive on this planet if we turn Earth into a place where humans can sustainably cohabit with nature and its limits; living in a zero-waste, fully biodegradable, adaptable, recyclable, clean and energy-neutral environment. It's time to design with, for or as nature (no matter the preposition we want to use). It's time to use our imagination, to invent and to change; it's time to direct ourselves, our environments and our behaviour into a world of circularity. A world where we not only make nature but live like nature. In short: a world determined by biology.

Let's finally enter the age of biology. Let's construct Biotopia.

According to some projections, humanity will reach 12 billion beings shortly. What does a world inhabited by 12 billion humans and many more living organisms need? How can we influence these figures? What is the true capacity of the planet? What can we innovate, technically and spatially? How can natural sciences, automation, nanomaterials, robotics, biotechnology, or biomimicry contribute to establishing new relationships amongst those 12 billion humans and all other living organisms?

Let's invent. Let's dream and imagine Biotopia.

Happily, there are more and more inventions, from glass that can generate energy to bioengineered products. But more inventions are still needed. Can we make an extensive list of inventions leading to the achievement of Biotopia? Can we imagine that these inventions merge into a new material or ecological complex? Can we imagine a material that gives light, creates energy, that filters, contains and makes sweetwater; a material that houses plants and animals; that grows and shrinks instantly; that recycles, makes soils, feeds, and moves? A material -or better said- a bio-matter, that can even form clouds for shading, food production or water catchment?

Picture yourself in that world, in a true biological city, a global Sponge, sometimes thick, sometimes thin, that protects itself against climate change. Such a Sponge is a new three-dimensional Earth Crust made from that bio-matter. It shapes our interiors, our homes, our city and -finally- our world. The Sponge spans across borders. It's a substance that is porous

for access, openness, and views. It cools down or warms up as needed and consists of self-growing, self-evaluating and self-learning properties that enable it to adapt over time.

For centuries, design focused on objects with single meanings: everything was architecture.

More recently, we zoomed out to look for new meanings, at every scale, from the very small to the very large: everything was urbanism.

Recently, design finally started to -timidly- understand the meaning of 'green': everything was landscape.

Today -more than ever- everything is biology. Everything is Nature.

Studios Overview

The Biotopia project is subdivided into three parts. In 2022 the Bio-City was studied. In this studio the scale of the Bio-House will be explored. In 2024, The collection of this research will lead to the Biotopia Book.

Details and contacts

Programme: Architecture and Urbanism, Landscape Architecture, Design
Academic year: 2023-24
Term: Winter
Module: ATBS, ATOS, ATSS, ATU, ATVZ, ATV
Module guarantor: Winy Maas
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About this studio

Studio Maas is part of [The Why Factory](#) (T?F) - a global think-tank and research institute led by Professor Winy Maas, founding partner of MVRDV. It explores possibilities for the development of our cities by focusing on the production of models and visualisations for cities of the future.

In the fall of 2022, The Why Factory joined the CTU in Prague as a guest studio to focus on research in two areas: the winter semester concentrated on global solutions for more livable and sustainable cities, while the summer semester focused on proposals to improve specific areas tied to the ministries in Czechia for an even better country. This research is summarised in two outcomes - [The Biotopia](#) and CZ2.

In the winter semester of 2023, the studio will narrow down its scope to a house as a living unit. From analysing the current footprint and recyclability of Czech houses to studying both current and future (bio)technologies, as well as speculating on new inventions to come, the studio will immerse itself in sustainable practice to build a comprehensive toolkit for future living. In turn, this will inform the speculative design of possible houses that, with future technologies and strategies, will turn our households into recyclable, flexible, biodiverse, food-providing, energy giving and carbon-neutral

environments that can provide the desired comfort of living for many years to come. The results of the studio will be collected in the form of a book and presentation, accompanied by an immersive 3D animation of our future biohomes.

Learning objectives

- To understand the ecological impacts of the way we live
- To gather knowledge of current and future technologies in the field of sustainability
- To be able to analyse, sort and interpret large amounts of data
- To be able to work in a team with the aim of producing a shared outcome
- To be adaptable to changes in the course of the research
- To communicate complex ideas and concepts effectively
- To be able to produce outputs of excellent quality and clarity
- To be able to specialise in the different outputs of this studio

Research aims

- Identify the specific requirements of an average household and understand the current technologies that meet these requirements.
- Analyse the performance of these technologies in relation to energy, materials, ecological footprint, etc.
- Research and invent technologies that help the performance of a household, while improving our ecological footprint.
- Study and understand how different inventions can be combined to optimise efficiency.
- Identify new materials needed to make these inventions a reality
- Link these inventions with available resources to turn them into real-life solutions

Table of contents

1. The ecological footprint of a current household, the footprint with respect to sustainability and recycling
2. Household technologies today
- 3.
4. The dream - setting up the vision and needs of the BioHouse
5. The material - combining technologies to create a material that has multi-performative properties that fulfil the needs of the BioHouse respecting the footprint, sustainability and recycling
6. The film - 24 hours in the life of the BioHouse. How must the House react and behave towards its inhabitants over the day?
7. Backcasting - what new inventions are needed, to bring future visionary inventions closer to reality?
8. Presentation and Filmmaking

Process

The studio will be developed as a single shared research project that everybody works on. Teamwork is thus a vital aspect of the studio.

There will be specialised sub-teams that will focus on the different components of the project (research, inventions, scripting, filmmaking & animation, graphics, presentation and the final installation).

There will be weekly tasks, ranging from research to speculative design and invention. These will be followed by weekly presentations and feedback, either common or per group. More specific feedback on an as-needed basis.

Outputs/deliverables

- Weekly presentations on behalf of the whole team
- Weekly presentations on behalf of the groups in case the research is split
- A book summarising all research and design
- A short film/animation encapsulating the findings: The 24-hour life in a biohouse
- An exhibition in the atrium showing the research process, the results, the film and supporting installations
- A public final presentation with guest critics
- A 3D digital model

How the studio is taught

Students are encouraged to work in the studio at any available time to participate in group work which is at the core of the research.

We will meet twice a week as a full group with tutors on:

- Mondays from 14 to 17
- Fridays from 13 to 17 (with 9 to 12 reserved for group work preparation in-studio)

Based on the weekly content, we will review the current work as a group through short presentations with strict time limits and follow-up feedback and discussion. Solid organisation and collaboration are expected.

The teaching assistants will be in the studio on both Mondays and Fridays, with lead tutors present on specific dates. This can be reviewed in the planning schedule. **Please follow the schedule closely and check weekly for changes in the timetable.** Any changes will also be communicated via appropriate channels.

Assessment criteria

- Level of participation and involvement
- Quality of research and design process
- Quality of final design output
- Quality of final presentation and exhibition material

Feedback format

Students will receive feedback throughout scheduled reviews with the larger team, weekly with the teaching assistants and studio tutors. During the midterm and final reviews, guest critics will be invited to

Recommended literature

- *Sapiens*, Yuval Noel Harari
- *Limits and Beyond*, Ugo Bardi & Carlos Alvarez Pereira (original: *The Limits to Growth*, Dennis Meadows & Jorgen Randers)
- *Numbers Don't Lie*, Vaclav Smil
- *Dřevo (Wood)*, Jakub Cigler architects
- *Bio Design - nature science creativity*, William Myers
- *The Architecture of Closed Worlds - Or What is the Power of Shit*, Lydia Kallipoliti

Referential projects

- [Matrix One](#), 2023
- [Biotopia](#), 2023
- [Barbapapa](#)
- [Green Dip](#)
- [Senseable City Lab](#)
- [Neri Oxman](#) cocoon material ecology
- [Snohetta](#) material studies

Timetable

Please refer to the planning schedule (TBU closer to the semester start). **Please check weekly for changes**