

VIEWPOINT

Synthetic biology enabling a shift from domination to partnership with natural space

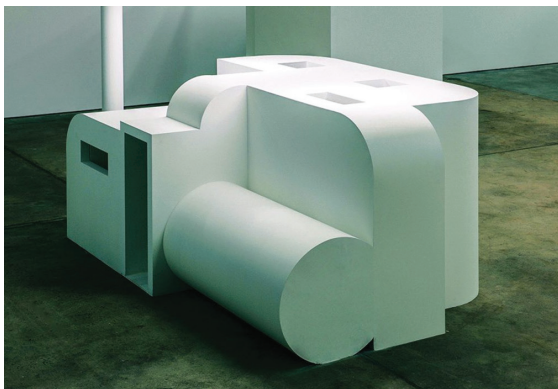
Supplementary File

(A) Artists and architects

Absalon

Ashdod, Israel. 1964 – Paris, France, 1993

- Meir Eshel (artistically known as Absalon) was a sculptor that among many other works during his short life career designed a series of minimal living spaces based on his own body measurements and basic daily tasks such as eating, sleeping, and showering.
- Project:
 - *Six Living Cells* (1991 – 1993)



- References
 - Lucarelli, F. (2014). *How to Isolate Yourself and Inhabit Everywhere: Absalon's Living Cells (1991-1993)*. Paris, France: Socks-Studio. Available from: <https://www.socks-studio.com>
 - Steierhoffer, E., & Mcguirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 150-152.

Alison and Peter Smithson

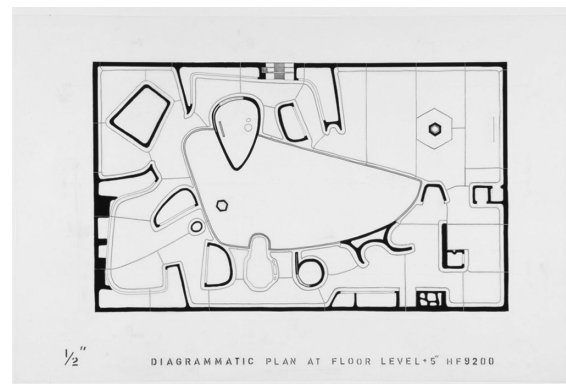
Peter Smithson (Stockton-on-Tees, England. 1923 – 2003)

Alison Smithson (Alison Gill) (Sheffield, England. 1928 – 1993)

- English architects and urban planners with an extensive constructive and theoretical work. They were active members of the Team X, especially relevant

group in the development of the ideas and ambitions in the architecture and urban planning fields of the second half of the 20th century.

- Project:
 - *House of the Future*. A prototype house fitted with mechanized furniture and incorporated into the architecture itself. It was exhibited in 1956 at the Daily Mail Ideal Home Exhibition at London's Kensington Olympia.



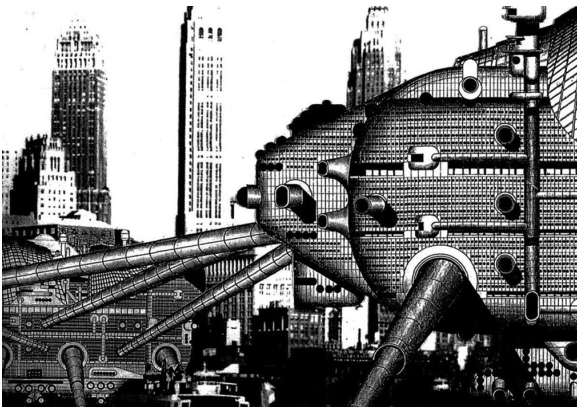
- Reference:
 - Steierhoffer, E., & Mcguirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 90-93.

Archigram

London, England. 1960 – 1974

- Group of architects formed by Peter Cook, Warren Chalk, Ron Herron, Dennis Crompton, Michael Webb, and David Greene who through publications and sporadic exhibitions suggested futuristic architectural ideas and urban scenarios between pop-art and science fiction.
- Projects:
 - *Plug in City*. A megastructure where the cabins were plugged in according to the needs of its inhabitants.
 - *Walking City*. Cities that are massive robotic mobile structures.

- *The Instant City*. An ephemeral city created by its inhabitants.

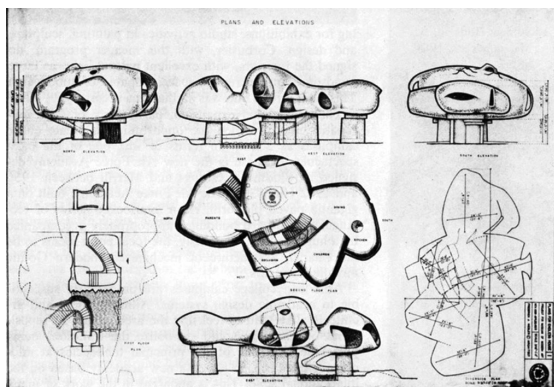


- References:
Available from: <https://www.archigram.net/portfolio.html>
Steierhoffer, E., & McGuirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 119.

Friedrick Kiesler

Chernivtsi, Austria-Hungary. 1890 – New York, United States. 1965

- Architect, sculptor, painter, and theorist whose work is based on what he called Correalism, that is, conceiving reality and architectural space as a fluid continuum. This is a manifesto in opposition to the modern movement of straight lines and rational and industrialized construction, which was the dominant architectural current of the mid-20th century.
- Project:
– *Endless House*.



- Reference:
Blanco, J. L. L. (2012). *Continuum C6smico: Frederick Kiesler (1890-1965)*. Arquia/Tesis No. 35. Madrid, Spain: Arquia.

Hans Hollein

Vienna, Austria. 1934–2014

- Austrian architect that apart from his extensive built buildings history, he developed some prototypes and research related to pneumatic, mobile, ephemeral, and autonomous architecture
- Projects:
– *Mobile Office*, 1969. An inflatable capsule that serves as an instant, isolated workspace to be placed anywhere.

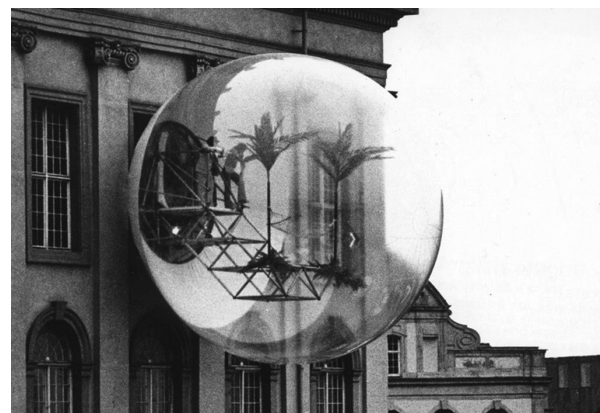


- Reference:
Steierhoffer, E., & McGuirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 54.

Haus-Rucker-Co

Vienna, Austria. 1967

- Group of architects formed by Laurids Ortner, Günther Zamp Kelp, Klaus Pinter and Manfred Ort. Their projects were speculations and sometimes satires based on pneumatic architecture and parasitic devices.
- Projects:
– *Klima Oasis n7*. Elemental pneumatic urban shelter conceived as a natural-artificial micro-ecosystem that explores the parallels between architecture and nature as culturally designed constructions.



- Reference:
Steierhoffer, E., & Mcguirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 39-41.

Neri Oxman

Haifa, Israel. 1976

- Architect, designer, and professor at the Massachusetts Institute of Technology (MIT) Media Lab, where she leads the Mediated Matter research group. She is known for art and architecture that combine design, biology, computation, and materials engineering.
- Project:
 - *Silk Pavilion*. Dome lined with the natural silk that 6500 silkworms have been producing guided by the base structure of the construction.

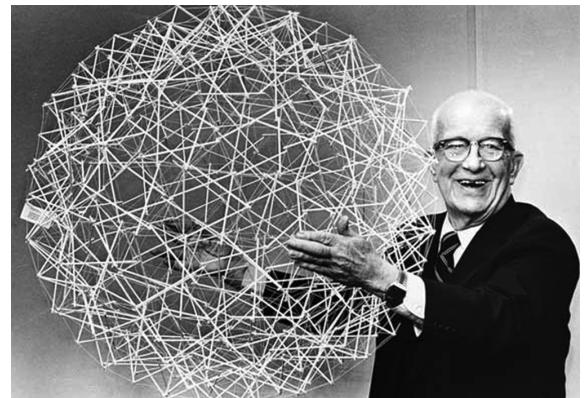


- References:
<https://oxman.com/projects/silk-pavilion-i>
<https://oxman.com/projects/silk-pavilion-ii>

Richard Buckminster Fuller

Massachusetts, United States. 1895 – California, United States. 1983

- Designer, architect, and inventor who developed prototypes of housing, vehicles, and dome structures.
- Selected projects:
 - *Geodesic dome and tensegrity structure*. Through a system of tensioned cables and rods, Fuller developed the so-called tensegrity (tensional integrity) structures. In parallel, he developed geodesic domes, spheres formed by a triangulated structure. Both systems can be combined to form compressible and expandable spherical structures.



- References:
Norman, F., & Fernandez-Galiano, L. (2010). *Buckminster Fuller 1895-1983*. Madrid, Spain: Arquitectura Viva.
Exhibition. (2020, 2021). *Radical Curiosity: In the Orbit of Buckminster Fuller*. Madrid: Espacio Fundación Telefónica. Available from: <https://en.fundaciontelefonica.com/exhibitions/radical-curiosity-in-the-orbit-of-buckminster-fuller/>

Superstudio

Milan, Italy. 1970's

- A group of Italian architects formed by Adolfo Natalini, Piero Frasinelli, and Cristiano Toraldo di Francia. Their theoretical projects were intended to disinhibit any functional design parameter, entrusting to a hypertechnological surface the ability to meet all the needs of its users.
- Projects:
 - *Monumento Continuo*. A series of huge megastructures are conceived as unifiers and condensers of civilization.

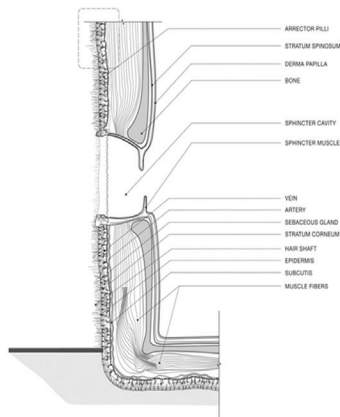


- Reference:
Mastrigli, G. (2016). *Superstudio Opere 1966-1978*. Roma, Italy: Quodlibet.

Terreform ONE

New York City, United States. 2006

- A non-profit architecture and urban design research group founded by Mitchell Joachim and Maria Aiolova that explores cutting-edge, experimental ecological designs to combat the possible extinction of humanity.
- Projects:
 - *In Vitro Meat Habitat*. “This is an architectural proposal for the fabrication of 3D printed extruded pig cells to form real organic dwellings. It is intended to be a “victimless shelter”, because no sentient being was harmed in the laboratory growth of the skin”.

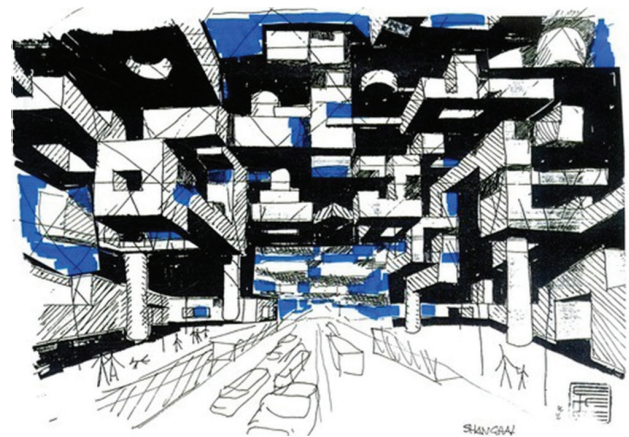


- Reference:
 - Mostafavi, M., & Doherty, G. (2016). *Ecological Urbanism*. Zürich, Switzerland: Lars Müller Publishers, Harvard University, Graduate School of Design, p. 234-239.

Yona Friedman

Budapest, Hungary. 1932 – Alaska, United States. 2019

- Architect and urban planner who through publications, writings, and exhibitions conceived radical ideas on flexible and democratic architectures and megastructures.
- Project:
 - *La Ville Spatiale*. Three-dimensional city project erected over the existing city. In this new city, framed by a megastructure, the architecture is in constant transformation. Its inhabitants are adapting their living space according to their needs and the conditions of their immediate and distant surroundings.



- References:
 - Friedman, Y. (2006). *Pro Domo*. Barcelona, Spain: Actar Publishers.
 - Steierhoffer, E., & Mcguirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing, p. 183-188.

(B) Research projects (sample)

Hyperbody Group

Hyperbody group is a research team at TU Delft University that in 2004 built the Muscle Tower, a prototype structure that changes its shape in response to parameters of its environment.

Reference:

- Maas, W., Hackauf, U., Ravon, A., & Healy, P. (2015). *Barba. Life in the Fully Adaptable Environment*. Rotterdam, The Netherlands: The Why Factory, Nai010 Publishers.

Claytronics

A research team directed by Seth Copen Goldstein in 2005 at Carnegie Mellon University in Pittsburgh presented Claytronics: A concept of a new material composed of many small round balls that can be programmed to connect and disconnect. This programmable material was never built, but raw prototypes and several studies have been developed.

Reference:

- Claytronics at Carnegie Mellon University*. Available from: <https://www.cs.cmu.edu/~claytronics>

Utility Fog

Utility fog is a concept developed by author and researcher John Storrs Hall that postulates that a swarm of nanorobots

floating in the environment could be programmed to automatically reorganize themselves by reproducing physical structures.

Reference:

Hall, J.S. (1993). Utility fog: A universal physical substance. In: Landis, G.A., editor. *Vision-21: Interdisciplinary Science and Engineering in the Era of Cyberspace*. Washington, DC: NASA Publication CP-10129, p. 115-126.

M-Blocks

The Distributed Robotics Laboratory, led by Daniela Rus at the MIT, is developing small robotic cubes that, through a system of batteries, motors and magnets, are capable of autonomously readapting to the shape and configuration requested by the user.

Reference:

The Distributed Robotics Laboratory. Available from: <https://www.csail.mit.edu/research/distributed-robotics-laboratory>

The Regenerative Home

The Danish designer company Space 10 has launched an initiative https://space10.com/project/the-regenerative-home/?mc_cid=d65d5a75c0 led by its head of research (Helen Job) aimed at restoring and upgrading buildings to prolong their life, enhance energy efficiency, and create and uplift local communities on the base of using locally-sourced natural materials such as straw and clay for new building work and insulation, integrating solar, green hydrogen, and other renewable energy systems into the exterior and interior design and integrating valorization of waste.

Fungateria

This project (<https://www.fungateria.eu/>) focuses on bringing mycelium-based materials into an “Engineered

Living Material” (ELM) context. ELMs comprise living cells that remain biologically active in use-cases, including architectural and urban projects, thereby offering radically new and tailored functionalities over non-living materials, for example, self-regeneration, adaptation to environmental cues, and self-organization across hierarchies of scale and structure. This largely involves development of a portfolio of ELMs using a cocultivation process employing mycelium and bacteria as a way to set up ELM manufacturing platforms.

(C) Further reading

- Friedman, Y. (2006). *Pro Domo*. Barcelona, Spain: Actar Publishers.
- Norman, F., & Fernandez-Galiano, L. (2010). *Buckminster Fuller 1895-1983*. Madrid, Spain: Arquitectura Viva.
- Lucarelli, F. (2014). *How to Isolate Yourself and Inhabit Everywhere: Absalon's Living Cells (1991-1993)*. Paris, France: Socks-Studio. Available from: <https://socks-studio.com/>
- Blanco, J. L. L. (2012). *Continuum Cómico: Frederick Kiesler (1890-1965)*. Arquia/Tesis No. 35. Madrid, Spain: Arquia
- Maas, W., Hackauf, U., Ravon, A., & Healy, P. (2015). *Barba. Life in the Fully Adaptable Environment*. Rotterdam, The Netherlands: The Why Factory, Nai010 Publishers.
- Mastrigli, G. (2016). *Superstudio Opere 1966-1978*. Roma, Italy: Quodlibet.
- Mostafavi, M., & Doherty, G. (2016). *Ecological Urbanism*. Zürich, Switzerland: Lars Müller Publishers, Harvard University, Graduate School of Design.
- Steierhoffer, E., & Mcguirk, J. (2018). *Home Futures*. London, United Kingdom: Design Museum Publishing.