

Innovative use of mycelium in construction

Abstract

The goal of the interdisciplinary study presented in this paper was to identify opportunities for innovative applications of mycelium in construction, including housing construction. This solution is gaining significance due to its sustainability and eco-friendliness. Mycelium can be seen as an innovative alternative to traditional building materials, and can be transformed into permanent structures using mycotecture. In 2023, within the framework of cooperation between researchers from the Warsaw University of Technology and experts from the Łukasiewicz Research Network Institute, an experimental study was conducted and produced interesting results. The study is at the testing stage. The interdisciplinary research team grew to include researchers from the Cracow University of Technology, Eurac Research from Italy and InnoRenew CoE from Slovenia. The methodology of research on mycotecture is a comprehensive process that begins with defining research goals and analyzing the literature. After analyzing existing cases and drawing conclusions, research experiments are designed, which include both laboratory tests and field tests. Field tests of the material produced during the study was linked with the participation of students from the Warsaw University of Technology, who built the Future Pavilion also known as the "We Stand For" initiative, where a prototype mycelium brick was used in the pavilion's structure.

Keywords: mycelium brick, mycelium, sustainable architecture, biomaterials, housing environment

INTRODUCTION

The modern world increasingly focuses on pursuing innovative, sustainable construction materials which can aid in reducing carbon dioxide emissions and improve the condition of the environment. One promising approach to designing sustainable materials is the use of biotechnology, including natural raw materials such as fungi. By analyzing the potential applications of biomaterials, especially fungi, in the context of urban development and thus also the environment of human habitation and carbon footprint reduction, we aim to combine design with natural solutions. Using innovative biomaterials, we aim to create eco-friendly architectural solutions that will contribute to building more sustainable cities and urban spaces (Arthur, 2014; Baker, 2016; BioMASON, 2017).

One of the key advantages of using mycelium in construction is its extreme lightness, which makes it particularly interesting. Mycelium has a durable and resistant structure, but compared to traditional materials such as concrete or wood, it may appear less attractive. Despite this, its low weight makes it ideal for lightweight structural systems. Using the novel mycotecture process, the mycelium can be molded into a variety of shapes to create both lightweight and strong structures. Furthermore, due to its low weight, this material can potentially be transported into space, which opens up opportunities for use in

extreme conditions. One example of this innovative approach is the MycoTree project, created by architect Dirk Hebel (Baker, 2016), which perfectly illustrates mycelium's potential in the context of architectural load-bearing. The use of mycelium in construction is aligned with sustainability principles and lowers the negative impact of construction materials on the environment. Mycelium is a renewable resource that can be grown in just a few days using organic waste such as agricultural refuse and wood chips. This approach not only reduces our dependence on finite resources, but also helps reduce waste and promote recycling. In addition, mycelium-based materials are biodegradable, making them a sustainable solution for the end of a building's life cycle. Fungi, especially mycelium, play a fundamental role in ecosystems, contributing to the decomposition of organic matter and the nutrient cycle. Projects such as the Hy-Fi Tower in New York¹ show how mycelium can be used to create sustainable structures that benefit both the environment and urban biodiversity.

Examples of architectural projects such as The Myco Tree by Dirk E. Hebel and Philippe Block (Frearson, 2017), The Circular Garden by Carlo Ratti (Hitti, 2019) and The Growing Pavilion by Pascal Leboucq, Lucas De Man and Eric Klarenbeek (Pownall, 2019) demonstrate the innovative use of mycelium in architectural design. These projects highlight the versatility

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and sustainability of mycelium as a building material, paving the way for the future development of green building practices. Additionally, projects such as The Mycotectural Alpha by Philip Ross (Evans, 2014) and The Shell Mycelium Pavilion by Beetles 3.3 and Yassin Areddia Designs (Frearson, 2017) demonstrate the architectural potential of mycelium to create unique and environmentally friendly structures. Moreover, initiatives such as The My-co Space by Carlina Teteris, El Monolito Micelio by Jonathan Dessi-Olive (Lewandowska, Bonenberg, Sydor, 2024), The Hayes Pavilion by Simon Carroll (Hahn, 2023) and The Mycelium Textile Pavilion by Nikolai Emil Svenningsen, Sean Lyon and Sos Christine Hejselbak (Jordahn, 2022) continue to push the boundaries of sustainable architecture by integrating mycelium into their designs. These projects not only demonstrate the aesthetics of mycelium-based structures, but also highlight the importance of incorporating natural, biodegradable materials into architectural practices to promote sustainability and biodiversity in cityscapes. The innovative use of mycelium in construction is a promising avenue for developing lasting, sustainable and biodiverse architectural designs (Cooke, Cooke, 2017).

Initiating the FUNGAR project², a group of researchers began exploring the types of new buildings that could be built out of fungi. Although the use of fungi as a building material may sound strange, it is worth pursuing solutions that not only reduce carbon emissions, but also do not strain natural resources. The project stressed the need to build more housing because of the world's growing population. Professor Han Wosten,³ a mycologist at Utrecht University in the Netherlands, began experiments on producing building materials from fungi as soon as the FUNGAR project began in 2019. In his lab, he combined mycelium with agricultural waste such as straw. Ongoing research has already found that by controlling growth, processing and post-processing, we can obtain various types of construction materials with varying characteristics. While acknowledging that it is too early to claim that a house could be made entirely of fungi, it was found that some of its elements indeed can. The project is intended to go beyond the conventional use of mycelium-based products as components in construction projects and aims to explore entirely new types of structures that could be created from fungi, such as a "living," self-healing house or a building capable of decaying. Researchers recognize the need for further research not only on the material itself, but also on how it ages (Sheldrake, 2020). Thanks to the efforts of many researchers, mycelium-based materials are increasingly seen as a potential alternative to traditional building materials, paving the way for a more environmentally friendly future in the construction industry.

RESEARCH PROBLEM AND STATE OF RESEARCH

The research problem concerns the inclusion of mycelium in designing the built environment, including the human housing environment. Classified as a distinct kingdom by Carl Linnaeus (Simmons, 1997; Stearn, 1959; Corentin C. Loron et al., 2019), fungi

play a key role in ecosystems, and their properties are used to produce a variety of building materials. (Maharachchikumbura et al., 2016; Wijayawardene et al., 2017). The potential of mycelium as a lightweight alternative to traditional construction materials could help reduce transportation costs and energy consumption. As the demand for green materials grows, research into fungus bioproducts is an important step toward sustainable design. Phillip Ross of MycoWorks specializes in furniture and mycelium blocks (Ross, 2016; Wicaksono, Irawanto, Hujatnika, 2023). His work focuses on the use of mycelium as an innovative material in design and construction. Tamar McNealy – a professor of biology at Clemson University studies the use of fungi in medicine (Raftery et al., 2014). Although her work focuses mainly on biological aspects, her findings may also have implications for the development of biological materials (Palmer et al., 2016). Nattawut Boonyuen – a mycologist at the National Center for Genetic Engineering and Biotechnology (BIOTEC) in Thailand, conducts research on the properties of mycelium and its potential applications in various fields, including construction. Pitak Laoratanakul – employed at the National Metal and Materials Technology Center (MTEC) in Thailand studies mycelium-based materials, focusing on their mechanical properties and potential industrial applications (Kohphaisansombat et al., 2023). The research of Professor Agata Bonenberg of the Poznań University of Technology focuses on the applications of mycelium as a building material, including aspects of sustainability and innovation in urban design. Professor Bonenberg also studies the impact of these materials on the aesthetics and functionality of buildings (Sydor, Cofta, Doczekalska, Bonenberg, 2022; Bonenberg, Sydor, Cofta, Doczekalska, Grygorowicz-Kosakowska, 2023; Sydor, Bonenberg, Doczekalska, Cofta, 2021). Another researcher is Katarzyna Ławińska, a leading professor from the Łukasiewicz Research Network – Łódź Institute of Technology, whose team studies fungi and their application in materials technology. This innovative research contributes to the development of biodegradable materials that can replace traditional raw materials, which adds to environmental protection. The composite material based on mycelium and waste substrate and the method of its production became the subject of an invention filed with the Patent Office of the Republic of Poland.⁴ It is also necessary to mention the research team from Pennsylvania State University Institute of Energy and the Environment. The team, composed of experts from various fields, has begun studying fungi to develop innovative mycelium-based biocomposites. The team includes: F. Davis as principal investigator, B. Gürsoy, A. Ghazvinian, F. Oghazian, J. Pecchia, and A. West, all serving as co-researchers (Ghazvinian, Gürsoy, 2022a; Ghazvinian, Gürsoy, 2022b). Each member of the team brought their unique knowledge and experience, which allowed for a holistic approach to the project. In the first phase of the project, the team focused on analyzing the properties of mycelium and the factors that affect its growth. The researchers conducted a series

of experiments to understand how different environmental conditions, such as temperature, humidity and nutrient availability, affect mycelium development (Walter, Gürsoy, 2022, Ghazvinian, Khalilbeigi, Mottaghi, Gürsoy, 2022). Other researchers on the topic are scientists from the Łódź Institute of Technology, who study fungi and their application in materials technology. This innovative research contributes to the development of biodegradable materials that can replace traditional materials, which adds to environmental protection (Lasoń-Rydel, Sieczyńska, Gendaszewska, Ławińska, Olejnik, 2024).

In the context of architecture and urban planning, the key challenge is the analysis and integration of innovative mycelium-based materials into design practices, which will create new opportunities for the sustainable development of cities and public spaces. Therefore, a research group from the Warsaw University of Technology, led by Professor Anna Maria Wierzbicka, has collaborated with the Łukasiewicz Research Network – Łódź Institute of Technology to study the applicability of mycelium bricks in urban spaces as structure oxygenation elements. This cooperation is aimed at exchanging knowledge and experience, which will contribute to the development of modern technologies in construction, as well as promote the use of biological materials in urban planning. The interdisciplinary research team grew to include researchers from the Cracow University of Technology, Eurac Research from Italy and InnoRenew CoE from Slovenia. The team is also preparing for further research on biomaterials under a scenario and methodology that are already under development. The research project was named: *Boosting Bio-based Building Renovation for Climate Responsible Neighborhoods (bio-built)*.⁵

RESEARCH GOAL AND METHOD

The aim of the research presented in this paper was to evaluate the effectiveness of using mycelium-based materials in the context of sustainable urban development and improving the quality of life of residents through the introduction of innovative and environmentally friendly construction solutions, and to identify opportunities for the innovative use of mycelium in construction, including housing. The study was conducted in multiple stages. A critical analysis of the literature on mycelium and previous developments in the field was made. After analyzing existing cases and drawing conclusions, research experiments were designed, which included both laboratory tests and field tests. The next step was real-world testing. Field tests of the material produced during the study was linked with the participation of students from the Warsaw University of Technology, who built the Future Pavilion also known as the “We Stand For” initiative, where a prototype mycelium brick was used in the pavilion’s structure. The final stage of the study was based on an experimental design process of creating a prototype of a cobalt-colored mushroom brick and placing it in an art installation – the Pavilion of the Future at the Royal Baths Museum. The research, carried out by researchers in collaboration with students,

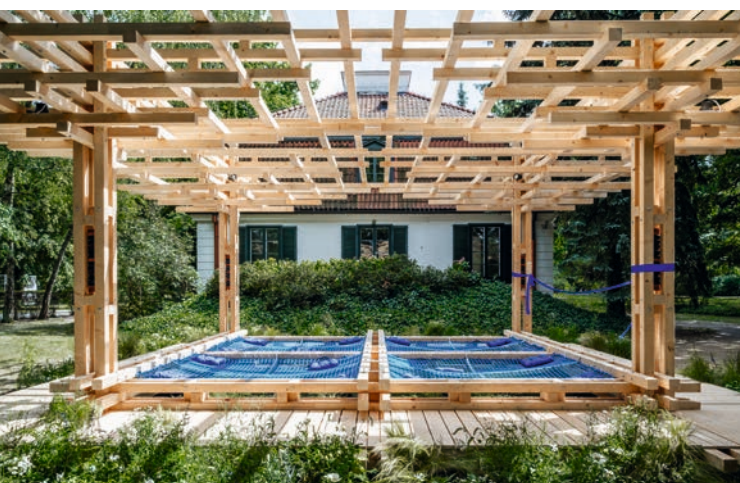
was aimed at evaluating the strength of the mycelium and its potential use in construction in a housing environment. The Pavilion of the Future was designed and constructed by employees and students of the Faculty of Architecture of the Warsaw University of Technology under the supervision of researchers: Professor Architect Anna Maria Wierzbicka, Architect Maciej Kaufman, Architect Szymon Kalata, Landscape Architect Kinga Ziowiec-Cieplik and M.Sc. Mariusz Wrona. The brick was exhibited and left exposed for more than four months and subjected to rain and atmospheric pollution. The pavilion was built behind the Hermitage at the Royal Baths Museum. The team of researchers established to conduct this research contributes to the knowledge about mycelial materials and their applications in fields ranging from architecture to medicine, which could lead to innovative solutions for sustainable development. The implementation of this research allows data collection and analysis of results to assess the properties and potential of mycelium materials in architectural and construction-related contexts. The analysis and interpretation of results lead to conclusions and the identification of further research directions to develop this innovative area. The methodology of research on mycotection is a comprehensive process aimed at gaining insight into and using mycelium in architecture, contributing to the enhancement of sustainability in the construction sector. The project is experimental and represents the first initiative meant as an introduction to a planned construction workshop, in the context of the New European Building. Research on mycelium bricks is currently in the testing phase at the experimental level. It began in 2023, and a joint research phase led to the production of a prototype and its incorporation into the structural elements of the pavilion, indicating the significant potential of this innovative material.

OVERVIEW OF THE STUDY

Along with the increase in the number of residents currently living in cities, as the demand for housing increases, so does demand for new construction materials. The global construction industry is mainly focused on a few traditional materials, which leads to an overconsumption of natural resources. Therefore, there is a need to look for alternative materials, such as mycelium, that can be used to build green structures. MycoTree is a prototype project that uses mycelium to create organic structural elements (Adamatzky, Wösten, Ayres, eds., 2023). This project was developed by the Department of Sustainable Construction at the Karlsruhe Institute of Technology (KIT), the Block Research Group at the Swiss Federal Institute of Technology (ETH) in Zurich, and the Future Cities Laboratory (FCL) in Singapore. As part of the project, research on building components associated with mycelium focuses on the use of agricultural waste as a substrate for mycelium. The project is led by researchers from the aforementioned institutions, and work on the MycoTree structure was presented at the “Beyond Mining – Urban Growth” exhibition at

the 2017 Seoul Biennale of Architecture and Urbanism (BioMASON, 2017). This project represents an innovative approach to the production of building materials and demonstrates the potential of using renewable resources in thoughtful structural design for a more sustainable future of construction (Heisel et al., 2017). One example of a structure that combines mycelium and urban space was the Hy-Fi project, an architectural structure that represented a significant step toward using mycelium on a larger scale for the first time. It was a tower more than 12 m high, which was created as part of an annual competition held by the Museum of Modern Art in New York. The project was aimed at young and promising architectural studios. In 2014, the structure was built as a winning project by the New-York-based practice The Living in collaboration with Ecovative, a company known for its pioneering work on the use of fungi in building materials. Throughout the summer, visitors to the MoMA's PS1 courtyard had the opportunity to admire the pavilion, which was built from 10,000 fungus-grown bricks. The production process involved a five-day period of mycelial growth in molds measuring $45.5 \times 23 \times 10$ cm, with corn stalks serving as the substrate. After a simulated three-week aging process to replicate three years of natural conditions (including rain, wind and moisture), the tests confirmed that the bricks retained their properties, demonstrating the durability of the material. In addition, mycelium bricks were lightweight, weighing about 0.5 kg, compared to traditional bricks that weigh 2–4 kg, making them a promising lightweight and durable building material with structural potential. Mycelium bricks were used to build a tower in the form of three connected shafts, giving the pavilion an experimental character. It served as a prototype tested under natural conditions, demonstrating the feasibility of using biologically sourced bricks in architecture. In the intervention it was difficult to analyze relevant information, but there were numerous messages that the facility did not survive the torrential New York rains and had to be dismantled soon after opening. The novel material proved to be nondurable. The Hy-Fi project has contributed significantly to the growing popularity of mycelium as a sustainable building material and inspired further research into its applications in architectural design (Scardifield et al., 2024).

III.1 The Pavilion in the Royal Łazienki in Warsaw designed and aligned at the initiative of Anna Maria Wierzbicka. Specialty A3 - Architecture of Technology and Structures - Faculty of Architecture, Warsaw University of Technology. photo: Artur Brzozowski



Professor Agata Bonenberg, in a publication on interior design elements made of fungal materials, describes a survey of professional architects' and interior designers' perceptions of mycelium-based composites (MBCs) in terms of familiarity, aesthetics and willingness to use them. The results showed that MBCs were relatively unknown to the professionals surveyed, but after seeing examples, 90% of respondents found MBCs visually appealing. Interestingly, the natural, unprocessed appearance of the material was found to be less aesthetically pleasing, and its value increased after thermal treatment. Architects showed a greater tendency to incorporate MBCs into professional projects for clients than for personal use, indicating a "double standard." These results demonstrate the potential for developing MBC applications in the architectural sector (Lewandowska, Bonenberg, Sydor, 2024).

As the above brief review of projects using mycelium demonstrates, it can be concluded that its importance in the context of sustainable development is becoming a key asset. Mycelium can be seen as an innovative alternative to traditional building materials, and can be transformed into permanent structures using mycotecture. Its green properties, the fact that it is based on a renewable resource in the form of organic waste, and biodegradability, mean that it is a promising material for sustainable construction. Incorporating mycelium into architecture can promote biodiversity by creating habitats for microorganisms. This gave rise to research and development work aimed at obtaining a biodegradable material with excellent thermal insulation properties (which could be a substitute for, among other things, polystyrene foam, which is problematic to dispose of), desirable mechanical properties and fire resistance. The result was a biodegradable material with very good thermal insulating properties ($\lambda = 0.038$ W/mK) and mechanical strength ten times greater than polystyrene, in addition to being resistant to a single flame (according to PN-EN ISO 11925-2:2020), and which can be produced from readily available materials that are in most cases waste materials. The fungus used can grow on a variety of waste from the agri-food industry, mainly on waste containing cellulose, such as sawdust from deciduous trees, straw, used waste paper, or textile waste properly prepared and hydrated.⁶

The final stage of research using mycelium material was the Pavilion of the Future project, known as the "We Stand For" initiative, carried out at the Faculty of Architecture of the Warsaw University of Technology under the direction of Professor Anna Maria Wierzbicka (Wierzbicka, 2024). The project was experimental and aimed to explore the use of mycelium brick materials in a housing environment.⁷ The concept of the future was illustrated by students of the Warsaw University of Technology through architecture. While at the university, the group received support from specialists and time to implement the project. Together they obtained materials, sponsors and construction permits. Supported by the experienced "We Stand For" group, the students were tasked with creating

a conceptual proposal for a building that would symbolize this abstract theme. The entire process was conducted democratically, considering the opinions of students, faculty, sponsors and other professionals. According to the students, relationships were to be the foundation of the future, and thus decided to share their ideas in pairs. Out of several proposals, one was selected for execution through a vote. The construction of the Pavilion of the Future in Łazienkowski Park was an expression of the students' inspiration, energy and commitment. The entire process, from the assignment of tasks to the final opening of the pavilion, was challenging, inclusive and a time of learning for the participants.⁸ The pavilion symbolized the coming challenges and hopes for the future through innovative materials, such as mycelium bricks made by Łukasiewicz – Łódź Institute of Technology. Working together, the involvement of sponsors and professionals and the activism of the academic community were crucial to the success of the project. The Pavilion of the Future in Łazienkowski Park has become a place of recreation, reflection and inspiration for all, becoming a symbol of a dynamic, innovative vision of the future. The use of mycelium bricks presented physical challenges. Initially, there was the idea of building an entire wall out of this material, but due to a lack of manufacturing capacity, the designers abandoned the idea. Designing the form – the size, shape and color – was also a challenge. The goal was to create small pieces measuring $3 \times 5 \times 12$ cm, with two 1 cm diameter system holes to make it easier to assemble the pieces without an adhesive. The integration of mycelium bricks in the construction of the Pavilion of the Future in Łazienkowski Park symbolized an innovative approach to solving upcoming challenges and hopes for the future. Cooperation between Łukasiewicz – Łódź Institute of Technology, sponsors, professionals and the academic community was crucial to the successful implementation of the project. Initially, there were many ideas about where to place the bricks. Due to a lack of strength and approvals, it was not possible to use these elements as structural components. The bricks were placed in structural columns consisting of four elements measuring 30×30 cm, made up of bricks with a cross section of 10×10 cm. The brick was placed between the columns and covered with a continuous ceramic layer to showcase the material's diverse texture. Despite the many challenges associated with the production and use of mycelium-based bricks, the students and specialists successfully completed the project, creating an innovative architectural structure. The bricks, with their unique shape and blue color, were an integral part of the pavilion, giving it character and originality. Their skillful use in the construction of walls and columns underscored a commitment to finding alternative building solutions that meet both aesthetic and environmental criteria. The bricks not only made a positive contribution to the appearance of the pavilion, but also had considerable symbolic value. Their unconventional use was a manifestation of a sustainable approach to architecture, promoting



III.2. Brick from mycelium - circular contact - brick project by Anna Maria Wierzbicka. Production and firing - Łukasiewicz Institute in Łódź. photo: Artur Brzozowski

innovative technologies and eco-friendly materials. Using mycelium to build the Pavilion of the Future, the students at Warsaw University of Technology showed that ecology and modernity can and should go hand in hand, inspiring others to do similar experiments and driving them to action. The properties of the mycelium-based composite material from which the bricks were made can be shaped by the use of additives, for example, in terms of biodegradability. Mycelium bricks, produced in May 2024, show interesting properties after four months of exposure to the weather. The installation of these elements took place in early June, and they were exposed to a variety of weather conditions for almost six months. The bricks were not significantly damaged, although some were subjected to mechanical loads. Exposure to atmospheric conditions showed that the materials have high durability and resistance to changing environmental conditions. This suggests their potential usefulness in construction, especially in the context of sustainability, where the search for green and durable materials is becoming increasingly important.

FINAL CONCLUSIONS – FUTURE RESEARCH TRAJECTORIES

Interdisciplinary cooperation in research on mycelium use in construction, including housing, is creating new opportunities for the future of building materials. Focusing on the development of a material, researchers introduce innovative solutions in the construction sector. This research reveals the essence of



III.3. Mycelium bricks recorded in the structural column of "On the Future Pavilion Construction" - the initiative "We Stand for the Future" - at the Royal Łazienki Museum. Photograph: Artur Brzozowski.

this collaboration and the potential effects of the new material on the construction sector. Researchers are focusing on creating a new material based on mycelium, aiming for a substance that is stable, durable and easy to form. One example is a material designed to minimize brittleness, making it ideal for load-bearing elements and providing structural support. Mycelium can be seen as an innovative alternative to traditional building materials. Its green properties, the fact that it is based on a renewable resource in the form of organic waste, and biodegradability, mean that it is a promising material for sustainable construction. Incorporating mycelium into architecture can promote biodiversity by creating habitats for microorganisms. Researchers are working to adapt this material to specific projects, allowing for greater flexibility and personalization in the construction of buildings. Such versatility is key to creating unique, modern structures that meet the demands of contemporary architecture. Integrating mycelium into architectural designs not only enhances their aesthetic value, but is also key to promoting biodiversity in urban areas. Using the distinctive properties of mycelium, architects can construct

structures that not only stand the test of time, but also contribute to the overall health of the planet. As the construction industry continues to prioritize environmental awareness and sustainable practices, mycelium is emerging as a versatile and environmentally friendly building material with tremendous potential to shape the future of architecture (Cooke, Cooke, 2017). The use of mycelium materials in architecture and interior design has attracted the attention of designers who seek innovative solutions.

Completed at the Faculty of Architecture of the Warsaw University of Technology, the "We Stand For" project was not only an example of interdisciplinary cooperation and creativity, but also paved the way for further research into sustainable building materials. The Pavilion of the Future, built with mycelium-based bricks, not only fulfilled its practical functions, but also inspired reflection on the future of architecture and its relationship with the surrounding environment. Its unique character and symbolism have made it not only a place for meetings and recreation, but also an important educational element promoting environmental awareness. By working together to develop a mycelium-based material, researchers demonstrate the potential of collaboration in accelerating technological advances in the construction industry (Sheldrake, 2020). Combining laboratory-tested technology with architectural expertise is a promising step toward a new era of building materials. By focusing on the development of stable, durable, and adaptive mycelium material, researchers are opening up new opportunities for innovative construction practices. With further interdisciplinary collaboration and engagement, this new material has the potential to bring fundamental changes in the approach to building design, leading to more sustainable and efficient construction methods. The goal of further research is to build a memory map of a fully consumed fungus. At present, the research is at the experimental stage and is of an implementation nature. The research team hopes to implement the results of this project in the future, which could benefit both science and practical applications in various fields.

III.4. The team engaged in the construction of the "Future Pavilion Construction" - the initiative "We Stand for the Future" - at the Royal Łazienki Museum. Photograph: Artur Brzozowski



ENDNOTES

- ¹ *Pawilon letni Hy-Fi projektu The Living. Materiały biodegradowalne we współczesnej architekturze* <https://architektura.muratorplus.pl/realizacje/pawilon-letni-hy-fi-projektu-living-materialy-biodegradowalne-we-wspolczesnej-architekturze-aa-GtCA-wFaA-RELq.html> (accessed: 24.06.2024).
- ² <https://mogu.bio/fungar-project-bbi-h2020-press-release/> (accessed: 24.06.2024).
- ³ With fungi we can recycle waste streams into high quality materials. <https://u.nl/staff/HABWosten1>, (accessed: 24.06.2024).
- ⁴ The application was marked with the number P448845.
- ⁵ Project submitted for the Competition: HORIZON-MISS-2024-NEB-01-01: Exploiting the potential of secondary bio-based products 19.09.2024.
- ⁶ Due to pursuing a patent, the results of ongoing work have not yet been published.
- ⁷ The design and implementation of the pavilion was under the direction of Anna Maria Wierzbicka, and the design work was carried

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out in cooperation with architects: Maciej Kaufman, Szymon Kalata, Kinga Zinowicz-Cieplik, Mariusz Wrona, Paweł Trębacz and a team of second-semester Master's students of the 2023/24 academic year: Alicja Bakalarska, Paulina Cieśla, Stanisław Dawidziuk, Maria Hofman, Zofia Jemioło, Anita Karczmarczyk, Konrad Kmiecik, Michał Komorowski, Patrycja Kuczyńska, Maria Kuryłowicz, Natalia Małolepsza, Zofia Pabianczyk, Szymon Panek, Przemysław Sasin, Grzegorz Staron, Julia Stepanow, Mikołaj Szafrński, Michał Szczepanek, Grzegorz Środa, Bartłomiej Urbanowski, Natalia Wnukowska, Katarzyna Wroczek and Marta Zawadka. Sponsors: Main sponsor: Flora Development – Dominik Różański, Maciej Sobieski, Royal Baths Museum. Hilti, Schröder, Fundacja Deloitte Polska, Łukasiewicz – Łódzki Instytut Technologiczny, Oltens, Abies Kuczyński s.c., Unibep SA, Urban Jungle, The Swiss Embassy, New European Bauhaus, Zakład Ceramiczny Dąbrowka.

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ONLINE SOURCES

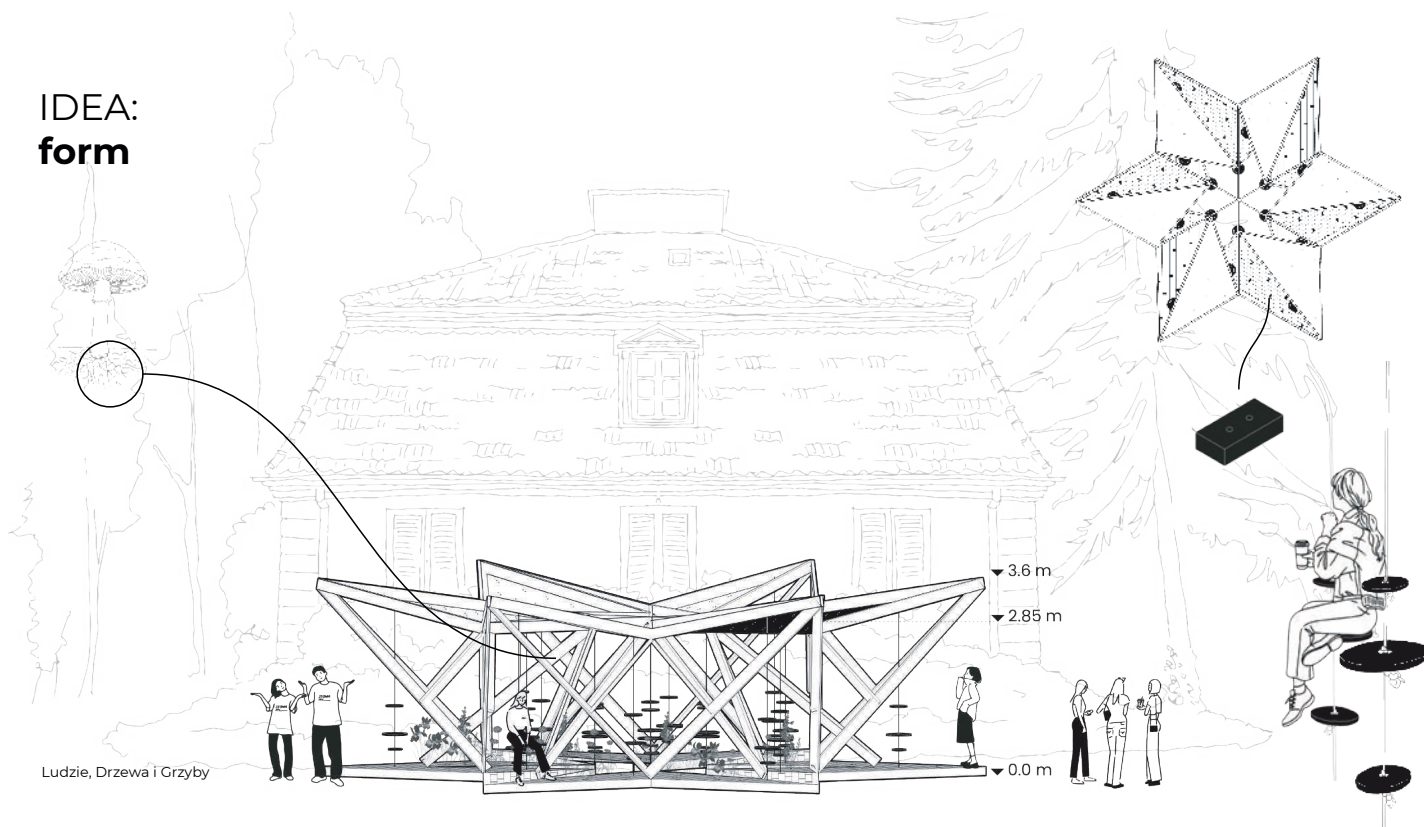
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THE PAVILION OF THE FUTURE

design by Zosia Jemioła i Natalia Małolepsza

IDEA:
form

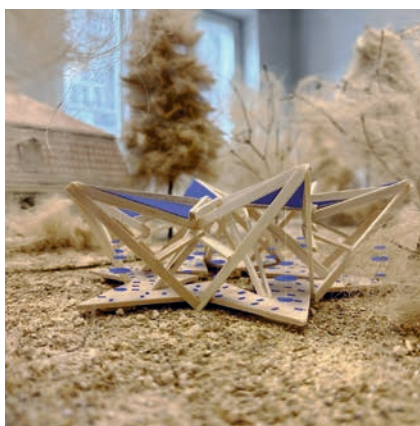


THE FUTURE IS:

Relation - A connection or association between people, events, or things.



widok z lotu ptaka



widok z poziomu pieszego

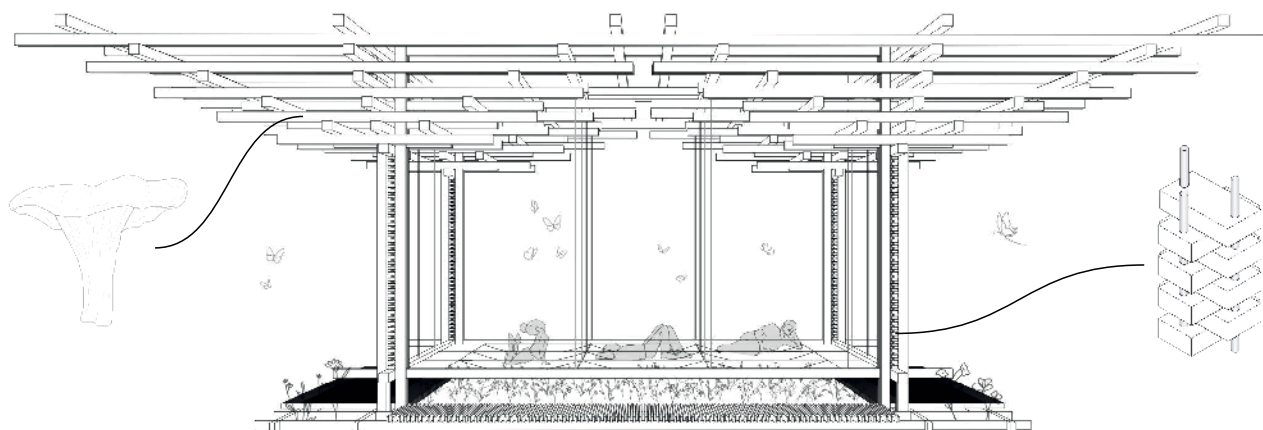


widok z poziomu pieszego

THE PAVILION OF THE FUTURE

designe by Katarzyna Wroczek i Mikołaj Szafrński

IDEA: **form**



Spotkanie pod kapeluszami

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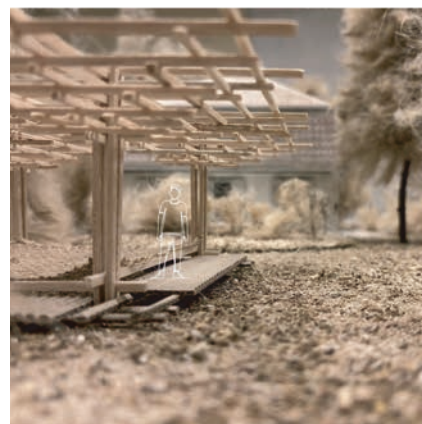
Relation - A connection or association between people, events, or things.



widok z lotu ptaka



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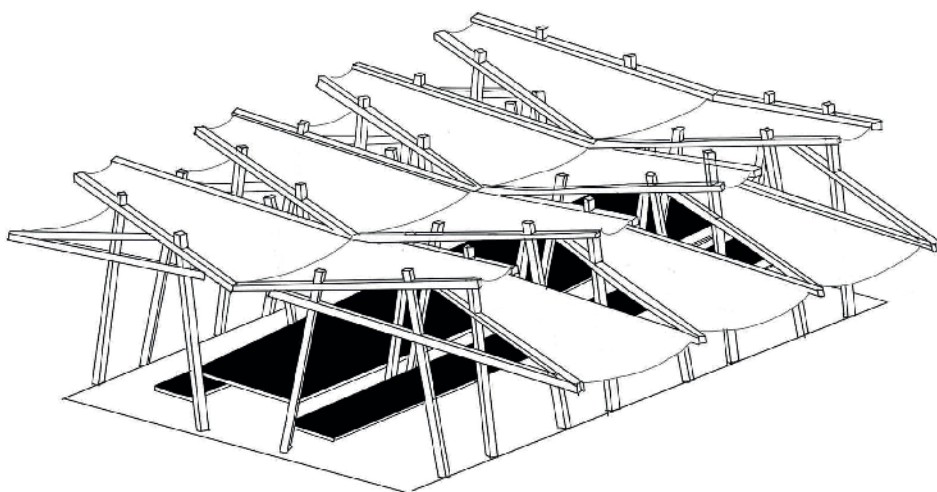


widok z poziomu pieszego

THE PAVILION OF THE FUTURE

designe by Maria Hofman i Michał Szczepanek

IDEA:
form



THE FUTURE IS:

People - Human beings, members of society.



widok z lotu ptaka



widok z zewnątrz

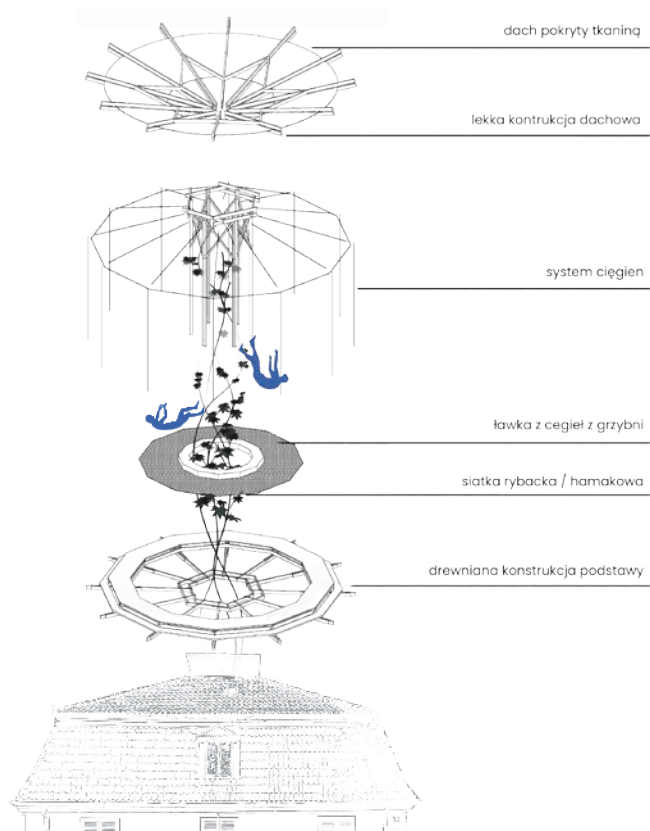


widok z zewnątrz

THE PAVILION OF THE FUTURE

designe by Julia Stepanow i Konrad Kmiecik

IDEA: form



THE FUTURE IS:

Anew - Starting something from the beginning, re-engaging in activities.



widok z lotu ptaka



widok z zewnątrz

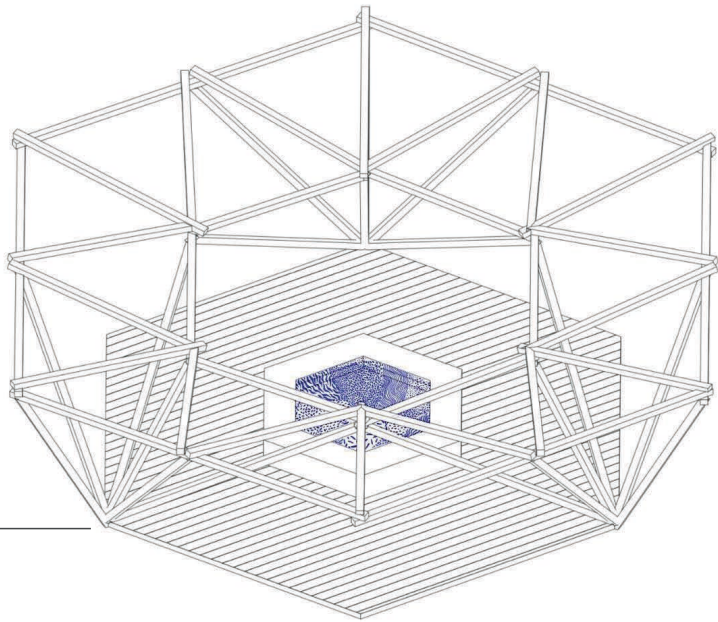


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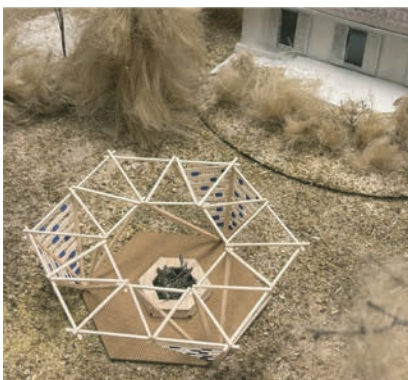
designe by Natalia Wnukowska i Patrycja Kuczyńska

IDEA:
form

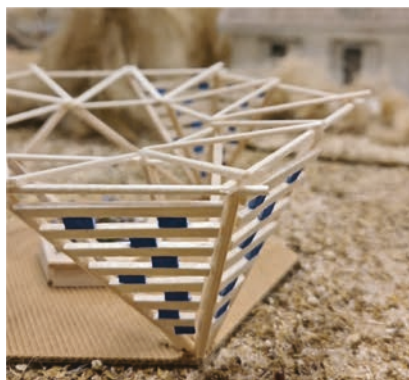


THE FUTURE IS:

Synergy - The interaction of different elements that produces a combined effect greater than the sum of their separate effects.



widok z lotu ptaka



widok z zewnątrz

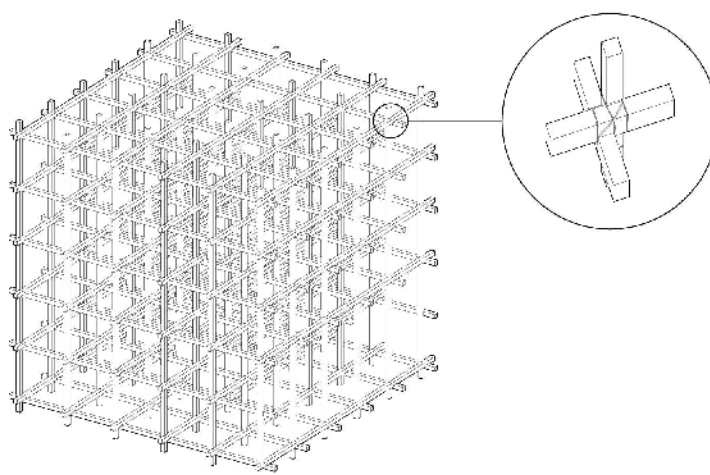


widok z zewnątrz

THE PAVILION OF THE FUTURE

designe by Paulina Cieśla i Stanisław Dawidziuk

THE FUTURE IS:
growth



THE FUTURE IS:
People - Human beings, members of society.



widok z lotu ptaka



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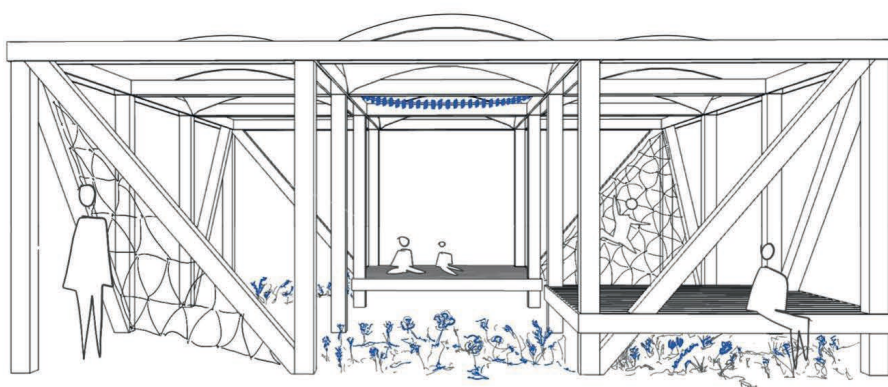


widok z wewnątrz

THE PAVILION OF THE FUTURE

designe by Maria Kuryłowicz i Przemysław Sasin

IDEA:
form



PAWILON POMIĘDZY

Ludzie, Drzewa i Grzyby

THE FUTURE IS:

Connection - A relationship between various elements, the integration of different parts into a whole.



widok z lotu ptaka



widok z poziomu pieszego - z zewnątrz



widok z poziomu pieszego - z wewnątrz

THE PAVILION OF THE FUTURE

designe by Szymon Panek

IDEA: form

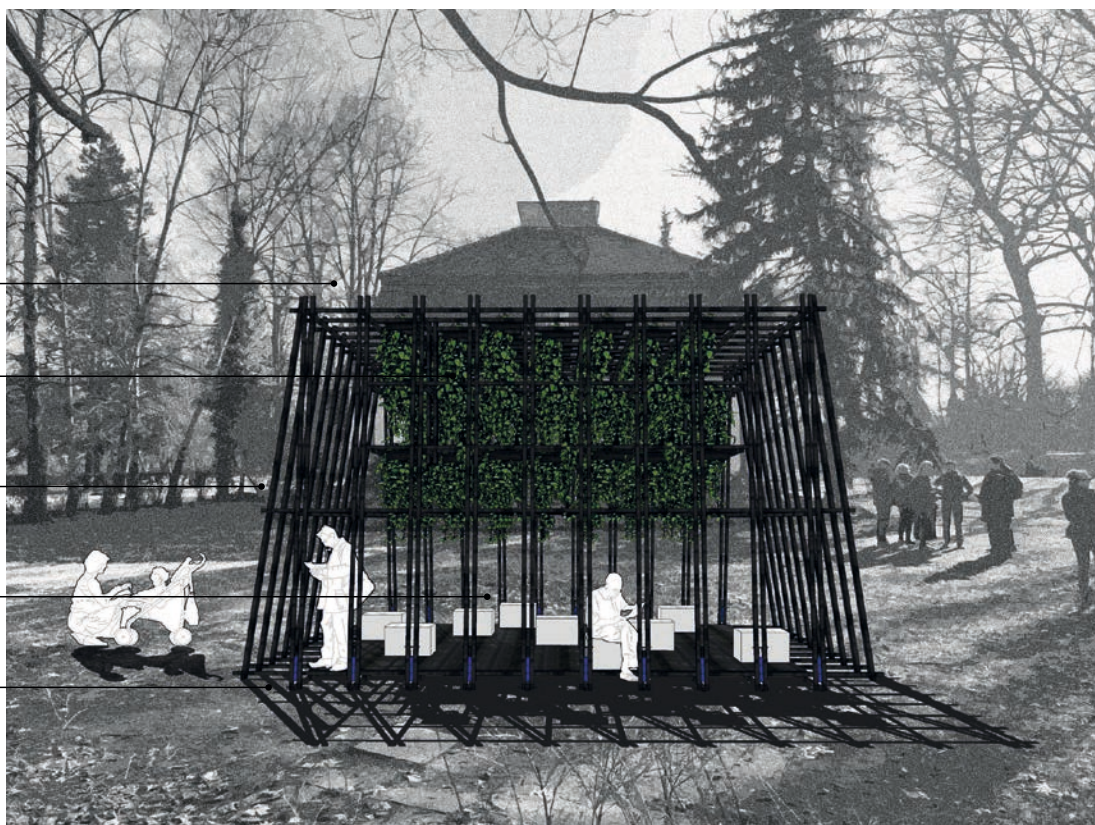
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9 modularnych, autorskich
mebli bibliotecznych

cegła z grzybni tworząca cokół



THE FUTURE IS:

Awareness - The state of being aware, knowledge of the surrounding reality as well as one's own thoughts and feelings.



widok z lotu ptaka - draft



widok z poziomu pieszego - draft

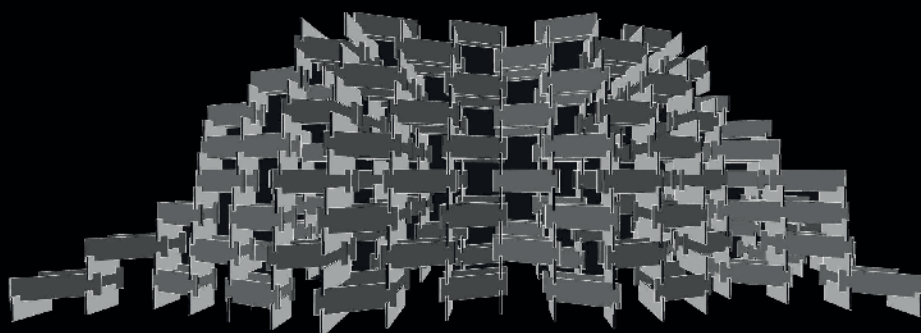


widok z poziomu pieszego z wewnątrz - draft

THE PAVILION OF THE FUTURE

designe by Alicja Bakalarska i Bartłomiej Urbanowski

IDEA:
form



THE FUTURE IS:

Anxiety - A feeling of fear, worry, or unease about the future or a situation.



widok z poziomu pieszego z wewnątrz



widok z poziomu pieszego

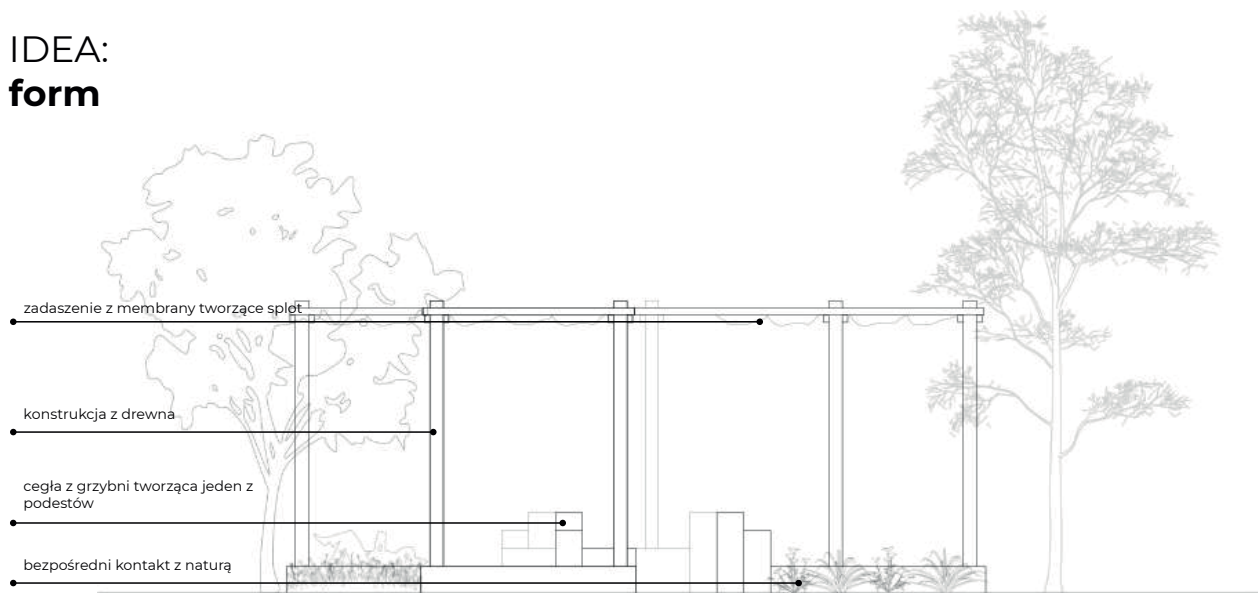


widok z lotu ptaka

THE PAVILION OF THE FUTURE

design by Michał Komorowski i Zofia Pabiańczyk

IDEA: **form**



THE FUTURE IS:

Blank sheet - A blank piece of paper, symbolizing new possibilities and the potential to create something new.



widok z lotu ptaka



widok z poziomu pieszego

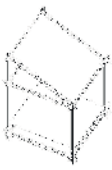


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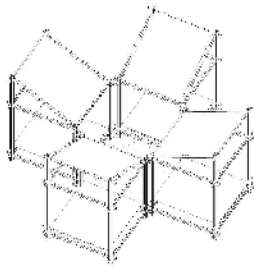
THE PAVILION OF THE FUTURE

designe by Marta Zawadka, Anita Karczmarczyk

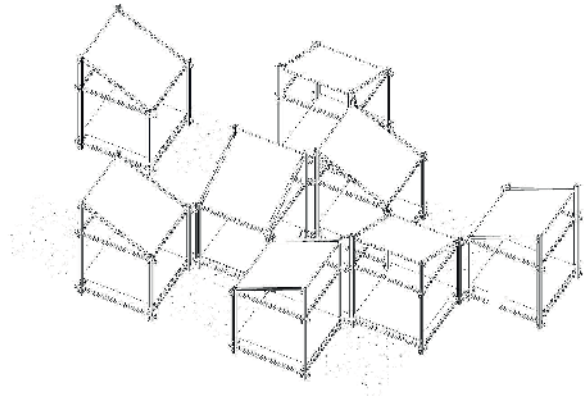
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moduł pojedynczy



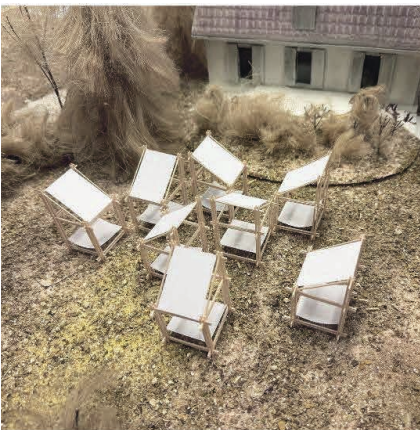
forma stworzona z
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forma stworzona z
ośmiu modułów

THE FUTURE IS:

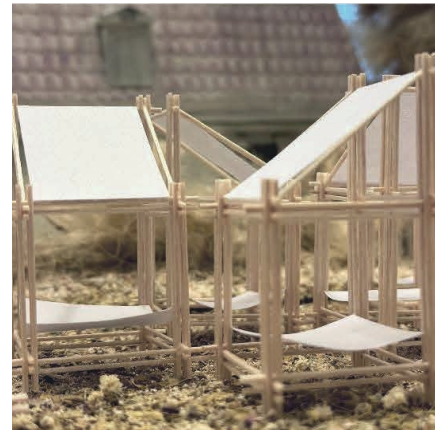
Possibilities - Options, chances, or potential for action or achievement.



widok z lotu ptaka



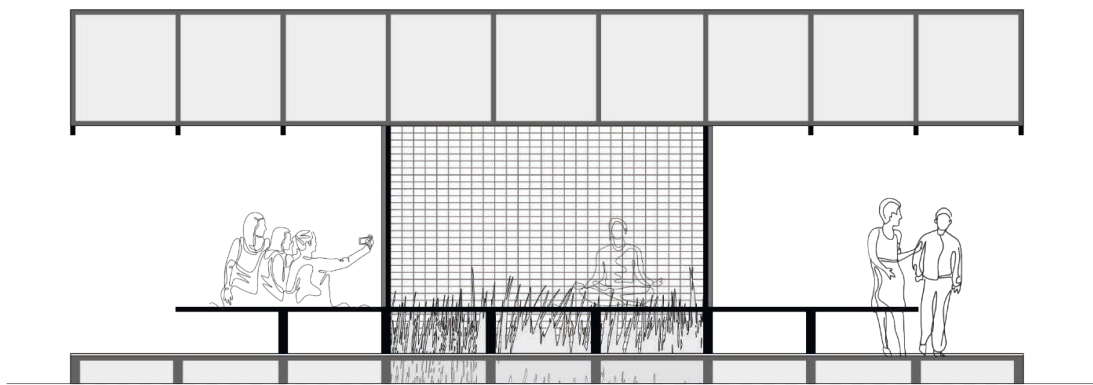
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widok z poziomu pieszego z wewnątrz

THE PAVILION OF THE FUTURE

designe by Grzegorz Środa i Grzegorz Staroń



fasada

