



REDEFINING CITIES IN VIEW OF CLIMATIC CHANGES 2023

 Faculty
of Architecture
WARSAW UNIVERSITY OF TECHNOLOGY

Warsaw University
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Redefining Cities in View of Climatic Changes 2023

Abstracts

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Warsaw heritage of urban gardening

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Introduction

Air and water pollution, increased waste, extreme weather events, limited resources, and ongoing climate change are all outcomes deeply intertwined with how we shape our built environment. Consequently, architects and professionals in architecture-related fields should be pivotal in addressing these pressing issues. The central theme of this conference revolves around the pursuit of optimal solutions for shaping the built environment, with a fundamental question at its core:

In the face of dramatic climate change, how should we design the functional and spatial fabric of the city, encompassing public spaces, green systems, buildings and infrastructure, leveraging both traditional and modern technologies?

This conference places a focused lens on sustainable development, aligning with the UN Sustainable Development Goal 11 - Sustainable Cities and Communities. It delves into climate-responsible aspects of urban and architectural design, exploring adaptation and mitigation strategies in response to climate change. Key topics include water retention, ventilation, air quality, the use of renewable energy sources, and low-carbon materials, among various other pertinent issues.

The platform provided by the conference aims to foster discussions, collaboration, and the exchange of experiences among scientists from diverse centers, representing a spectrum of disciplines and research interests. The presented research, analyses, and practical solutions will predominantly center around:

- The city and climate change
- Sustainable living environment
- Minimizing a building's embedded carbon footprint
- The interdisciplinary process of sustainable building design
- Climate change adaptation through green and blue infrastructure
- Innovations in pro-climate design

- Revitalization, modernization, reconstruction, expansion, renovation - utilizing existing resources as a basis for sustainable design and functionality of natural buildings
- Criteria for evaluating sustainable architecture
- Inclusive built environment
- Education for sustainable architecture

We firmly believe that this conference serves as a unique opportunity for the exchange of ideas and knowledge, facilitating discussions on how to render the built environment as climate-responsible as possible.

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Keynote Speakers



Tomasz Bradecki

PhD. Associate professor b. 1979, designer, academic teacher, researcher, architect, urban planner, author of dozens of publications in the field of architecture and urban planning, expert in research on urban spaces, mostly residential and public spaces with the use of 3D models and augmented reality, member of the commission of the Polish Academy of Sciences o. Katowice, active popularizer of science, creator of the urban planning game titled HOUSING ESTATE GAME. Founder of URBANMODEL www.urbanmodel.org research group dealing with models of place of residence, co-organizer of conferences, workshops and summer schools. Registered architect, member of the Chamber of Architects of the Republic of Poland, author and co-author of dozens of architectural and urban planning projects, multiple winner in professional architectural competitions.

Areas of interest: housing estates, compact city, public spaces, models in architecture and urbanism.



Kees Christiaanse

Studied architecture and urban planning at TU Delft. In 1980 he joined the Office for Metropolitan Architecture (OMA) and was appointed partner in 1983. In 1989 he founded his own company, now KCAP Architects&Planners, in Rotterdam. In 1990 he co-founded ASTOC Architects and Planners in Cologne and was partner until 2002.

Kees focuses in his work on urban assignments in complex situations and on guiding of urban processes. He is an expert in the development of university campuses and in the revitalisation of former industrial, railway and harbour areas and is a supervisor of several international urban developments.

Throughout his career Kees has always combined teaching and research with his professional work within KCAP, which has generated fruitful cross-fertilisations. From 1996 until 2003 he held a professorship for architecture and urban planning at the Technical University of Berlin. From 2003 until 2018, he has been chair of the Architecture and Urban Planning Institute of Swiss Federal Institute of Technology (ETH) in Zurich. Since 2010, he has been involved in the Future Cities Laboratory (FCL) in Singapore. In 2013, he was appointed Chairperson of the External Advisory Board of the Architecture and Design Department of the Singapore University of Technology and Design (SUTD), in 2020 he has been appointed Distinguished Affiliated Professor of the Technical University Munich (TUM). In 2009, Kees was curator of the 4th International Architecture Biennale Rotterdam (IABR) with the title "Open City. Designing Coexistence". He is author of a multitude of books and essays about architecture and urban planning. Kees has received numerous honours among others the lifetime award '2016 RIBA International Fellowship' for his particular contribution to architecture, the 'ARC17 Oeuvre Award' for his lasting and innovative contribution to the improvement of the built environment and the 'ULI Leadership Award 2018' for his special commitment and courage with which he commits himself to sustainable

urban development and a better quality of life in the urban centres of Germany.



Joanna Jabłońska

An architect and assistant professor at the Faculty of Architecture at Wrocław University of Science and Technology; and a Vice-Dean since 2020. In 2022 became an Accredited Tutor (Collegium Wratislaviense), and in 2019 Certified Tutor (Ghent University). In 2019 she was granted the title of a Habilitated Doctor, and since 2009 PhD in architecture and city planning. In 2009 she obtained a professional license for architectural design and became a member of: the Chamber of Polish Architects, TensiNet, IASS, and the Commission for Architecture and Urban Planning (Wrocław branch of Polish Academy of Sciences), where now she serves as Vice-president. She led or cooperated in several implemented international or national research and education projects (2xEU, Bank of Sweden, Ministry of Education and Science, NAWA, KM). She is an author of scientific publications engaged in research on architecture and urban environment (works registered and open to the public: 146, indexed in WoS CC: 22, indexed in SCOPUS: 25).



Anna Januchta-Szostak

D.Sc. Ph.D. in Architecture, the researcher and academic at the Faculty of Architecture of Poznań University of Technology, coordinator of the Architecture and Urban Planning discipline at the PUT Doctoral School and a member of the University

Council. An expert in the field of urban resilience, adaptation to climate change, blue-green infrastructure and integrated urban water management. She is a member of the Interdisciplinary Advisory Team on Climate Crisis at the President of the Polish Academy of Sciences, the Climate Council at UN Global Compact Network Poland, Open Eyes Economy think tank as well as an expert of WaterLab and Retencja.pl. Locally, she cooperates with the city of Poznan in the field of development of the Warta valley, Nature-based Solutions and improvement of environmental quality as well as preparation of the rainwater management strategy for Poznan. She is a member of the Consultative Council for Environmental and Climate Protection at the Mayor of Poznań. Recipient of several rewards such as the Minister of Infrastructure prize for outstanding achievements in the field of urban planning. Author of the book "River-friendly cities" (2020) and over 130 other scientific publications.



Robert Knippschild

Univ.-Prof. Dr.-Ing., head of the Interdisciplinary Centre for Transformative Urban Regeneration (IZS) at the IOER. Lecturer at University of Applied Sciences Zittau/Görlitz, Faculty of Architecture.

-Member of the Deutsche Akademie für Städtebau und Landesplanung (DASL)

-Member of the Academy for Territorial Development in the Leibniz Association – ARL (Landesarbeitsgemeinschaft Sachsen/Sachsen-Anhalt/Thüringen)

-External reviewer for Federal Ministry of Education and Research/Projektträger Jülich (BMBF/PtJ), German Research Foundation (DFG), Robert Bosch Stiftung (funding area: science), European Commission (HORIZON 2020), Slovenian Research Agency - ARRS
-Peer reviewer for various scientific journals (disP – The Planning Review, European Planning Studies, Regional Studies, Raumforschung und Raumordnung, Journal of Borderland Studies.



Manfred Köhler

Education: Technical University of Berlin, Germany. Diploma Degree 1981, PhD: 1987: about "Eco effects of vegetated facades".

Professional activities:

- 1981 – 1990: Scientist; Institute of Ecology, Technical University, Berlin, Germany.
- 1990 - 1994: Executive Director of the Research Centre of Landscape Ecology, Bremen, Germany
- 1994- March 2021: Professor of Landscape ecology at the University of Applied Sciences, Neubrandenburg.
- Since April 2021: Senior Professor Univ. of Applied Sciences,
- April to August 2021 also visiting Professor Warsaw University of Life Sciences,
- Part time lecturer Jiao Tong University, Shanghai.
- Landscape architect,
- Member of related Associations, such as FLL, BUGG, BDLA.

Co-founder of World Green Infrastructure Network (WGIN) in 2008; since 2008 President of this organization (www.worldgreenroof.org).

More than 200 related scientific publications, with main focus on green roofs, living walls or indoor greening.



Piotr Kuczia

An internationally operating architect specializing in energy-active and solar architecture. His designs have been featured in over 60 books and hundreds of magazines across five continents, showcased in exhibitions in several European countries, as well as in China, India, and Japan. He is the author of the book 'Educating Buildings,' and serves as the co-editor for the German book series 'Design Educates,' contributing to numerous other publications on architecture.

His work has been awarded with more than 70 international prizes, including a number of top positions at Architecture Masterprize (USA), A'Design Award & Competition (Italy), Iconic Award (Germany), New York Product Design Award (USA), Muse Design Awards (USA), Green Good Design (USA), German Design Awards (Germany) or International Architecture Awards (USA).

He is the initiator and curator of the international "Design Educates Awards" and a jury member in various international competitions.



Emanuele Naboni

A professor and sustainable urban and architectural technologist, holding positions at the Norman Foster Institute in Madrid (since 2023), UNSW Sydney (working with Prof. Santamouris, since 2023), the University of Parma (since 2020), and the Royal Danish

Academy (since 2010). He has pursued his educations at Politecnico di Milano, UC Berkeley, TU Eindhoven, and ETH Zurich.

His academic roles have included teaching at NTNU Norway, ETH Future Cities Lab Singapore, EPFL Lausanne, Southeast University in Nanjing, the Architectural Association in London, and the University of California Berkeley. Professionally, Naboni has worked with the Lawrence Berkeley National Laboratory, Skidmore, Owings and Merrill LLP in San Francisco, and as a consultant for firms like Renzo Piano, BIG, Kengo Kuma, William McDonough, Mario Cucinella Architects, Arup, Atkins Global. He has consulted EU in several projects. HE is an editor for "Energy and Buildings" and has authored books on regenerative design with Routladdge, RIBA, Taylor and Francis and Elsevier.



Jonathan Natanian

Ph.D. an assistant professor at the Technion IIT, and the head of the Environmental Performance and Design Laboratory (EPDL). Jonathan holds a Bachelor of Architecture from the Technion, master's degree with distinction in sustainable environmental design from the Architectural Association (AA), and a Ph.D. from the Technical University of Munich. In his doctoral dissertation, which won the highest distinction and the Marschall Prize, Jonathan developed methodologies for integrating environmental considerations into urban planning using digital tools. The Environmental Performance and Design Laboratory led by Jonathan combines sensing tools, computational capabilities, and

advanced visualization interfaces to investigate the interrelations between environmental engineering and architectural design at various scales. Since 2014 Jonathan has been leading StudioADAPT – a research-based consultancy through which he is exploring the architectural applicability and spatial expression of his research on environmental performance in practice.



Lucyna Nyka

(PhD, DSc) a full Professor in the Faculty of Architecture at Gdańsk University of Technology (Gdańsk Tech), Gdańsk, Poland. Her research interests focus on blue-green infrastructure, regenerative urban design and water-related architecture and urbanism. With her research team, she delves into such issues as automated greenery design, nature-based solutions for cities (NBS) and the role of AI tools and remote sensing in urban greenery design. She is the author, co-author and expert in many European research projects, currently leading at Gdańsk Tech the European Horizon 2020 'SOS Climate Waterfront' project focused on linking research and innovation on waterfront studies to face climate change (2019-2023). She is a Council member of the Architecture and Urbanism Committee at the Polish Academy of Sciences (PAN), one of the Vice-Presidents of the International Academic Advisory Committee of the World Institute for Engineering and Technology Education (WIETE-IAAC), based in Melbourne, Australia, a member of the Research Committee for Valencia International Biennial of Research in Architecture (VIBRArch) and a member of the International Group of Urban and Architecture

Design INTEGRO UAD based in University of Florence, Italy. She is a reviewer and a member of numerous editorial boards in Poland and abroad.



Magdalena Pios

Member of The Chamber of Polish Architects, graduate of Faculty of Architecture at Warsaw University of Technology, postgraduate studies Building with Wood at Bern University of Applied Sciences and Project Management at Kozminski University. From 2019 to 2023 Chairwoman of The Circle of Sustainable Architecture and currently the vice – president of The Warsaw Branch of Association of Polish Architects, Warsaw Urban Architectural City Commission expert. Co – author of many buildings certified with environmental certificates LEED and BREEAM at the highest levels. Since the beginning of 2023 has been leading an Architecture studio AMBIENT implementing sustainable architecture principles into its projects.



Dan Pitera

FAIA is a social and political activist masquerading as an architect. For almost 40 years Dean Pitera has practiced, taught, and researched methods focused on the social, ecological, equitable, and political aspects of designing and realizing thoughtful architecture and urban design for all people. After a twelve year period of inquiry and discernment in four different US locations and five different universities, in 1999, Dean Pitera settled at the University of Detroit Mercy, where he was named as the Executive Director of the Detroit

Collaborative Design Center (DCDC). It is here that he concentrated his efforts to directly influence students, professionals, and community/political leaders. In 2019, Dan Pitera, FAIA was appointed Dean of the University of Detroit Mercy School of Architecture + Community Development and is currently serving as Treasurer of AIA Michigan Board of Directors. Dean Pitera recently won AIA Detroit's 2023 Gold Medal and the 2018 Charles Blessing Award. He was a 2004-2005 Harvard University Loeb Fellow and was inducted into the College of Fellows of the American Institute of Architects in 2010, an honor bestowed to only 3% of all American architects. Mr. Pitera is regularly a resource member for Mayor's Institute for City Design (MICD) and the National League of Cities (NLC). He has co-authored the book, *Syncopating the Urban Landscape: More People, More Programs, More Geographies* and co-edited the book, *Activist Architecture: The Philosophy and Practice of the Community Design Center*.

During his time as Executive Director, the DCDC received the National AIA's 2017 Whitney M. Young Jr. Award for social justice and was included in the 2017 Curry Stone Design Award's Social Design Circle. DCDC also won the 2011 and 2002 Dedalo Minosse International Prize, and was included in the US Pavilion of the 2012 and 2008 Venice Biennale in Architecture. DCDC was awarded the 2011 SEED

Award and the 2009 Rudy Bruner Award for Urban Design Excellence for the St. Joseph Rebuild Center in New Orleans. DCDC was the recipient of the National NCARB Prize in 2002 (Grand Prize) and 2009 and was included in the international exhibit/conference

ArchiLab in 2001 and 2004 in Orleans, France. Dan Pitera, FAIA has lectured and taught globally. He likes “fallout shelter” yellow...



Noah Resnick

Prof., currently teaches and practices in the city of Detroit, Michigan. As a partner at Laavu, he operates under the interrelated concepts of the architectonics of multiple scales; the architect as urban collaborator; and the architect as community builder. Resnick is a Full Professor at the University of Detroit Mercy School of Architecture and Community Development, and was the Director of the Master of Architecture Program from 2011 - 2019. He currently serves as the Associate Dean for Academic Affairs.

Resnick grew up in Miami, Florida, where he attended the Design and Architecture Senior High magnet school (D.A.S.H.). He earned his Bachelor of Architecture (BArch) from the Illinois Institute of Technology in Chicago, graduating at the top of his class, for which he was awarded the AIA Henry Adams Medal of Excellence. Noah completed his Master of Science in Architecture Studies (SMarchS) at the Massachusetts Institute of Technology in the Architecture + Urbanism stream. This degree culminated in an urban design thesis that focused on the potential for transit oriented development nodes as a sustainable stabilization strategy for the city of Detroit. In addition to Detroit, Resnick has lived and practiced in Chicago, Boston, and New York, as well as Berlin, Germany where he worked in the studio of Daniel Libeskind.



Stefano Salata

Born in Grado (GO), is PhD in Territorial Government and Urban Design XXVI Cycle at the Department of Architecture and Urban Studies (DASU), Politecnico di Milano. He is Assistant Professor of Ecological Planning at Politecnico di Milano and, previously at the Izmir Institute of Technology (Turkey). He has been Research Technologist of the Interuniversity Department of Regional and Urban Studies and Planning, Politecnico di Torino and worked on the project EU LIFE SAM4CP for the same Department. He works at the intersection of ecosystem service assessment and urban planning, and his actual research focuses the examination of how to increase the sustainability and resilience of urban systems in the face of climate change. His interests concern both the theory and practice of urban and territorial planning. He is a member of Ecosystem Service Partnership (ESP) and a member of National Research Centre on Land Take - ITALY (CRCS).

Co-editor of Italian National Reports on land take (2010, 2012, 2014, 2016, 2017, 2018 and 2022) of CRCS and author of many empirical research on scientific international journals.



Katarzyna Zielonko-Jung

An architect, academic lecturer, scientist, professor at Gdańsk University of Technology at the Department of Environmental Design. She has co-created the program for postgraduate studies in Ecological Architecture and

Construction and is a lecturer there. She has authored numerous Polish and foreign publications related to ecological architecture issues, in particular their relationship with microclimatic phenomena in the urban environment. She participated in research projects focused on sustainable architecture and improving the quality of city climate. She is a member of Gdańsk Architecture Council, UN Global Poland Climate Council, Mazovian District Chamber of Architects, and Association of Polish Architects.

Abstracts

Hussein Annan, Lucyna Nyka

Gdańsk University of Technology

Empowering green and blue infrastructure networks with AI, GIS and RS: a comprehensive review of current advancements and future directions

Green and blue infrastructure (GBI) networks are becoming increasingly important for mitigating the impacts of climate change and improving urban sustainability. Artificial intelligence (AI), geographic information systems (GIS), and remote sensing (RS) are powerful tools that can be used in urban planning to design and manage GBI networks more effectively. However, the modes for the implementation of such tools, particularly those supported by AI technologies, have not been sufficiently investigated. For this purpose, the scientific review was conducted, through qualitative research of academic articles, books, and other scholarly sources to examine the specific ways in which AI can be integrated to improve the design and decision-making processes for GBI networks. The study's findings indicate that data science and machine learning can effectively contribute in creating more dynamic digital representations of GBI, facilitating proactive management, and enabling novel interactions with nature. They also provide several case studies that demonstrate the successful application of AI, GIS, and RS for GBI projects. However, the study also reveals that despite its popularity and extensive discussion within the scientific community, GBI practical implementation in urban contexts remains limited. Additionally, it appeared that the current GBI planning and assessment primarily rely on traditional planning methods, supported by advanced GIS, or remote sensing techniques alone. Addressing individual GBI benefits often involves generating GIS suitability maps or simple classifications without employing a holistic approach. While some advanced programming has been utilized to develop web-based tools for calculating green factor scores, and one study employed drones to classify GBI on a university

campus using machine learning, these efforts represent isolated instances. In conclusion, AI is currently not widely used in GBI planning and monitoring, opening up future opportunities for harnessing this technology's advancements. However, AI should serve as a complementary tool rather than a replacement for the existing methods. Keywords: Green and blue infrastructure, artificial intelligence, geographic information systems, remote sensing, design, decision-making, case studies.

Anahita Azadgar¹, Giulia Luciani², Lucyna Nyka¹

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A comparative study on distributional justice of nature based solutions in form of public spaces in Gdansk and Rome

Urban areas in Europe face significant challenges posed by climate change, including flooding and the urban heat island effect. Traditional strategies, referred to as "grey infrastructure," prove ineffective and environmentally costly. Nature-based Solutions (NbS) emerge as an alternative, encompassing actions that sustainably manage ecosystems to address social, economic, and environmental challenges while providing multiple benefits. Despite NbS' positive impacts, concerns about their equitable distribution within urban areas exist. While conducting the literature review, several distinct research gaps were identified, particularly in terms of the geographical distribution of case studies and the scarcity of comparative studies. The state of the art in Nature-based Solutions (NbS) research reveals a predominant focus on case studies within the United States. This underscores the significance of conducting studies encompassing diverse cases in various geographical settings. In response to this research gap and to broaden the knowledge on the role of NbS in the public urban landscape, this article aspires to map the spatial distribution of NbS in the forms of public green spaces in two cities of Gdansk and Rome. This experimental study aims to produce a clearer and more detailed outlook on the status of NbS's locations, and discuss them in the context of the socio-economic attributes of their geographical surroundings. Comparing these two case studies yielded valuable insights that enhanced understanding of local differences. Methodologically, this study utilizes a descriptive qualitative analysis; using Google Earth, ArcGIS, and Excel to create spatially explicit maps of public NbS. Results reveal an unequal distribution of public green areas and expose areas of high deficiency. Findings emphasize the need for policymakers to address

the issues, comprehend the shortcomings of present policies and possibly eliminate them to obtain better effects in the future. In the end, the article recommends future researchers and policymakers go deeper and focus on the quality of green spaces in less affluent urban areas and not only on their spatial distribution in the whole city.

Anna Bać, Lea Kazanecka-Olejnik

Wrocław University of Science and Technology

Adaptive earthquake resistant design in Hatay - case study

One of the most important aspects of redefining cities in view of climate change is the redefinition of related architectural didactics. A sustainable, adaptive, resilient and regenerative approach to professional architectural and urban design requires changes in our life style and in current teaching methods. The presentation introduces an example of the concept of green didactic of tomorrow implemented during the international summer workshop dedicated to the reconstruction of the city of Hatay, after the 2023 earthquake. The objective was to identify an optimal, architectural form of a safe space of a universal and transtemporal character, enabling the concept to be implemented in all earthquake-prone areas. The basic determinant of the selection of the location for the refugees' area is finding an easily accessible intersection in the pedestrian zone in the urban grid. The solution was to design a public space that would become a safe refuge for vulnerable people in an emergency situation. On a map of a central part of the city Hatay, currently mostly in ruins, were selected potential development areas that respected the principles of providing a 10-minute community. The urban network of such spaces should cover the entire city plan, creating an even distribution of safe spaces. They should be designed as adaptive and resilient public facilities, that are independent from urban infrastructure. The students were firstly tasked with identifying those potential sites and choosing one for further development. Two primary strategies were used in the design approach, enabling the highest quality facilities to be designed for comfort at a relatively low environmental and economic cost. The first strategy is the principle of 10 areas of sustainability: energy - operational and embodied, materials, waste, water, greenery, transport, costs, place, community and process. The second strategy is focusing on '10 Rs': reduce, reuse,

recycle, renew, rethink, respect, (be) responsible, regulate, regenerate, restore. Those two strategies led to the design basis being facilities described as: "a safe and autonomous place of refuge for 7 days for 100 earthquake victims". At the urban scale - the concept of 10-minute communities, concentrated within a 10-minute walking distance to resilient and adaptive community centres, was adopted. On an architectural scale - the workshop resulted in 5 original and unique public facility designs: Neighborhood Centre, Coworking Offices, Service Centre, Shelter-Basin, Local Centre. They've met the stated requirements of regenerative urban design and resilient-adaptive architecture. The results of the Hatay summer workshop – sustainable and R based approach – will be used to create earthquake resistant urban strategies in Turkey. At the invitation of the Working Group from Yeditepe University, students presented their projects to the local architectural community.

Hybrid model in the management of urban spatial structure

The fundamental objective of urban policy is to enhance cities' capacity to grow in a manner that produces an effective and cohesive composition, resulting in greater competitiveness and resilience. The potential for reducing urban flows and effectively managing and using natural resources depends on sustainable development and certain factors. These include the compactness of urban forms, morphology and structure of settlements, of which cities are a key space for saving natural resources, including energy. Changes in monitoring, action programs, strategies, and directions of spatial development as outlined within local policy impact the management of city space. Those accountable for deciding on public matters and implementing operational goals, which include those related to sustainable development, comprise managing bodies, local governments, planners, and space users. The best impact is achieved by a management system that is implemented at the optimal scale, taking into account local conditions and supported by the idea of social participation. Effective urban management combines monitoring tools and decision-making bodies. It requires overcoming the challenges posed by the large number of bodies involved in the decision-making process, the fragmentation of their powers and responsibilities, the development of technology and the methods of financing projects. New forms of management require cooperation between public and private entities, local communities and institutions involved in resource management. An effective urban development policy takes into account the whole system and its interactions, and the principles of operation are oriented towards short and long term goals. Hybrid models are a tool that makes it possible to present proposed solutions, e.g. for the development of urban space, in the form of alternative solutions, as a coherent result of activities aimed

at taking into account available expert opinions, possible demands of interested parties and resolving controversial issues arising from different views or conflicting interests of interested parties. Alternative solutions based on event scenarios, in which the interested party becomes familiar with possible combinations of input values and elements included in the arrangements of the plan or concept land development, thus integrating input data from dispersed groups, making it possible to supplement the knowledge of experts and the opinions of interested parties, thus providing a convenient and helpful tool for decision making in the field of urban space management.

Tomasz Bradecki

Silesian University of Technology

**Housing estate card game – experimental
(non)/immersive tool in architectural and urban design
education on housing density - lessons
from application tests**

Promotion of sustainable environmentally friendly solutions in the planning of residential complexes is a particularly important and contemporary issue at a time when the planet's population is growing and the number of resources is decreasing. Excessive intensification of development and the widespread suburbanization of development are negative phenomena that demonstrate the importance of rational planning of the residential environment. Therefore, it is important to popularise knowledge and possible solutions in this area both for professionals and among people not connected with the field. Illustrative models and demonstrative solutions are considered as methods of popularisation. The Housing estate card game is an example of a tool used in architectural and urban planning education, which uses models of residential development to demonstrate the role of the value of urban indicators. The housing estate game is an urban planning game, a card game that allows easy virtual construction of housing complexes from the position of an ecologist, developer, planner and resident. Figures in the game are arranged in ascending order according to the intensity of development and illustrate the relationship between the degree of investment of the land and the amount of surface area, as well as biologically active elements. Despite the simplifications that have been adopted in the figure models of each card, it is easy to see the differences between the different cards. The spades cards colour represents land development designed by an 'environmentalist' depicts a utopian green housing development with green roofs, photovoltaic cells and retention basins. At the same time, the diamond card colour represents the

'developer's approach, where the number of dwellings and built substance is the highest. The overriding value in the game is parks and public services, which are accessible by public transportation (jockers). The essence of the game is to demonstrate how land-consuming extensive development is and how different approaches to development plans may result in better land use pattern. Dedicated games designed for the 'Housing estate game' are useful in the education of children, young people, as well as architecture students, and can be used as a tool in workshops and public participation. The use of 3D models of individual cards allows easy immersive exploration of each figure using a web browser, augmented reality or virtual reality. It is assumed that some of the premium solutions implemented in the game are ecological and sustainable and can illustrate optimal solutions in planning of residential development. The Housing estate Game may have theoretical and practical applications in shaping a better sustainable residential environment.

Piotr Bujak

Warsaw University of Technology

How to be understood? The language of communication in an interdisciplinary design team. A case study based on the Architecture and Urban Planning course at the Faculty of Civil Engineering, Warsaw University of Technology

The design problems faced by interdisciplinary teams are complex in nature. According to Horst Rittel's definition, these are problems where the solution - often innovative - requires the application of knowledge from different disciplines. Designing cities and buildings according to sustainable development principles places particular demands here. The search for optimal solutions in terms of low-emission, reduced energy consumption or use of renewable energy resources is an issue in which design decisions need to be confirmed by detailed analyses, and where the designers choose the best one from a range of possibilities according to the established criteria. The participants of this type of design process have roles to play, their nature and responsibilities are determined by the specifics of the disciplines they represent. These disciplines can be divided into two groups according to the competences provided by their representatives: disciplines of generalization (architecture) and disciplines of specialization (civil engineering, environmental engineering, etc.). One of the important distinguishing features of these groups is the language used in communication, the traditional aim of which is to reach agreement and, more specifically, to develop solutions that, from the perspective of the team members, are in line with the professional requirements of the discipline. It was assumed that for the purpose of describing the problem it would be preferable to limit the number of disciplines to two: Architecture (representing the group of generalisation) and Civil Engineering (representing the group of specialisation). The analysis served as a source material for the development of the author's design methodology, used experimentally during Architecture and Urban

Planning course with students of the Faculty of Civil Engineering. This experiment, which started in 2020, is still continuing. The results presented in the paper represent the status as of 2023.

Kees Christiaanse

ETH Zürich / Technical University of Munich

Inversion and subtraction in urban design

The lecture is about methods and approaches to arrive at sustainable urban design projects in complex urban and rural situations. Specifically the scenario approach and how to anticipate radically changing circumstances will be the focus of the talk.

Agnieszka Chudzińska¹, Anna Stefańska²

¹Warsaw University of Technology, ²Warsaw University of Life Sciences
(SGGW)

Award-winning transformations: designing inclusive and climate-resilient urban spaces in response to the 2023 Polish Urban Space Competition

The evolution of public spaces continues to be a milestone in the tapestry of urban life, especially in the aftermath of the recent global health crisis. The 2023 edition of the competition for the best urban space, hosted by the Polish Association of Town Planners, brought forth innovative and transformative designs that redefine the landscape of Polish cities. This paper dives into the winning projects of 2023, showcasing how contemporary urban design responds to the evolving needs and desires of the community while maintaining aesthetic and functional harmony. Through an extensive review of current literature and detailed case studies of the awarded projects, we explore the integral components that contribute to the success of these public spaces. The analysis highlights the social, cultural, and ecological factors fostering community engagement and environmental sustainability. The paper examines the innovative approaches adopted by architects and urban planners in creating spaces that are not only visually appealing but also inclusive, adaptable, and resilient in the face of changing urban dynamics. The findings from the 2023 competition offer a unique perspective on the future of urban space development. They underscore integrating flexibility, user-centric design, and ecological considerations into urban planning. This study aims to inspire and guide future urban development projects, contributing to the ongoing discourse on creating vibrant, sustainable, and inclusive urban environments.

Maciej Czarnecki, Teresa Kelm-Krauze

Warsaw University of Technology

Raw earth architecture as an alternative for cities today

Recent Raw earth as a building material is known in the architectural tradition of many cultures around the world. Treated until now mostly as a traditional technology, it has been increasingly making a comeback in recent years. Raw earth architecture is proving to be an alternative to the commonly used building techniques of concrete, steel, brick and wood. It can also appear as a complement to other solutions, in the form of a combined system. In recent years, there has been a growing interest in the technique of constructing buildings using raw earth. Increasingly, raw earth buildings are being constructed in modern cities, revealing new potential for this material. The paper presents a compilation of recent examples of raw earth building. The material will also present a consideration of the potential for the dissemination of this technology in different variants and technical solutions. With climate change inevitable, a return to traditional, low-cost, low-carbon and sustainable technologies using low-processed building materials is a necessity. The material presented here explores the possibilities of using traditional raw earth building techniques in modern architecture in a contemporary city. Consideration will be given to the use of raw earth as the main construction material and as a material that cooperates with other technologies. The analysis includes the following functions: individual and multi-family housing, public buildings, religious buildings, commercial buildings other structures and spatial forms. Different technological variants of raw earth solutions will also be presented, as well as an example of an experimental house realised using this technique. The paper will also look at the potential of raw earth technology to combat homelessness. The dissemination of raw earth technologies also plays a major role in reducing the negative impact of the expansion of the construction industry on the environment.

Paulina Filas - Zajac¹, Jacek Wojciech Kwiatkowski²

¹Warsaw University of Technology, ²University of Warsaw

Physiographic considerations in architectural design – selected projects by Svein Hatloy – a case study

In the context of contemporary climate change, physiographic conditions are an extremely important design issue and environmental analyses can contribute to better management of undeveloped land. Carrying out analyses of the physiographic conditions of specific sites can result in the development of new guidelines for urban planning. In-depth and multifaceted analyses of these conditions support the security of natural resources, renewable energy potential and local culture and tradition. The case study of selected works by Svein Hatloy presented in this article (the Museum in Florø or the school project in Loddefjord) can provide examples of good practice in designing with respect for physiographic and environmental conditions. Svein Hatloy, both in his numerous speeches and in his design work, referred to the regional building tradition, where the buildings being built were strongly connected to the local landscape, climate and culture. As the initiator and founder of the Bergen School of Architecture, whose main goal was to promote the idea of the individual's responsibility in society for space, he stressed the importance of learning to observe and understand the landscape and its transformations. According to him, the environment and climate were the most important aspects of man's life, his copartnership with nature, which he translated into his original curriculum. His activities and the ideas he preached are an important aspect in the light of considerations for the design of sustainable buildings. Analysis of the Norwegian architectural and urban planning experience and its interdisciplinary nature can help to clarify innovative conclusions and insights in the context of problems related to the development of the modern city.

Magdalena Grochulska-Salak

Warsaw University of Technology

Resilience and self-sufficiency of sustainable city - critical infrastructure in the process of re-urbanisation

The process of urban re-urbanisation today is linked to the resilience of the city in crisis and the realisation of modern spatial solutions respecting the identity of the place and its cultural heritage. Recognition of potential crisis situations provides a rationale for designing hybrid solutions in urban units to meet the needs of residents and provide security in times of crisis. The subject of this research is the shaping of development units for energy production, food and energy plants, water storage and treatment, phytoremediation, and security and storage as part of the Smart City's critical infrastructure. Ensuring access to water, food, energy and remediation and oxygenation measures are identified as key in shaping the critical infrastructure of urbanised areas. A model for shaping a modern urban unit, a programme and a functional and spatial structure proposed for shaping urban resilience is presented. A valorisation and typology of Smart City infrastructure elements using Nature-Based Solutions (NBS) and modern technologies is presented.

Małgorzata Hanzl, Bartłomiej Olczak

Lodz University of Technology

Social-technological systems perspective versus climate-friendly transportation infrastructure. The case study of the tramway system in the region of Lodz, Poland

Numerous studies prove that well-functioning transportation infrastructure is pivotal for climate resilience transition. However, in suburban areas, providing the necessary transport systems can be a challenge due to the low population numbers. Establishing well-functioning transportation systems in outlying regions is problematic, specifically in suburban places with varying population densities. Therefore, a collaborative effort between local governments and the public is needed to manage regional networks. Through the social-technological systems perspective, we can gain an understanding of the intricate transformations happening in urban regions. After carrying out an in-depth literature review, we see an opportunity which we intend to employ in the current case study. The analysis of stakeholders' attitudes proves critical to the understanding and shaping of the technological systems. We use this approach to study the modifications to the tramway system and inequalities in public transportation in the Łódź metropolitan area of Poland. The case study is centred on the northern region. Our methodology incorporates a comprehensive case study evaluation, keeping track of each individual, activity, and stage. We aim to recognise the likely influences of the continued modifications on assuring mobility solutions for everybody. The analysis provides valuable guidance for future redevelopment activities. The main finding relates to applying the concepts set forth by communicative planning theory and strategising the transition process.

Post-industrial areas as strategic climatic areas in the revitalization process

The subject of the study are post-industrial areas, which constitute a key strategic area in the context of challenges and the revitalization process. As a result of economic changes, cities are increasingly faced with the task of transforming their abandoned industrial areas into sustainable places of life and integrating them into the urban ecosystem. The study examines how these areas can play an important role in combating climate change by adapting and using sustainable urban planning practices. Post-industrial areas have a chance to become landscape retention areas and may contribute to improving living conditions in cities. The study highlights the need to integrate revitalization activities with environmental and climate goals, paying attention to the social and economic aspects of the transformation of these areas. The analysis included examples of post-industrial areas surrounding large urban centers in Poland, including the Kraków Branch of the ArcelorMittal Steelworks. Understanding the role of post-industrial areas as strategic areas in the environmental context is crucial for the effective implementation of sustainable urban solutions and achieving sustainable development goals.

Joanna Jabłońska

Wrocław University of Science and Technology

Noise in architecture and urban planning

Noise in the built environment is pollution and negatively affects human life expectancy and health. Although the problem has been noticed and addressed at the European Union and national levels, it is rarely discussed in the context of sustainable development, green policies and obtaining clean energy. It is worth noting that these issues are closely related and mutually affect each other. This presentation presents the results of measuring noise levels and reverberation time from various urban and architectural sites and comparing them with the standards permissible in a given area. They state a basis for developed recommendations, constituting research conclusions. Guidelines for architects and urban planners that support design aim at reducing and generating as little noise as possible in the built environment.

Rewilding cities for resilience

Contemporary challenges related to the climate and environmental crises are closely interconnected, and the green capital of cities plays a key role not only in climate protection and adaptation to the effects of climate change, but also in the quality of life of residents and the productivity of the economy. Cities occupy only 3 percent of land area, but they have a significant negative impact on both ecosystems and global warming processes. The most noticeable direct impact on biodiversity is the loss of natural habitats as a result of suburbanization and exurbanization processes. Globally, the built environment has increased by 66% in just 12 years of the 21st century (IPBES, 2019). In Europe, urban ecosystems make up around 22% of the land area, where more than three-quarters of EU citizens live (EU Biodiversity Strategy for 2030, 2021). We should therefore pay special attention to the connectivity and productivity of ecosystems in our cities. The EU Urban Agenda and the New European Bauhaus point to the direction of greening cities as key to improving the quality of life of citizens, but the well-being of ecosystems is still of secondary importance in constructing urban policies and standards of architecture and urban planning. The European Nature Restoration Law (2023) assumes no net loss of urban green space by 2030 and an increase in tree canopy coverage by 2050. Meanwhile, in Poland, the conditions for tree felling are being relaxed, migration corridors, wetlands and other naturally valuable areas are being developed. Moreover, the lack of data on the state of urban ecosystems makes it difficult to quantitatively and qualitatively assess their improvement or deterioration. The challenge is not only the increase in the green area, but also its biodiversity and the productivity of urban ecosystems. Cities should urgently take action to redefine their relationship with nature, protecting, connecting, restoring and strengthening urban ecosystems, through nature-spatial integration

in city planning and management. In my speech I will point out the environmental, social and economic benefits of rewilding cities and the importance of symbiotic architecture to accommodate wildlife.

Tomasz Jeleński

Cracow University of Technology

Renovation and retrofitting of old buildings in times of climate crisis

The subject of the presentation is the two-year project “Mitigating Greenhouse Gas Emissions in Heritage Buildings” implemented in 2020-2022 by Sendzimir Foundation and Croatia Green Building Council as part of the EUKI European Climate Initiative. The author was the leader of the project responsible for the academic quality of research, workshops, conferences and training. He also co-authored and edited a monograph “Renovation and retrofitting of old buildings in times of climate crisis”. The book is a result of in-depth interviews with stakeholders in the processes of conservation, renovation and energy modernization, and authorial cooperation with the Silesian Regional Heritage Conservator, scientists from the Cracow University of Technology, the Nicolaus Copernicus University in Toruń and the University of Warmia and Mazury in Olsztyn, and specialists from Sendzimir Foundation, National Association of Natural Construction and Croatia Green Building Council. The research included different perspectives and sensitivities related to conservation and modernization, focusing on common goals and values: to protect non- or hardly renewable natural and cultural resources. Attention was drawn to the need to analyze the entire life cycle of buildings. Increasing potential for conservative renovation has been demonstrated, taking into account cumulative carbon footprint and energy demand. Individual chapters discuss the threats and mistakes made when renovating historical buildings, and the solutions compatible with the thermal and humidity characteristics of old buildings. The recommended solutions enable improvement of the health, comfort and technical conditions while reducing renovation costs. The author proposes proprietary algorithms for the optimal scope of energy renovation – a practical tool that facilitates design decision-making consistent with the conservation paradigm while

increasing the durability, usability and efficiency of buildings and limiting their environmental/climate impact.

Olga Kania, Anna Porębska, Krzysztof Barnaś, Kinga Racoń-Leja, Bartłomiej Homiński, Filip Suchoń, Bartosz Dendura, Grzegorz Śladowski, Bartłomiej Szewczyk, Paweł Ocloń, Marzena Nowak-Ocloń, Izabela Godyń

Cracow University of Technology

Potential for forming energy-efficient housing complexes based on the DMD-M technology

The current level of technological development, with the appropriate application of market-available solutions, makes it possible for low- and mid-rise multifamily buildings to achieve at least zero-energy building performance. The specificity of modular technology makes it possible to build such complexes under complicated soil conditions and to densify existing development. This poster presents the results of interdisciplinary research and development done by a project team from the Cracow University of Technology as a part of the Energy- and Process-Efficient Construction project, commissioned by the National Center for Research and Development. The work resulted in the development and delivery of a design of an energy-efficient modular multifamily housing building, ready for rapid implementation nationwide. Within the framework of the consortium DMD-M Dostępny Moduł Mieszkalny, a key package of sustainability-focused energy technologies and volumetric modular construction technology was formulated, offering the best-in-class, optimally net-zero or positive yearly energy balance. The most important advantages of multifamily modular construction are: record-short construction times (usually a few months, which further reduces project costs), flexibility of solutions (repetitive and adaptable to different site conditions, including where erecting a traditional building would not be possible), top-quality workmanship, competitive project costs, ease of using sustainable technologies and a definite reduction in building operating costs. The research also focused on model urban analysis of the potential for planning housing complexes based entirely on volumetric

modular technology. Sample development layouts and site plans for selected layouts were drawn up, with the goal of producing structures that are most advantageous in terms of ergonomics, ecology and rational resource use, which are presented in this poster.

Natural environment renewal as raising the standard of housing estates in the view of climate changes

Spatial transformations of residential areas from the second half of the 20th century affect the deterioration of the natural environment, contributing to functional limitations and deterioration of residential comfort. In the view of climate change, an important aspect is the restoration of natural values to degraded green areas in existing residential complexes, in accordance with the guidelines of sustainable development and the principles of synergy. The three housing estates: Sadyba, Stegny and Goclaw in Warsaw were analyzed, which in their original assumptions had specific natural-climatic solutions applied to create appropriate microclimates as location determinants. The estates have been analyzed in terms of the state of changes created in the development of the main natural elements, mainly with a view to examining the possibility of restoring their original assumptions. The authors included natural areas in the study as an essential element of living comfort and housing standards. The aim of the study is to find an answer to the question of how the improvement of degraded green areas in housing estates of the 1970s-80s will contribute to improving the quality of life of local communities? A separate design and analytical approach to each common space at the scale of a block, a quarter and a complex in accordance with the individual needs of residents, supported by surveying guarantees the right solution, the restoration of user-friendly solutions. The paper presents a survey of residents of the Sadyba and Goclaw neighborhoods in terms of greenery and recreation needs, and shows foreign examples of adapting space to social needs. The need for changes related to enhancing the value of the natural environment in individual housing units based on the principles of NBS nature-based

solutions is demonstrated, as key solutions for introducing favorable changes in the microclimate and improving the quality of life of residents.

Robert Knippschild

Leibniz Institute of Ecological Urban and Regional Development & Dresden
University of Technology

Redefining cities in view of climatic changes: hopeless undertaking or exciting task for the future?

We are currently facing multiple crises. The climate crisis overlaps with, among others, socio-economic dynamics and tendencies of social divide. Municipalities are increasingly overwhelmed by the challenges they face. Based on my own experiences in cooperation between science and practice, I develop discussion theses for climate-neutral urban development. Here I focus on smaller cities with limited transformative capacities, their city-regional embedding and the role of science in municipal transformation processes.

Joanna Koszewska

Sorbonne University

Public spatial policies in response to climate change issues in Paris illustrated on chosen examples

The current situation, regarding the climate changes in the era of Anthropocene has been remarked and studies within different disciplines. The globalisation processes and growing urbanisation induce the climate changes. At the same time the impact of public policies are internationally believed to be a tool for changing the planet exploitation. Local planning instruments and programmes in Paris became in recent years an example of avant-garde movement for other local governments. In the undertaken research Public spatial policies in response to climate change issues in the capital of France are presented in the framework of national and European planning legal system. Planning initiatives as well as urban and architectural design solutions are presented on chosen examples within the Parisian administration. The applied methodology is adapted to the complexity of examined processes. The city management is held in regard to the constructed environment of the geographical location. Also the societal and behavioural factors, influenced by local laws and implemented policies play a key role in the climate-oriented changes. Aspects as: transportation system (both public and individual), waste management, construction and insulation standards, revitalisation, urban greenery reserves management and biodiversity, water management are being taken into consideration. Desktop research, semi-open focus group interviews with key policy makers and researchers, participative observation were undertaken to hold the presented research. Lobbying and policy influencing became a considerable phenomenon together with the European Union programmes, regarding practice exchange and municipality partnerships. The presented results incite a discussion on potential possibilities and practical limitations of transferability of local

policies in relation to geographical, climate and socio-political aspects of spatial policy elaboration and interpretation.

Manfred Köhler

Neubrandenburg University of Applied Sciences

Blue-green roofs - a new guideline in Germany

The Federal Environmental Agency of Germany support a new applied research project for three years. It started in July 2023 and have to present End of 2023 a new incentive guideline. The consortium is led by the Institute of Ecological Economy (IÖW, Berlin) in cooperation with Prof. Dr. Manfred Köhler and the both labs Hydrotox Lab (Dr. Ines Heisterkamp) and TZW (Dr. Oliver Happel). Together they are going to figure out future best performing green roofs. Methods are by testing materials, such as Drain layer, growing media and plant biodiversity. Some examples as State of the Art roof greenery will be installed in the Demonstration camp of LVGA in Groß-Beeeren near Berlin. Selected materials will be tested and best practice examples will be evaluated with life-cycle analyzes. One of the first project milestones will be a new guideline for better performing green roofs. This new incentive program will be explained within the lecture. The target of this program shall focus schools with high renovation demands and a great potential as multipliers. The incentive will go beyond the typical extensive green roof. Key words for better roofs are better water retention performance, higher biodiversity, or an extra focus on climate functionality. Urban gardening projects are highly welcome as well as so called bio-solar roofs. This program will be an action due to the demands by the European community for better and sustainable Cities to mitigate urban heat island effects.

Piotr Kuczia

KUCZIA Architects

Solar chimneys - an underestimated renewable energy system

Solar chimneys are renewable energy systems used to support or replace natural building ventilation, based on the utilization of solar and wind energy. They can also support the heating or cooling of buildings. Solar chimneys exploit the stack effect, in which solar-heated air rises due to pressure differentials, inducing the inflow of fresh external air. This phenomenon has been employed for centuries across various cultures, and nature itself provides numerous examples of utilizing the stack effect. This efficient and cost-effective solution is still underutilized, giving way to complex mechanical HVAC systems. Interdisciplinary cooperation with specialists from different fields is essential to ensure optimal system performance. Based on various authorial projects and implementations, the possibilities of integrating solar chimneys into the building structure are highlighted, showcasing their visible impact on architectural design. The presentation covers buildings of different scales and in different climate zones, demonstrating the wide potential application of this system.

Małgorzata Kurcysz-Gzowska, Anna Stefańska

Warsaw University of Life Sciences (SGGW)

The use of artificial intelligence in light pollution analyses

Light pollution is a common effect of urbanisation and industrialisation that poses environmental and human well-being challenges. This work will comprehensively examine the concept of light pollution and its various forms. Recognising the impact of light pollution on ecosystems, astronomical observations and human health, the research highlights the urgency of addressing this growing environmental problem. The importance of combating light pollution includes protecting biodiversity, reducing energy consumption and improving overall human health and well-being. Disruption of natural circadian rhythms due to excessive artificial lighting has been linked to various health problems, ranging from sleep disturbances to adverse effects on wildlife behaviour. To address the complex challenges posed by light pollution, this work explores the role of artificial intelligence (AI) in analysing and counteracting its negative impact. AI offers a promising avenue for efficiently processing large datasets such as satellite images, ground-based sensor measurements and sensor networks, enabling more accurate and timely assessments of light pollution levels. Machine learning algorithms play a key role in classifying and interpreting this data, making identifying sources contributing to light pollution easier. The possibilities of using AI in light pollution analyses will be presented, demonstrating the potential of these technologies in creating data-driven solutions. Integrating AI into monitoring systems enables real-time lighting intensity adjustment, contributing to proactive control activities. Additionally, AI-enabled model forecasting can aid urban planning by supporting the design of sustainable lighting strategies. This work raises awareness of the importance of a holistic approach to combating light pollution. Through Artificial Intelligence, designers aim to develop effective strategies to combat the

negative effect of light urbanisation, thereby supporting healthier and more sustainable pro-climate designing.

Karol Langie, Kinga Rybak-Niedziółka

Warsaw University of Life Sciences (SGGW)

A catalyst for participatory urban square design

A catalyst for participatory urban square design The aim of the work is to propose an integrated tool for participatory assessment of the quality of urban square space for the purposes of a socialized design process. The tool was developed on the basis of a literature review and an analysis of three Warsaw squares, locations of site-specific artistic interventions, by Joanna Rajkowska. The result is three benchmarks (design precedents), allowing us to trace both the strengths and weaknesses of places, as well as the impact of spatial interventions of various scales on improving their functioning. The proposed tool implements such key elements of the participatory process as recognizing the project situation, sharing knowledge and scaling assessments. It is also a step towards the co-creation of city squares and collaborative urbanism.

Angelika Lasiewicz-Sych

Cracow University of Technology

'User space is alive': the environmental dimension of inclusive architecture in designing urban common spaces

The concept of urban public spaces has undergone significant changes over the course of history, transitioning from a community of interest embodiment during the medieval city age to a modern city design dedicated to consumption and recreation. Furthermore, the symbolic representation of culture has shifted to an emphasis on the presence of nature within the city. The present adjustments in defining the design objectives of communal urban spaces are connected to a new comprehension of community, distinct from the previous one. Increasing emphasis is being placed on the uniqueness and individuality of each member of an urban community and on the need for an inclusive culture that respects not only the status of each individual's disability, age, or gender but also their political beliefs, background or religion, rather than a somewhat abstract community bound by more or less the same goals and needs. A public space must then unite people without discrimination and must be 'lived' rather than 'represented' for its users, as Henri Lefebvre wrote. The main inquiry here is how these principles are put into practice within the newest initiatives for reshaping urban squares in particular Polish cities, such as Warsaw, Cracow, Lodz, and Poznan. The purpose of this paper is to analyze and describe the characteristics and qualities of inclusive architecture in the field of public spaces.

Klaudia Liszewska, Anna Stefańska

Warsaw University of Life Sciences (SGGW)

Certification systems in sustainable building

New trends in construction are related to sustainable building. This is an important trend in the green market. The combined social, ecological and economic aspects aim to reduce the negative impact of facilities throughout the building life cycle. Developing construction, thus increasing demand for materials, affects carbon dioxide emissions and significant electricity consumption. Due to the use of fossil materials, emissions are expected to increase. To reduce the negative environmental impact, it is necessary to transform conventional construction into sustainable construction. The presentation introduces the concept of sustainable building, including factors that influence the evaluation of a building. In the construction industry, the object life cycle models that are being developed provide an approximation of the environmental impact of building materials and technologies used. Life Cycle Assessment (LCA) is an important aspect covered in the presentation. Buildings, from the early conceptual stage, should be designed in an environmentally conscious manner, starting with selecting the land on which the building will be located, and ending with using the building. The construction market uses various certification systems developed by specialists in various industries. Proper selection of materials and technologies used makes it possible to meet specific categories and earn critical points associated with obtaining a certificate. The presentation analyses two main certification systems in terms of newly designed buildings. The presentation includes selected certification descriptions in the construction industry, considering the certification schemes and divisions of categories of individual certifications on chosen architectural objects. Two certification systems are widely used around the world. LEED (Leadership in Energy and Environmental Design) was introduced in 1998 by the U.S. Green Building Council - USGBC. The system includes many

requirements related to criteria related to ecology, environment, material and natural resources. Another system is BREEAM certification (Building Research Establishment Environmental Assessment Method), introduced in 1990 in the UK by BRE Global, Poland's most widely used system. The system's categories include materials, water, energy, and transportation.

Anna Lorens¹, Stefano Tornieri²

¹Warsaw University of Technology, ²Università Iuav di Venezia

Integrating interventional and temporary solutions for adaptive architecture in the venetian lagoon landscape

This thesis delves into the unique challenges posed by the Venetian lagoon's distinctive landscape, offering a presentation of exemplary practices for constructing and appropriating water as a novel form of universal land. Emphasizing a departure from the conventional emphasis on timelessness, the study explores the significance of transience and temporality in architectural design. The ability to craft flexible structures that can evolve over time, accommodating the dynamic interplay of phenomena, resources, atmospheric conditions, social dynamics, and ecological considerations, is no longer just a virtue but a necessity. In the realm of interdisciplinary design, adaptability becomes a crucial value, particularly in the context of responding to changing conditions and diverse contexts. The study also scrutinizes the challenge of adapting the aesthetics and expression of small-scale architectural forms in uncharted territories, where landscape preservation is paramount. Central to the discourse is the exploration of methods for resource processing and the definition of new materials. Given their ephemeral nature, these materials necessitate a unique design strategy that anticipates the environmental impact of small-scale architecture over time. This involves ensuring their closed, sustainable circulation within the ecosystem. The thesis contributes to a broader understanding of how innovative design practices can harmonize with nature, offering insights into the evolving aesthetics and expressions in contexts where no precedents exist.

Przemysław Łacek, Agnieszka Starzyk

Warsaw University of Life Sciences (SGGW)

Circular economy in architecture opportunities and threats

Presentation aims to investigate the issue of recycling building materials. The subject area was determined with regards to building materials' use and the related environmental costs. The research methodology comprised source materials, as well as the analyzes and experiments conducted by the authors. The obtained research results present the current trends and definitions of terms related to the presented issues. Re-development potential and methods regarding the most typical building materials, as well as the main architectural trends towards using recycled materials, are presented.

Eliza Maciejewska

Warsaw University of Technology

Study of possibilities and threats for the construction of the port in Elbląg

Ports have been windows to the world for centuries and have enabled cities and countries to develop. Thanks to them, it was possible to trade and exchange goods that meant prosperity. Today, despite the developed network of road, rail and air roads, maritime transport still leads the way in connecting the global economy. Global production and supply chains are connected by sea routes, which transport nearly 90% of the volume and 70% of the value of international trade in goods. In Poland, domestic maritime trade is experiencing an upward trend in the country's largest ports: Gdańsk, Gdynia, Szczecin and Świnoujście. In 2022, maritime turnover amounted to 5.1 million tons, which is 23.7% more than in the previous year and accounted for 4.3% of total turnover. Cargo turnover in sea ports in 2022 amounted to 119.0 million tons, i.e. 23.1% more than in 2021 (GUS data 2022). The above data shows that ports play an important role in the economy of our country from the point of view trade and economics, their importance is increasing. In turn, the role of passenger transport by sea is decreasing. Tourist traffic by ship goes mainly to nearby seaports, including: in Sweden. In the above-mentioned issues of ports and their importance on the scale of Poland and the world, a research problem was located, which is the port city of Elbląg with the planned new port. In 2022, the government decided to excavate the Vistula Spit. Thanks to this hydrotechnical investment, the port in Elbląg gained a connection with the Baltic Sea without the need to influence Russian water areas. This brings with it a huge opportunity for the development of the city and the region, but also involves threats and difficulties. There are ongoing debates about the development of the city, how to use its new opportunities that appeared with the excavation of the spit, not forgetting about current problems. Elbląg is located in the Żuławy

area, where there are areas below sea level. According to forecasts and simulations showing global sea and ocean level rise, it may experience higher tides and more extensive storm flooding in the coming decades. The aim of the work is to present a study of the possibilities and threats for building a new port and to analyze the strengths and weaknesses of the city and the region in the context of local conditions.

**Anna Majewska, Małgorzata Denis, Damian Derewońko,
Joanna Jaroszewicz**

Warsaw University of Technology

**Recovering "vacant lots" as a tool for adapting cities to
climate change**

Recent years have shown how the crises that hit Europe affect the perceptions of life and redefine them. In 2022, Poland faced major challenges: a huge influx of refugees from Ukraine and rising energy prices. The ongoing crises make efficient use of space, reduction of urban sprawl, and creation of "15-minute cities" some of the most important objectives. In this context, it is extremely important to identify undeveloped parts of the compact urban fabric, which are referred to as vacant lots. The demand for new housing, which has intensified as a result of the refugee crisis, makes the use of these areas, which are usually well connected to the city center and to public transportation stops, an opportunity to improve the compactness and increase the population of stagnant cities. Because the housing situation of refugees requires quick action, solutions were sought that would enable rapid construction of buildings that are energy-efficient, low-cost, and easy-to-build. To this end, a model city block with housing was designed (which can be replicated in other cities), with modular buildings constructed using innovative technologies. The selected example of a vacant is located in the existing fabric of the metropolitan city of Warsaw, in areas with utility networks situated within a 15-minute walk from essential services and a train stop. This area was selected due to the desire to increase the compactness of the city, but also to avoid ghettoization of the refugees. Placing the proposed development in the vicinity of existing buildings will allow the new population to assimilate and take advantage of the existing service, technical, and communications infrastructure.

Katarzyna Matyszewska-Fuszara

Białystok University of Technology

Analysis of selected housing estates in Warsaw and Białystok cities in the context of the idea of 15-minute cities

According to the latest design trends and the European Union strategy, cities strive to turn towards green means of transport, reduce the number of passenger cars in city centers and encourage society to move around on foot. The purpose of research is evaluation of selected housing estates in Warsaw and Białystok in terms of meeting the requirements of 15-minute cities. Planning documents and literature were analyzed, describing guidelines on what services and amenities should be within walking distance. The research attempted to determine the walking accessibility of services in different age groups. A division was made into services and amenities that can be accessed not only on foot, but by bicycle within 15 minutes of the place of residence. The availability of amenities around new housing estates was compared and contrasted with housing estates built before 2000.

Emanuele Naboni

Royal Danish Academy

Design with local climate change: digital strategies for adaptive solutions

This presentation will explore the fusion of digital techniques with inventive construction practices, emphasizing their collective role in facilitating climate change adaptation in urban environments. The audience will be introduced to a spectrum of scalable solutions, ranging from intricately designed prototypes to comprehensive urban planning strategies. Each solution presented will highlight a steadfast commitment to ecological sustainability, public health, and the pursuit of decarbonization.

Jonathan Natanian

Technion - Israel Institute of Technology

Fast and meticulous: balancing speed and accuracy in eco-computational design

The race toward sustainability in the built environment is underway! Achieving zero carbon by 2050 and limiting global warming to 1.5°C are just a few of the ambitious milestones we must reach. But how can architectural design lead us there? Many advocate for a return to our past environmental architectural intuition—yet, will that alone be enough? Others advocate for fully digitized environmental design workflows—what consequences might this hold? This lecture delves into these topics, exploring the gaps between swift architectural design processes and the meticulous assessment of environmental impact, reflecting our journey at the Environmental Performance Design Lab (EPDL).

Application of biobased materials in architectural design

Development in the field of materials technology and technological solutions offers significant opportunities to shape environmentally responsible architecture. More and more research is being conducted into the application of solutions based on biomaterials. As a result, the number of available technical and technological solutions for minimizing the carbon footprint is increasing. Widely known and widespread are solutions for wooden structures and the use of wood-based materials, technologies based on straw, clay, earth, or various types of wool of natural source (hemp, sheep etc.) are also becoming important. Among modern and prototype materials, products using mycelium deserve special consideration. The wide possibilities of using this material in the form of, for example, thermal insulation, panels, or bricks mean that this material can find more and more applications in the construction sector. Not without significance is the high circularity of this material, which is formed from bio-waste from the production of corn, and the fact that, the material itself can be biodegradable after breaking. The method of production of the material provides the possibility of producing a wide range of shapes and patterns without the need to create more waste. The possibility of shaping any shape of individual prefabricated elements in a relatively simple way may be an important factor allowing wider use in architecture. This element can have also impact for design for disassembly solutions. Different possibilities of application mycelium combined with timber frame structure were presented in competition to affordable housing in Los Angeles.

Aleksandra Nowysz

Warsaw University of Life Sciences (SGGW)

Modernist projects of community-based urban farms in residential areas in regard to contemporary assessment of sustainable food systems

The main residential environment worldwide will be urban agglomerations in the close future. Inhabiting urban areas will rise by the year 2050 up to 70%. Currently cities consume 75% of the world's primary energy capacity, emit up to 80% of global greenhouse gases, and are a source of 50% of the world's waste. This energy consumption, greenhouse gases emissions and waste production will level up in case of anticipated urban development. Another issue is feeding the urban population. Due to increasing urbanization and global industrial agriculture, but also climate change, fertile soils and clean water resources are shrinking. Therefore, it is highly important to protect an agricultural land in and around cities. This study delves into the topic of food systems within the realm of urban development. In response to the impending challenges posed by environmental and food crises, numerous food-related initiatives have emerged globally in recent times. The research explores relevant residential area projects that blend urban living with food production, such as the establishment of agrarian cooperatives. In the first part, modernist projects of residential areas linked with urban farms are reviewed, considering cooperative movement and the Industrial Revolution. This review reveals that these earlier projects aimed to achieve self-sufficiency and sustainability by emphasizing local food production and the extensive use of green spaces. Subsequently, the study introduces agroecology concept which focus is on food production efficiency as well as environmental and societal aspects. Moreover, the paper presents contemporary frameworks for evaluating food systems, such as Milan Urban Food Policy Pact (MUFPP) Monitoring Framework Indicators. The study discusses how these modernist projects relate to the transformation

of food systems towards sustainability in regard to contemporary assessment frameworks. The research illustrates that urban agriculture encompasses more than just the creation of individual goods, like food grown for sale or personal consumption. The instances examined highlight that urban farming serves essential roles within residential design and planning, both in the past and at present.

Climate-resilient urban and landscape design – from inland water storage solutions to transition waterfront zones

The consequences of climate change, such as rising sea levels, heavy storms, flash floods, and prolonged periods of drought, demand diverse adaptation strategies to protect both people and the built environment. Concepts of a sponge city, porous city, or water-sensitive urban design are exemplary new approaches toward rethinking urban territories. However, there are still many unabridged gaps – conceptual, procedural and related to the complex interdependencies of many disciplines. For instance, although the relations between the design of blue-green infrastructure and architectural and urban heritage need to be reconceived, there is a scarcity of design methodologies, scenarios and planning procedures that can facilitate such integration. Similarly, rethinking land-water boundary zones to manage changing water storage capacity and sustain natural riverine ecosystems poses challenges related to inter-sectoral collaboration. Based on experiences from the European Horizon 2020 project SOS Climate Waterfront, this paper aims to enhance understanding of how the different scales of urban and landscape planning, architectural design, heritage perspective and environmental engineering technology link together in water-related strategies and how they impact each other in the definition of preventive action plans. Implementing research by design method, comparative analysis and environmental data modelling, this study presents the procedural framework for investigating and proposing design solutions for blue-green concepts in urban spaces that refer to historical hydrographies. It also gives insights into the climate-sensitive waterfront territories, indicating that the existing hard lines of the land–water interfaces are often transformed into soft transition zones with alternative and more fluid

boundaries and temporarily flooded amphibious areas. The findings allow for a better understanding of the impacts of climate change on urban territories and indicate paths for further research based on the integration of environmental, technological and urban design perspectives. The results demonstrate solutions equally focused on hydrological performance, environmental concerns, and social and urban benefits. By posing new challenges, they also foster the pursuit of innovations in climate-resilient urban and landscape design and planning.

Analysis of the possibility of increasing the retention area in the city by installing retention tanks on the roofs of existing buildings on the example of the "Niebuszewo" housing estate located in Szczecin

Due to the changing climate and the increasingly intensive urbanization of cities, the demand for water, especially in highly urbanized areas, is constantly growing. As a result of the expansion of agglomerations and their strong industrialization, city centers were deprived of water, most natural streams were drained or built over, and ponds were filled up. Free areas of green areas in city centers were intended for the development of large-scale buildings. The small amount of green areas and the increasing area of paved areas in cities generate a number of problems related to retention and lack of usable water. One of the solutions aimed at increasing the presence of water in cities is the installation of artificial retention reservoirs on the roofs of existing buildings. By storing rainwater, artificial water reservoirs perform many functions, including: ensuring the appropriate level of hydration of the area, regulating the flow of water into the storm sewage system during heavy rains, being a source of utility water that can be used in the second cycle, influencing air temperature and climatic conditions the immediate vicinity, constitute a reservoir of water for irrigation of vegetation, and constitute a habitat for many organisms. The article analyzes the "Pomorzany" housing estate located in Szczecin, with the predominance of buildings constructed using multi-panel technology, which are characterized by a flat roof made of reinforced concrete that can bear the loads associated with the installation of an artificial retention reservoir. The conclusions from the analysis will be used to calculate the potential area of roofs that can be adapted with retention tanks and to estimate the amount of water that can be used for the utility needs of city residents.

Nimet Pinar Ozguner Gulhan, Tomasz Radzik

University of Zielona Góra

Potential of GIS in envisioning climate sensitive cities

According to the World Bank; climate change will have an impact on Poland in the form increases in the frequency of extreme weather events including floods, droughts and hurricanes, sea level rise, increase in temperature and precipitation and these events will have an impact on Poland's agriculture, health, forestry, and biodiversity ("World Bank Climate Change Knowledge Portal" n.d.). For instance, an evaluation of precipitation extremes in Poland between 1959-2019 showed increase in more extreme precipitation in accordance with the progressing global warming (Pińskwar 2022). Climate changes affect food security; for instance potato cultivation in Southeastern Poland is more vulnerable to climate change than in the rest of the country (Sawicka et al. 2022) While rapid and unplanned urbanization is one of the catalysts of climate change, the nature of urbanization also needs to be assessed for defining problematic areas. For instance, the population of Poland living in urban centers is approximately 60.13 %. ("Poland - Urbanization 2012-2022" n.d.). While Poland is slightly less urbanised than the OECD average and it has a relatively dispersed pattern of settlement, with only 27% of its population living in cities, 40% in rural areas and the remaining 33% in towns and semi-dense areas according to the Degree of Urbanisation. Furthermore, Poland has gone through a marked process of suburbanisation (OECD 2022). This example demonstrates that climate change is a phenomenon that needs to be studied from diverse perspectives and methodologies. With developments in computer technologies and availability of commercial and open source softwares, old and newly developed GIS analyses are conducting in assessment of impact of climate changes in urban centers and visualize potential climate scenarios. Thus in this paper, we first analyze previous climate change studies that used GIS (Geographical Information Systems) to define

common methods used in establishment of climate change data in urban environments. Second, we will evaluate, climate change studies in Poland that focus on the country's specific conditions. Finally, we will discuss how current methods can be implemented in training of architects and urban planners at undergraduate level.

Magdalena Pios

Ambient Architects

Wooden public buildings in Poland - practical aspects

According to the Central Statistical Office, in 2021, 1160 wooden residential buildings were put into use which accounted for 1.1% of the total residential buildings. Wooden public buildings consist of a dozen or maybe several dozen small, usually single-storey or two-storey structures. Despite an earlier tradition of building with wood, which lasted for hundreds of years, this material is currently very rarely chosen by investors in Poland. On the European map, Poland stands out with a very small number of completed buildings in this technology. However, as Poland's environmental policy stems from the European Union's policy and the use of wood appears there in the context of regulations related to the European Green Deal and also thanks to architects, who appreciate this material not only for its ecological but also for its architectural qualities, the first projects on a larger scale are appearing. AMBIENT is one of the companies that design wooden buildings due to its pro-ecological attitude, so we are confronted with practical problems related to the use of this material. These are both issues resulting from regulations and other conditions, such as the lack of reference sites, low innovation among Polish investors and contractors, unwillingness to bear the risk associated with the use of unknown technology, or lack of specialists and knowledge among designers. However, with the coming regulations related to sustainable financing, circular economy rules and the need to calculate the building carbon footprint, the use of wood will increase and the Polish legal and business environment will also change in this direction.

Monika Piotrkowska, Katarzyna Rędzińska

Warsaw University of Technology

Measuring social adaptive capacity for the purpose of climate adaptation plans: Starachowice case study

Social adaptive capacity is defined as the ability of individuals or community to cope with, prepare for, and adapt to disturbance and uncertain social-ecological conditions induced by climate change. The study of social adaptive capacity can provide decision-makers with valuable knowledge in the process of developing strategic documents tailored to local needs. Furthermore, it is an obligatory part of the methodology of climate adaptation plans. However, measuring social adaptive capacity poses a challenge since indicators available in public statistics insufficiently cover the attitudes of individuals toward climate threats as well as the social capital of the local community. Moreover, relevant data is not always aggregated at the local level. It creates the need to obtain information directly from the community. This issue will gain importance following changes in Polish law making the development of climate adaptation plans mandatory for all cities with over 20,000 residents. The aim of this presentation is to introduce a tool for measuring social adaptive capacity developed during the project "Direction Future: Starachowice Local Development Program" funded by Norway grants. A survey questionnaire was created to gather information about the attitudes of the local community towards climate threats observed in the city. The questions covered the characteristics of various extreme weather events and their impact on residents' lives and the functioning of the city, including experienced damages and coping abilities. Additionally, beliefs about climate change adaptation and undertaken protective actions were examined. The tool was applied for the climate adaptation plan of Starachowice. The survey results indicated that, in the context of climate change, the city exhibits a higher level of social adaptive capacity than suggested by the preliminary research, which relied on an analysis of

public statistics. Residents mostly adopt an attitude that allows them and the city to prepare for future climate threats. Their responses indicated a sense of responsibility for preparing their households for various weather phenomena and undertaking actions that positively contribute to climate change adaptation. Simultaneously, they support top-down adaptive actions. It highlights the need to obtain data directly from the community and develop tools for measuring social adaptive capacity that can be applied in practice by local authorities for climate policy planning.

Dan Pitera

University of Detroit Mercy

Shaping change: architecture, urbanism and social impact

Shaping Change will center on the premise that built environmental professions should expand their influence on culture and society. Architects, urbanists, and designers should expand their clientele, where they work, and the types of projects they engage. This does not mean that they should exclude people who typically build or hire an architect, urban designer, landscape architect, or planner. Instead, the presentation will illustrate how to include more people, more programs, and more geographies in the design and building process. Built environment professionals can be advocates for people who are typically left out of design and place-making decisions. Designers can widen the undertaking beyond some people to include all (or more) people. The lecture, Shaping Change also presents the strategic position that people and firms operating in this way are not alternative practices; they are a part of the ecology that is altering how we practice. To practice in this way, community participatory processes are often employed. But they are also often misunderstood. Thus, Shaping Change will address the correlated issues of civic engagement and civic participation. We often hear that civic engagement means we have to abandon the tools that make great architecture, landscape, and urban design—in other words, we must accept mediocre products. The work and research that will be presented will be used to counter that argument. It is grounded in the position that people in the city do not stand in the way; but instead they are the primary catalysts for urban innovation. The presentation asks the question: How can people be key operators in inspiring and creating new ecological, equitable and inspiring urban environments and spaces? With this position, the outcome becomes meaningful and productive methods of community participation, where community expertise is blended with

discipline expertise...and...where communities and designers work as partners.

Mateusz Płoszaj-Mazurek

Warsaw University of Technology

Artificial intelligence for reducing carbon footprint of buildings. A comprehensive approach using convolutional neural networks and large language models in architectural design optimization

In the Anthropocene era, mitigating the carbon footprint in architectural design is crucial. The construction sector contributes up to 38% of global greenhouse gas emissions, necessitating efforts to reduce its carbon footprint. This article proposes Artificial Intelligence (AI) integration, specifically Convolutional Neural Networks (CNNs) and Large Language Models (LLMs), to address the challenges of data volume in carbon footprint analysis during early design phases. The first tool, developed as part of the author's PhD research, utilizes machine learning for carbon footprint estimation, while the second tool employs a LLM for optimizing low carbon architectural design. The author developed a Machine Learning model integrated into Rhinoceros and Grasshopper to estimate carbon footprints during the conceptual design phase. Testing on a conceptual project in Warsaw resulted in an optimized building form with a 25% reduction in carbon footprint, showcasing the tool's potential in both educational and commercial contexts. The second experiment explores the use of Large Language Models (LLMs), specifically ChatGPT, for carbon footprint reduction in architectural design. The integration of ChatGPT into an online carbon calculator tool, www.slad.ai, showcases the practical implementation of this concept. The tool, developed in Javascript, allows users to calculate the carbon footprint of their design. SLAD.AI utilizes ChatGPT through the OpenAI API to offer users suggestions for optimizing their building models. The tool incorporates the Oeakobau.dat database of emission factors for different building materials, enabling users to calculate the carbon footprint in various phases. The article stresses the need for complementing LLMs with expert

knowledge and considering multidisciplinary aspects in low carbon architectural design. The article underscores AI's critical role, combining machine learning and LLMs, in minimizing the carbon footprint in architectural design. The experiments demonstrate efficacy in streamlining carbon footprint estimation and providing design optimization suggestions. The proposed tools represent a stride towards a more sustainable future in architectural design, aligning with the imperative to combat climate change and promote environmental stewardship.

Aleksandra Przywózka

Warsaw University of Technology

Introducing the idea of a closed-loop economy in construction as a method of lowering the embedded carbon footprint

Defining construction as a sustainable, environmentally friendly activity seems to be an almost impossible challenge with the way this sector of the economy currently operates. This process will always be accompanied by environmental degradation, linked to both the construction space and the production space of building materials. The construction of buildings, especially commercial ones, is charged with a higher or lower environmental cost. It is worth considering whether, in order to radically change the direction of construction, which would slow down the negative environmental changes, the way of thinking about construction and design should be changed. These changes should apply not only to individual buildings, but above all, on a larger scale, to the planning of entire cities. The current trend is to build new buildings, for a period of - 20-50 years, not infrequently on previously undeveloped areas, and adaptation of existing buildings, rarely seems economically beneficial. Therefore, it is necessary to verify the possibility of optimizing newly constructed buildings to reduce their negative impact on the environment, and to improve already existing design and decision-making processes. Energy optimization of buildings has already been included in more than one study of passive building technology. The challenge for the coming years is to develop an approach that would equally reduce the energy demand consumed in material manufacture, construction, renovation and repair, and demolition. Analyzing the life cycle of a building from the phase of materials manufacture to demolition allows one to determine the impact of the various phases on a building's environmental footprint, as well as to define the determinants that would reduce it. The implementation of closed-loop economy principles in the construction

industry makes it possible to lower the embedded environmental footprint of buildings throughout their life cycle.

Kinga Racoń-Leja, Tomasz Jeleński

Cracow University of Technology

Kraków in view of climatic changes - green neighborhoods, pilot project experience and feedback

Kraków is taking number of actions related to adaptation to climate change, regarding most of all its neutrality assumed by 2050. Krakow University of Technology was involved in several pilot projects. The activities got carried out in interdisciplinary teams, combining urban and architectural issues with environmental engineering and effective-energy planning, supported with management and economics of construction and landscape architects. The involvement of urban design specialist was a substantial element in the search for opportunities for comprehensive implementation of solutions, including the search for representative buildings to improve thermal efficiency. The proposals approached the comprehensive adaptation of prefabricated panel-block buildings, many of which were built before 1989, to climate change and the requirements of people with special needs while alleviating Modernist planning deficits. Systems (GIS), urban and social analysis, and Multi-Criteria Decision-Making support methods (MCDM) for comprehensive thermal retrofitting, combined with remodeling to address crucial deficiencies in accessibility and public space renewal. Our approach can aid in extending the utility of panel-block buildings in preparation for their eventual replacement. The multidisciplinary activities of the Krakow University of Technology also include an attempt to develop the so-called Climate standard for municipal public buildings. The standard included number of recommendations, including: energy solutions, building surroundings (greenery and retention) planning, ambient microclimate, comfort of the internal environment, building materials and technologies, and as well the possibility of implementing these solutions as part of systematic procedures related to administrative proceedings. The team is working on a program implementation model.

Noah Resnick

University of Detroit Mercy

Educating a just architect: climate justice in the design curriculum

Throughout their formal education, the architecture and urbanism student should be immersed in a design pedagogy which is holistically centered around human and environmental experiences, empathy and responsibility. To that end, if the discipline of architecture is centered around humans, then architectural education must explore all aspects of the human condition, and, through the educational process, allow students to understand that design solutions must be equitable, safe, resilient, and sustainable. This translates to an understanding that “sustainable design” is as much about social issues as it is technical ones. Urban and architectural design must be taught as an act of social and environmental justice, meant to amplify Social, Economic and Environmentally Just Design for all people. As pedagogical approaches evolve in the era of climate action, students must continue to be taught the important role architects and urban designers play in addressing the issues surrounding global and local climate change and climate justice. This talk explores curricular strategies that connect the technological climate issues with the social issues of climate and environmental justice. It posits the assertion that a values-based design education is needed - one which approaches collaborative and interdisciplinary sustainable tactics as both technical and cultural, focusing on ideas surrounding a “sustainable community” which include energy efficiency and carbon reduction, as well as racial and ethnic culture, history, wellness, and community engagement.

**Urban Greening Plans as instruments of climate actions-
- a comparison of American and European approaches**

Urban greening goals related to green infrastructure are integral to climate adaptation and mitigation strategies worldwide. However, planned actions' scope, targets, and level of detail vary significantly across regions. The Urban Agenda for EU's recent report (Varbova & Zhechkov, 2022) highlights deficiencies in integrating green and blue infrastructure dimensions within Sustainable Urban Development plans and Integrated Territorial Investment Strategies. The study identifies inadequate integration of diverse Green Infrastructure (GI) solutions into local and sectoral plans and insufficient implementation of successful GI integration practices into sectoral policies. This research focuses on urban greening plans as instruments for deploying climate-related policies. The objective is to compare the approaches of American and European cities to urban greening processes, considering scope, targets, and actions. A summary of a systematic review of urban greening plans from 12 selected American cities in the Northeastern Region is compared with the European Union's urban greening guidelines and Polish guidelines for Blue-Green Infrastructure Management Plans outlined in the National Urban Policy 2030 (2023). Analysis reveals that the American approach is mainly "sectoral," involving separate strategies for urban greening sectors such as green stormwater infrastructure embedded in water management systems, park and recreation systems, urban forestry, and urban agriculture. Each sector has distinct roots, varying stages of development as elements of urban policies, and specific goals, targets, and actions. In contrast, European guidelines present a comprehensive framework incorporating the sectors into a single document. The paradigmatic level of the approaches also differs; the European approach, rooted in the EU Biodiversity Strategy, focuses on ecosystems and biodiversity protection,

while the American approach concentrates on providing ecosystem services.

Elżbieta Ryńska

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Taxonomy as part of the modern architect's workshop

In recent years, there has been a significant increase in investments that carry the adjectives "green," "sustainable," or "ESG." Until recently, however, there were no rules and indicators for assessing the sustainability of business. The taxonomy regulation aims to classify economic activities in terms of their sustainability, and will be one of the main factors leading to the continent's climate neutrality by 2050. Developers and building owners will be guided by the investment gap and EU regulations on sustainable financing to ensure the soundness of projects and minimize the risks associated with accessing green financing. As a result, taxonomy-compliant building design will create greater value for those clients who must comply with regulations. Architects can have a significant impact in the early stages of a building's life cycle. It is particularly important to ensure the circulation of information about design features. Also, to ensure a procedure to prevent their loss between the design phase and the commissioning of the building. It should be ensured that data is transferred in such a way, that the circular nature of buildings and their potential for sustainability can be realized.

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FoCa (Free of Carbon Architecture) - an interactive online platform providing information on the environmental properties of construction materials and products

Wrocław University of Science and Technology, in consortium with the Polish Green Building Council (PLGBC), the Institute of Building Technology (ITB) and research partners from Turkey, has started the international project FoCA - Free of Carbon Architecture. Its aim is to create a publicly available tool - an interactive internet platform providing information on the environmental properties of construction materials and products available in Poland and Turkey. The platform will allow users to compare and assess the environmental impact of selected materials required under the Fit for 55 package. Both in Poland and Turkey there is no tool enabling such comparisons, and knowledge about the impact of materials on the environment is very low. To develop the platform, it is necessary to collect information about building materials, products or building systems available on local markets (Polish and Turkish), in the form of data describing their selected environmental impacts, such as greenhouse gas emissions (GWP), primary energy consumption expressed in MJ distinguishing between renewable sources (TRPE) and non-renewable sources (TNRPE) and water depletion (WD). Data for over 100 materials or products will be developed. The service will enable, among others: calculation of the Global Warming Potential (GWP) indicator, the calculation of which in energy performance certificates was announced in the Draft Directive on the energy performance of buildings of December 15, 2021, to the extent consistent with the definition given in the common EU Level (s) framework for indicator 1.2. The service will also enable comparison of materials and products in terms of their specific properties, such as: thermal insulation, acoustic insulation, vapor permeability, and

compressive strength. The most complex form of analysis will be a single building analysis or a comparative analysis to achieve a selected goal or demonstrate the potential for optimization activities. According to the Applicant's estimates, several hundred SMEs will benefit from the service. Moreover, producers of materials and products will also benefit from the project. They will receive information about the GWP, TRPE, TNRPE and WD properties of some of their products. Since obtaining this information is now costly and time-consuming, this will be a competitive advantage for them.

Stefano Salata

Politecnico di Milano

Green and blue infrastructure as a tool for climate change adaptation

Global warming is causing threats such as less frequent rain events of longer duration and an increase in the frequency and size of wildfires in certain ecosystems. Precisely targeted strategies are needed to adapt to these threats. Future land-use-planning policies must be based on environmental health, informed by customized ecological analysis of smaller areas, and easy to apply. Sustainability assessment indicators must be integrated with the spatial dimensions of specific areas to assess sustainability more effectively. GIS-based ecological analysis allows the assessment of environmental changes within small areas over short periods. Using GIS-based analysis, it is now possible to make land-use decisions based on predictive modeling of specific locations and test different solutions to determine which provide the greatest ecological benefits.

Edyta Skiba

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Potential of the finge-belts within circular city vision

In the linear – not circular - economy urban peripheral zones could be seen through productive approach in which all elements of the landscape are being treated as resources to be used and turned into profitable investments. Even though the local plans of urban development describe every single plot with function and parameters, the complex process of spatial planning leaves vast amounts of the land unprotected from unhampered development. On the mental city map these territories are gaining status of wastelands, which as parts of the city's nature are not used for production purposes anyway, they naturally become a candidate for nature reserves (Böhme, G., 2002). At the same time greening contemporary cities gains a lot of societal support; this should refer as well to their outskirts. Nevertheless, a division between Urban Green Spaces (UGSs) and Informal Green Spaces is visible. Despite that, the IGSs cover a much larger share of urban spaces than UGSs and are appreciated by the inhabitants, they are considered by the city authorities as reserves for further development (Biernacka et al. 2023). Individual landowners hold similar attitude. It is more likely that IGSs will be "sacrificed" by the elites, which can access different UGSs within the city centre (Kronenberg et al. 2023). They consider post- agrarian spaces as economical deposits to be transformed into "Field Urbanism". That might be one explanation why the peri-urban landscape becomes a place where large logistic hubs meet relicts of tame settlements. From the perspective of urban morphology those suburban regions can be seen as physical manifestation of the landscape of periods of slow movement or even standstill in outward extension of the built-up area of the standard zone, occupied by land uses seeking large sites and having low requirements of the accessibility to the commercial core. IGSs as reservoirs of biodiversity for cities (Di Pietro, F., Robert, E., et al. 2021) can be perceived as key

element of city fringe-belt defined by Lewis. Unfortunately, IGSs are usually not considered in official statistics, plans and studies (Andersson et al. 2022). The aim of the publication is to test the fringe-belt potential for the improvement also strengthening connections of isolated neighborhoods with more central and consolidated areas (Olivera, V., Spolaor, S., 2022) The analyzed case study refers to Amsterdam, Lyon and Lodz with an interest towards fringe-belts role in circular city visions.

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Use of biomaterials in the fabrication of single-family house components

The changes in the international formal requirements imposed on buildings result in a shift in their designing and manufacturing process. It requires active research on how to enhance the efficiency of the manufacturing process, both in terms of utilising renewable materials and technological precision. Prefabrication based on natural materials may respond to economic, environmental, and social problems. This technology allows for sustainable development-compliant design, reducing carbon footprint and using non-renewable materials. The presentation provides an overview of available prefabrication technologies using bio-based materials. It conducts analyses of the potential application of natural materials in single-family housing in the area of Central-Eastern Europe. The summary provides roadmaps for the utilisation of renewable materials in traditional construction. The contemporary era of anthropocentric exploitation of natural land resources has led to significant climate changes and air, water, and soil pollution. Recent efforts to reverse this trend have resulted in numerous resolutions and changes in law promoting sustainable resources and material management in the architectural and construction sector. Renewable building materials are often associated with a niche of traditional construction, primarily employing wooden structures. However, the technological possibilities of modern prefabrication allow for optimal shaping of ready-to-use building elements. The demand for a change in design is evident in various interdisciplinary competitions for sustainable single-family home projects. The contemporary architectural solutions provide decarbonisation strategies, such as in single-family homes by up to 75%, which is the project by Danish designers as part of the 4-to-1 planet initiative. Another approach involves exploring prefabrication

possibilities using natural materials, reducing the carbon footprint of structures, waste production, water, and electricity consumption and improving the indoor microclimate, contributing to residents' health improvement. The presentation presents the current knowledge regarding the potential use of biomaterials in industrial fabrication for single-family housing. Therefore, an analysis of current technologies available in Central-Eastern Europe will be presented, along with the potential for further development in this industry and its technological limitations.

Revitalisation of multi-family residential buildings in rural areas and small towns as a method to reduce environmental burden and suburbanization on the example of a building in Obory village

The significant share of construction in the spectrum of human activities with a negative impact on the environment prompts the search for solutions aimed at creating a model of management of existing resources that allows to maintain the highest possible natural balance. Since even the most thoughtful and rational, in terms of use of the planet's resources, construction activities are still a burden to the planet, special attention should be paid to the possibility of using existing facilities to meet current and future social needs. The aim of the study was to identify the possible scope of revitalization of a typical multifamily building constructed with prefabricated technology from the 20th century to determine the potential for its effective use to satisfy current social needs, while reducing the negative environmental impact of the investment. Preliminary analysis criteria were developed to determine the rational use of similar resources in the country, along with the identification of possible constraints. From among identified resources, a multi-family residential building completed in 1985 using prefabricated technology located in the village of Obory near Warsaw in the Konstancin-Jeziorn municipality was selected. The building may be categorized as substandard due to the low value of spatial and technical solutions resulting in, among others, low comfort of use, negative social perception, unfavorable aesthetics and low energy efficiency contributing to high emissions during its use cycle. The criteria for analyzing the environmental viability of the use of the resource are: the demand for investment in a given location, the technical condition of the site and its expected life-span, technical possibilities of adaptation to new functions, efficiency of the process of thermo-modernization and

decarbonization of the object in relation to a comparable new investment, impact on the urban structure and society. Opportunities include reducing the economic and environmental costs of new development, prevention of the process of "sprawl" of urbanized areas, preservation of the formed urban structure. The identified constraints depend on poor technical condition and limited adaptability of facilities, unrecognized public attitudes toward this type of proposal, financial constraints. As a result of the analysis, the following were proposed: deep thermo-modernization of the building envelope, implementation of photovoltaics, replacement of the heating system with heat pumps, enclosing balconies with conservatories, combining units into larger apartments, aestheticization of staircases and entrance areas, integration of ground-floor apartments with green areas, construction of elevators . The results of the analysis of the revitalization potential of the selected site indicate that residential buildings made with prefabrication technologies from the 20th century can be an important resource, the possibilities for the use of which should be subjected to a multi-criteria analysis of cost-effectiveness in the context of contemporary challenges and planned environmental policy, as well as improving the spatial order of the country.

Solar Passive

Sustainable design is about rendering buildings independent from outside sources of energy. To achieve this, architects reach for solar-passive and permaculture designs, where design is optimised for the surroundings of the site, as well as integrated capabilities, such as heat storage, wall-built heat collection, solar chimney-driven ventilation or greenhouse effects. The SolarPassive house design is about maximisation of the solar gain, while minimising thermal loss, by encasing the sun-facing side in a greenhouse, while maximising the natural isolation from the north. A greenhouse features high solar gain, which potentially allows elimination of the need for winter heating in mild European climate. The challenge is to control summer internal temperature, which is achieved by buoyancy-driven ventilation, heat storage for night heat dissipation and green roof. The life experience in such building is about blurring the boundary between inside and outside. Mild temperature gradients, abundance of natural light allow comfortable, energy-independent living. The value of this proposition is of particular value, given the rising energy costs and aging centralised infrastructure.

Challenges of architectural and urban education for the city of the future from the perspective of climate change

The UN Secretary-General Antonio Guterres said, "Climate change is moving faster than we are" and added that the "climate time bomb is ticking". The latest climate changes are becoming stronger and stronger and might devastate humans, Earth's species and ecosystems. The main goals of the modern world are global warming, ecological awareness, and creating a sustainable environment. According to the World Bank report, some 56% of the world's population – 4.4 billion inhabitants – live in cities. Across most high-income and upper-middle-income countries, it goes up to 80%. This trend is expected to continue, with the urban population more than doubling its current size by 2050; at that point, nearly 70% of the world's population will live in urbanized areas. The environment of the city is mainly made from concrete. The speed and scale of urbanization bring challenges, such as extreme climate crises, i.e. heatwaves, floods and heavy rains, droughts, fires or strong winds, which we must deal with. Cities play an increasingly important role in tackling climate change since their exposure to climate and disaster risk increases as they grow. Architects and urban planners are on the front line of planning and designing the cities. Sustainable architecture and urban planning can mitigate the impact of human behavior on the existing and future environment. Therefore, the education processes must show the latest trends in architecture design and urban planning based upon sustainable, pre-ecological and pro-environmental solutions. Especially in education, we should teach young, future architects and urban planners how to preserve the natural environment and reflect the needs of local societies. At the Faculty of Architecture WUT and School of Architecture and Community Development, UDM students are taking courses in which they are taught how to protect future cities and citizens against climate change

by making more sustainably aware designs. The presentation will include representative projects from both universities on the architectural and urban scale.

Anna Maria Wierzbicka

Warsaw University of Technology

Sustainable solutions: New European Bauhaus and the use of wood in innovative approaches

Wood is one of the oldest materials used by humans since the beginning of civilization. Its availability and ease of processing have made wood widely used in Europe. However, with technological advancements and increased environmental awareness, we are now witnessing a return to renewable materials that reduce CO₂ emissions into the atmosphere during the production or prefabrication process. Modern technologies allow for the use of wood in the form of Cross Laminated Timber (CLT), which is used as a construction material in the building industry. CLT consists of several layers of wood that are glued together under high pressure. This production method makes CLT very strong and stable, allowing for the construction of solid and safe structures. Wood is also widely used in the prefabrication of wooden houses. The frame and panel system, based on wood, enables fast and efficient construction. Prefabrication reduces construction time and minimizes waste, resulting in lower energy consumption and reduced CO₂ emissions. Wood is also used in small architectural forms such as gazebos, pavilions, or bridges. Its natural beauty and warmth make wood an ideal material for interior finishes. Furniture, floors, or stairs made of wood give rooms a cozy and elegant character. In the context of sustainable development, wood plays a crucial role. As a renewable resource, wood contributes to the protection of the natural environment. Sustainable forest management ensures the sustainable harvesting of wood, which translates into the protection of forests and their biological diversity. In conclusion, wood is a material of the future. Its availability, ease of processing, and ecological properties make it increasingly used in construction. Modern technologies allow for the use of wood in various forms, from panels and structural elements to interior finishes. With proper forest management, wood can be a key

material in the pursuit of global sustainable development. As part of these activities at the Faculty of Architecture of the Warsaw University of Technology, students have the opportunity to familiarize themselves with various technologies and techniques for using wood in construction. They learn how to design and construct sustainable and energy-efficient buildings using wood as the main material. Introducing wood into architectural education is important because future architects will be aware of the ecological and aesthetic benefits that wood brings. They will be able to design environmentally friendly buildings and at the same time beautiful and functional. In conclusion, wood is a material that has many advantages and potential for use in construction. Its availability, ecological properties, and aesthetics make it increasingly popular among architects and investors. With technological advancements and increased environmental awareness, wood is becoming a material of the future that can contribute to global sustainable development.

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Perception of street space

One of the most important challenges related to shaping sustainable cities is changing the transportation model in the city, including increasing the share of active mobility. The space in which it takes place is especially important for pedestrian mobility. The aim of the study was to find out whether certain spatial features of streets of similar length, such as the number of crossing streets, attractiveness of architecture, colors, greenery or sunlight, can influence people's perception of distance. The study was a pilot study and its results are not clear. The presentation is intended to discuss the results and preliminary conclusions from this study, including conclusions about the methodology for researching this type of issues.

Katarzyna Zielonko-Jung

Gdańsk University of Technology

Urban and architectural features crucial for adaptation to heat waves on the example of Warsaw

Global warming is already a scientific fact, as is the urban heat island phenomenon affecting large cities. As a result, they require adaptation to rising temperatures and heat waves. This also applies to cities from temperate and cold climate zones, where traditions of protection against heat are not developed. The purpose of presented study is identification key factors connected with buildings that influence the experience of temperature by citizens. The key factors were divided into architectural features and urban features relating to the scale of the city as a whole, the local scale and the scale of the immediate vicinity of buildings. These groups of features were analyzed using the example of Warsaw as a city where, as in other Polish cities, the criterion of protection against cold, not heat, was so far dominant. Meanwhile in 1981-2014 an increase in the average annual air temperature in Warsaw was noted (0.02-0.04°C per year). In 1976–2011, the urban heat island phenomenon occurred in Warsaw for almost 87% of the year. This study is focused on multi-family buildings in Warsaw, as the most numerous and the most basic for the quality of life of residents. A systematics of Warsaw's multifamily buildings in terms of overheating problem was proposed. Their architectural features (including the technologies in which they were built) and their urban conditions were analyzed in terms of resilience to high temperatures and ability to adapt to climate change in this regard. This study is a part of transdisciplinary research on urban overheating entitled Embodying Climate Change (EmClic). The findings of this study have been used for the anthropological and sociological research planned by the EmClic project. However, they may also be useful to architects, urban planners and all other participants in the urban development process.

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Warsaw heritage of urban gardening

In the 21st century, urban gardening is becoming increasingly popular, from individual activities, less formal support groups to large organized and legally sanctioned garden complexes. The research conducted and presented is aimed at identifying the heritage of urban gardening in Warsaw and assessing its potential in terms of intellectual, material and institutional achievements. The work was carried out based on the analysis of bibliographic analog and electronic databases, Warsaw planning context, documentary resources and legal acts. The collected material was organized according to the adopted criteria, using applications enabling the creation of relational databases using the Dataverse tool supported by the Power Apps application. The developed relational database is not only a resource showing the richness, diversity and complexity of the topics, but above all it allows for further analyzes in terms of the adopted criteria and the search for principles, correlations and dependencies between the sets of collected data. This, in turn, may prove to be a useful tool for pointing the direction of the relationships network and for the efficient and effective management of urban gardening resources.

