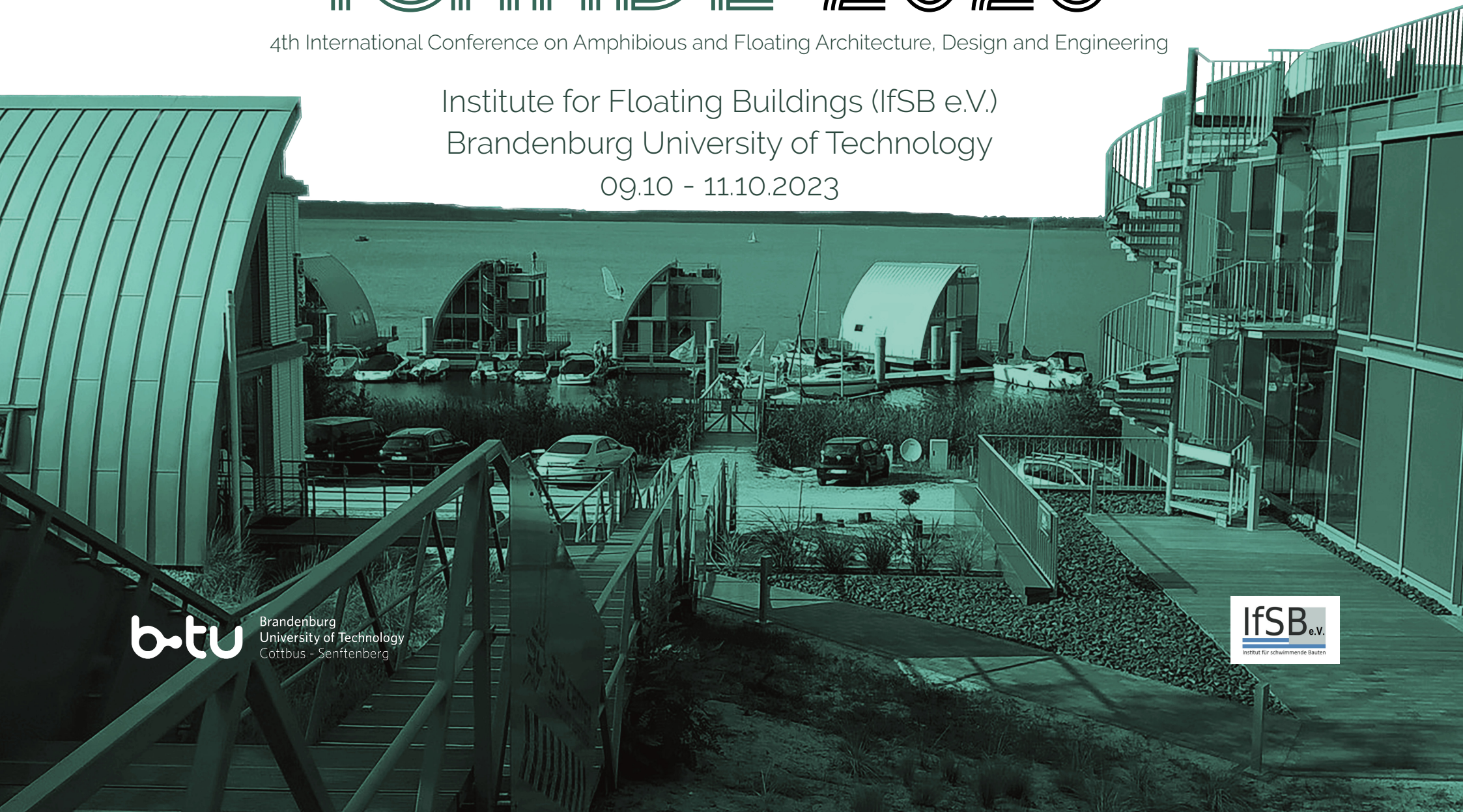
Book of Abstracts

ICAADE 2023

4th International Conference on Amphibious and Floating Architecture, Design and Engineering

Institute for Floating Buildings (IfSB e.V.)
Brandenburg University of Technology
09.10 - 11.10.2023



Brandenburg
University of Technology
Cottbus - Senftenberg

IfSB e.V.
Institut für schwimmende Bauten

Brandenburg
University of Technology
Cottbus - Senftenberg

IfSB e.V.
Institut für schwimmende Bauten

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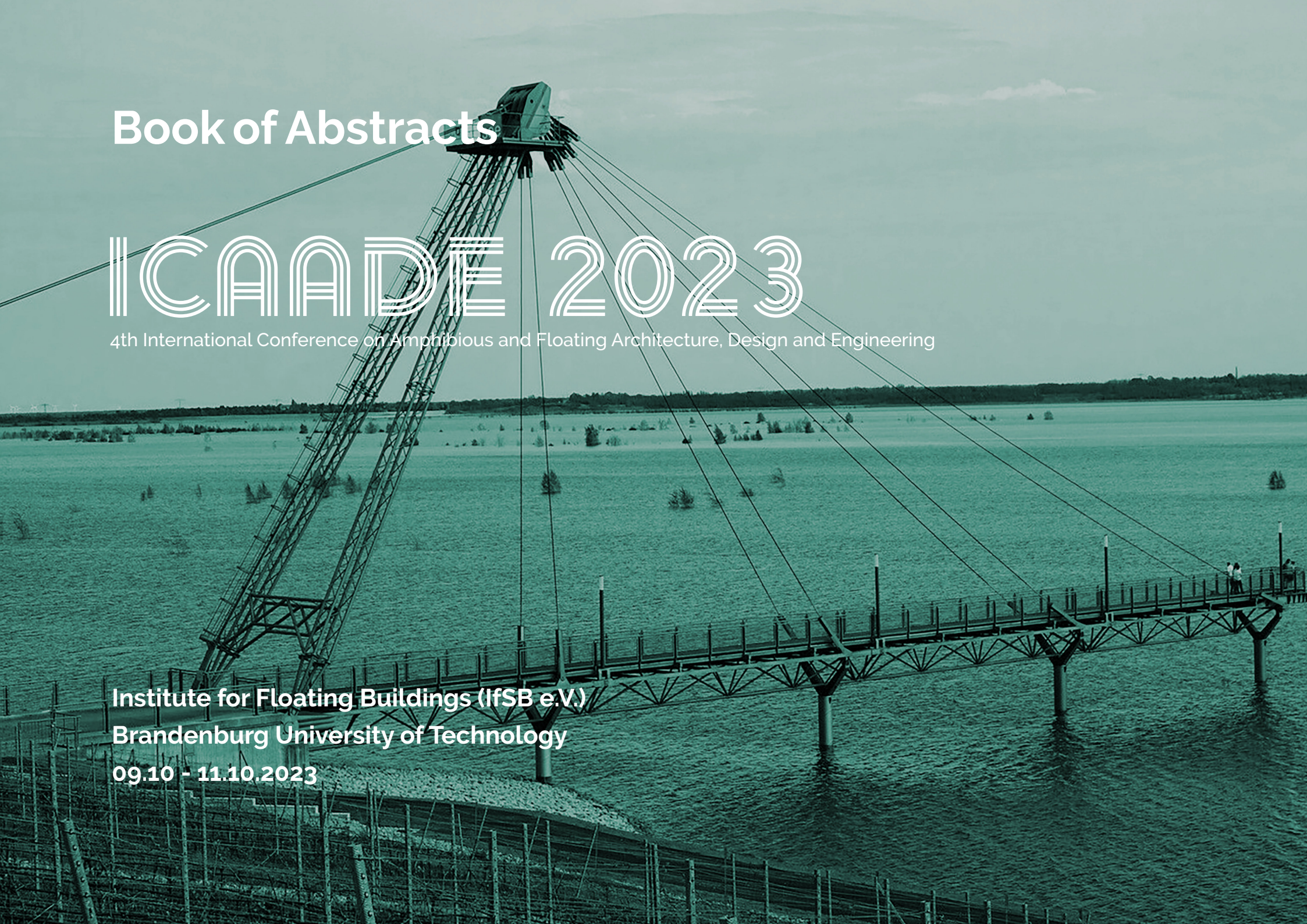

Institute for Floating Buildings (IfSB e.V.)
Brandenburg University of Technology
09.10 - 11.10.2023

ICAADE 2023 COMMITTEES

ICAADE 2023

EXECUTIVE COMMITTEE:

Frank Hoefler (Committee Chair)

Elizabeth English

Lukasz Piatek

Nanma Gireesh

SCIENTIFIC REVIEW COMMITTEE:

Elizabeth English

Frank Hoefler

Rolf Kuhn

Lukasz Piatek

Peter Strangfeld

Saif Ul Haque

Richard Coutts

Rutger de Graaf

Koen Olthuis

Robert Newman

Nanma Gireesh

LOCAL ORGANIZING COMMITTEE:

Frank Hoefler (Committee Chair)

Nguyen Thu Trang

Horst Stopp

Peter Strangfeld

Eduard Voelker

Moritz Weigel

Book design: Moritz Weigel

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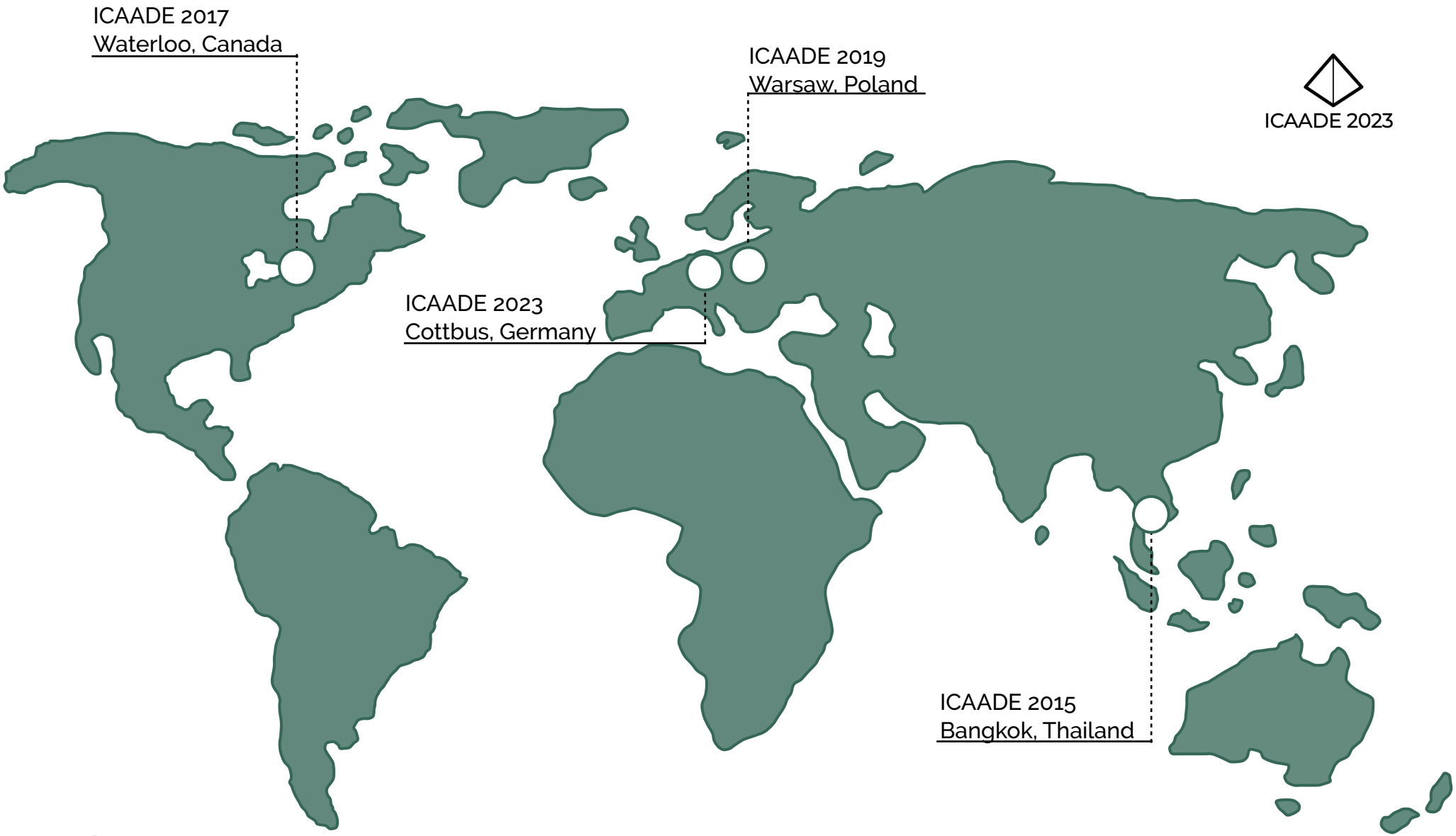

ICAADE 2017
Waterloo, Canada
ICAADE 2019
Warsaw, Poland
ICAADE 2023
ICAADE 2023
Cottbus, Germany
ICAADE 2015
Bangkok, Thailand

ICAADE 2023

ICAADE 2023

ICAADE 2023 is the 4th International conference, held every two years, interrupted by the Covid-19-pandemic in 2021, dedicated to interdisciplinary issues regarding the boundaries of water and land by use of architecture, design and engineering. This years ICAADE conference will be held at the Institute for Floating Buildings (IfSB e.V.) and Brandenburg University of Technology (BTU) in Cottbus, Germany, from October 9 to 11, 2023. The conference consists of a 3-day-programm with various panel sessions attended by internationally recognised keynote speakers, architects and engineers,

SETTLING SAFELY ON AND BESIDE WATER

We want to bring together practitioners, researchers, authorities, students, NGO's, communities and investors in the exchange of knowledge and practice on amphibious and floating issues. Architecture, design and engineering are the result of long-lasting social, economic and technological progress and pathways. We need multidisciplinary perspectives on shifting the boundaries of water and land by use of architecture, design and engineering. These perspectives can support the identification of open questions, market potentials, acceptance and engagement, and flood risk mitigation and climate change adaptation.

We aim to overcome the land-water-dichotomy by providing space and time for discussions on the various paths of practice, experience and knowledge. A pier for science to policy, to practice, and vice versa will offer opportunities to include business, health, finance, design, insurance, politics, research and engineering. In the procedural amphibious space and for floating architecture, it is crucial to integrate natural, technological and human interactions for a more sustainable stewardship. With shifting perspectives, the ICAADE conference reflects on shifting boundaries and water-levels.

What is amphibious and floating architecture?

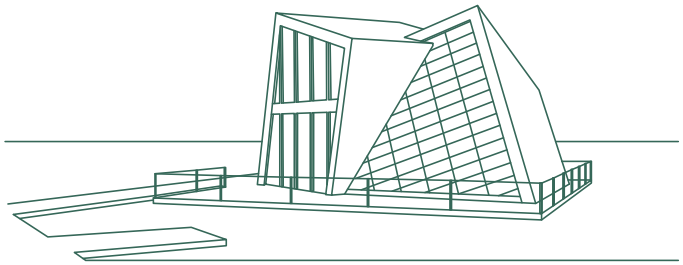
ICAADE 2023

Amphibious and floating architecture refers to an alternative flood mitigation strategy that allows an otherwise ordinary structure to float on the surface of rising floodwater rather than succumb to inundation.

An amphibious foundation retains the building's connection to the ground by resting firmly on the earth under usual circumstances, yet it allows the building to float as high as necessary when flooding occurs. It is a flood mitigation strategy that works in synchrony with a flood prone region's natural cycles of flooding, rather than attempting to obstruct them. Amphibious construction may also refer to one of several hybrid conditions. One such is where the weight of a structure is partially supported by both land and water simultaneously. Another situation is where a mechanical system as jacks or hydraulic pumps are used to elevate the structure temporarily. "Wetproofing" is another hybrid strategy, whereby residents occupy the first floor during dry seasons and move to an upper floor during periods of flooding.

Floating architecture includes individual buildings and larger settlements on shores and lakes that are permanently floating on the water surface. Taking into account the resulting conditions related to the thermodynamic and mechanical properties of the existing water environment (use of alternative energies for cooling and heating, changeable location and position in relation to the water environment), there are many opportunities and risks to be considered for the future (influences from exposure to sunlight or neighborhood, and hazards related to water and ice attack, corrosion, and pollution). Another topic are questions about sustainable mobility, supply and disposal as well as about rescue services in case of accidents and fires.

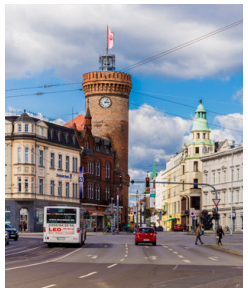
Amphibious design and floating architecture also includes the concepts of land use planning, site selection, community resilience issues such as the place of buildings in multiple-lines-of-defense systems, and policy considerations. Amphibious and floating structures engineering addresses infrastructure, mechanical systems and utilities issues, system components and selection criteria, and codification and certification concerns.



The venue: Faculty 6: Architecture, Civil Engineering and Urban Planning Brandenburg University of Technology Cottbus-Senftenberg

ICAADE 2023

Cottbus/Chóśebuz



Cottbus/Chosebuz is a university town with almost 100,000 inhabitants in southeastern Brandenburg, forming the centre of the Lower Lusatia region. The city, formerly known for its textile production, experienced an economic boom as a result of the industrialization and developed into a cultural and industrial city. Thanks to the local lignite mining in the region, Cottbus became the most important coal and energy supplier in GDR times. It was also at these times that Cottbus rose to a large city and reached its peak of population. With the reunification of Germany and the end of socialism in October 1990, the privatisation of the economy began in Cottbus and initiated a profound structural change in the region. In recent decades, the city has undergone far-reaching transformational processes and has since reinvented itself as a cultural and scientific location. Today Cottbus/Chosebuz is a green city with many extensive parks and natural spaces along the River Spree and in the city centre, as well as centre for innovation in Lower Lusatia.

The university

The BTU is a a young, vibrant technical university, founded in its current format ten years ago in 2013. It is the second biggest university in Brandenburg and consists of three campuses, the main campus in Cottbus, a smaller second campus in Cottbus-Sachsendorf and a third campus 40 kilometers away in Senftenberg. The university has around 6,800 enrolled students, 40% of which are international students from over 125 different countries. In a region marked by economic transformational processes and political right-winged orientation, the university is clearly committed to sustainability, tolerance and cosmopolitanism and, as an important actor, wants to actively help shape structural change in the region through excellent research and smart knowledge and technology transfer.

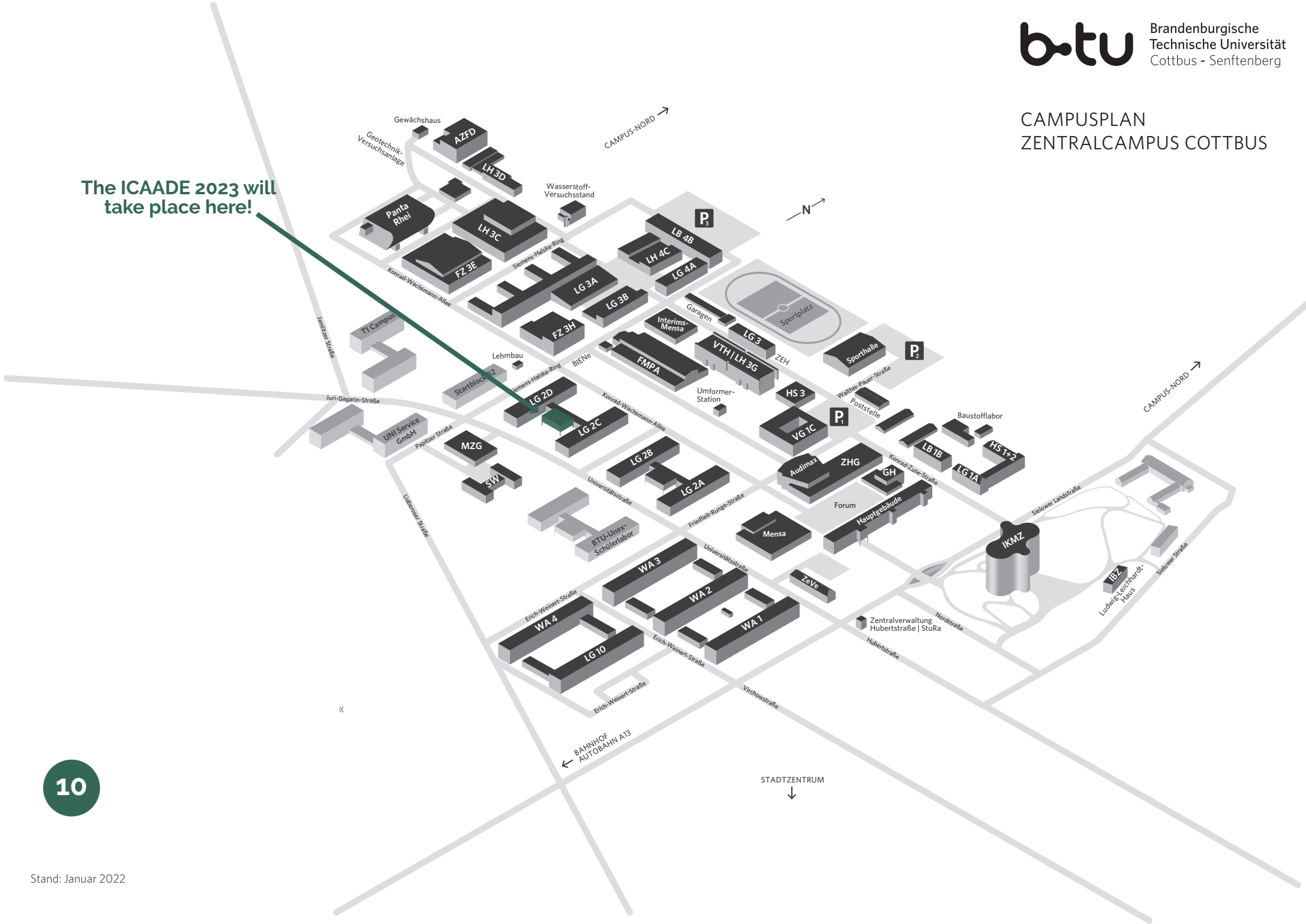
Our faculty

For more than 25 years, our faculty has been researching and teaching an interdisciplinary mix of design, engineering, artistic, historical, legal, economic and administrative chairs. What we call the Cottbus model is based on the concept of bringing future planning partners from the construction industry together during their university education, looking beyond the boundaries of our own subjects in teaching and research, and tailoring them to the needs of today's world using the different ways in which thinking and working are structured and combined together in the Faculty.

Brandenburgische
Technische Universität
Cottbus - Senftenberg

CAMPUSPLAN
ZENTRALCAMPUS COTTBUS

The ICAADE 2023 will take place here!



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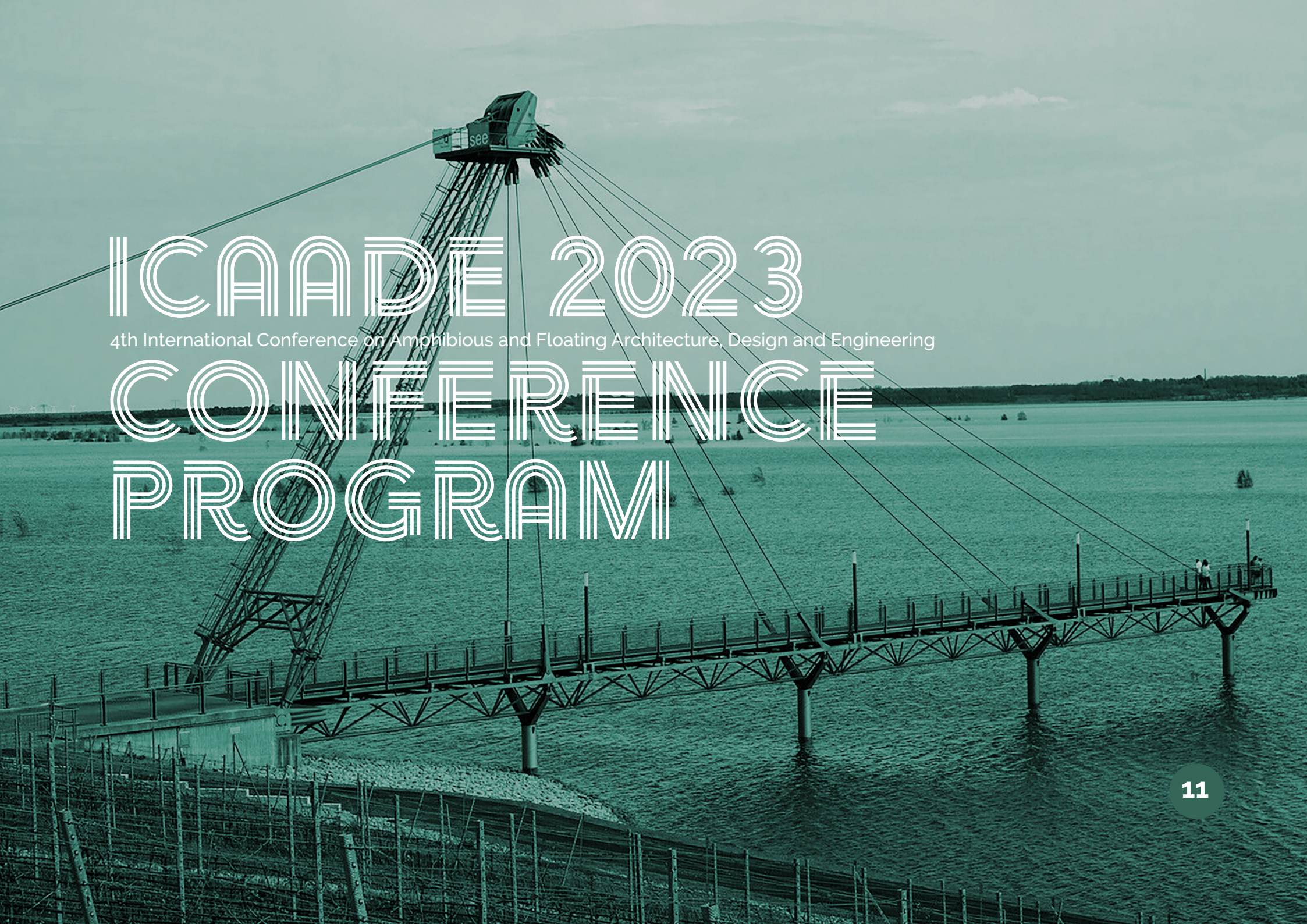


ICAADE 2023

4th International Conference on Amphibious and Floating Architecture, Design and Engineering

CONFERENCE PROGRAM

Sunday, October 8th 2023	Location: Lindner Hotel, Berliner Platz - Goehte room - 1st floor
till 18.00	arrival
18.00 - 20.00	Ice-Breaker Welcoming Reception at Lindner Hotel

Program for the field trip on Wednesday:

Wednesday, October 11th 2023	
09.00	Meet at university camous (confernce venue) or Lindner Hotel
09.00 - 14.00	Field trip to Lusation Chain of Lakes and Floating Architecture
14.00 - 16.00	Lunch at Seehotel Grossraeschen
17.30	Drop off at Berlin Airport
19.00	Arrival back in Cottbus

additional information:

each 75 minute session consists of 4 presentations, 15 minutes per presentation, 15 minutes at the end for discussion

Monday, October 9th 2023	Location: BTU Main Campus - Building 2 C/D - Atelier Oestreich, 1st floor
09.00 - 16.30	Registration
09.30 - 10.15	Conference Opening & plenary session Inaugural adresses: Michael Huebner, Elizabeth English, Frank Hoefler
10.15 - 10.45	Coffee break
10.45 - 12.15	Keynote Sessions Keynote Speaker 1: Edmund Penning-Rowsell Keynote Speaker 2: Colin Ashby Moderator: Elizabeth English
12.15 - 13.15	Lunch
13.15 - 14.30	Day 1, Session 1: Paper 1: Łukasz Piątek and Artur Karczewski Paper 2: Eike Albrecht and Juliane Jentsch Paper 3: Horst Stopp and Peter Strangfeld Paper 4: Livia Calcagni Moderator: Robert Newman-Brooke
14.30 - 15.45	Day 1, Session 2: Paper 1: Peter Song Paper 2: Elizabeth English Paper 3: Nanma Gireesh and Ben K. George Paper 4: Robert Newman-Brooke Moderator: Łukasz Piątek
15.45 - 16.15	Coffee break
16.15 - 17.30	Day 1, Session 3: Paper 1: Yaraslau Sliavin, Eduard Voelker Paper 2: Ahu Gurler Akdeniz Paper 3: Carolina Binder Paper 4: Sridhar Subramani and Koen Olthuis Moderator: Frank Hoefler
17.30 - 19.00	Snack buffet and drinks Poster presentation - networking conversations

Tuesday, October 10th 2023	Location: BTU Main Campus - Building 2 C/D - Atelier Oestreich, 1st floor
09.00 - 11.30	Registration
09.30 - 11.00	**Keynote Sessions** Keynote Speaker 3: Rolf Kuhn Keynote Speaker 4: Barbara Dai Bo Zanon Moderator: Frank Hoefler
11.00 - 11.30	Coffee break
11.30 - 12.45	**Day 2, Session 1:** Paper 1: Wijanarka Wijanarka Paper 2: Bart J.A. van Bueren, Roslyn T. Prinsley and Usha Iyer-Raniga Paper 3: Maria Mendez Guijarro and Fernando Pabon Paper 4: Carolina Jiménez Amador Moderator: Nanma Gireesh
12.45 - 13.45	Lunch
13.45 - 15.00	**Day 2, Session 2:** Paper 1: Ebru Gurler Paper 2: Frank Hoefler Paper 3: Wei Lin, Yinghui Tian and Mark Cassidy Paper 4: Nanma Gireesh, Chris Zevenbergen and Koen Olthuis Moderator: Sridhar Subramani
15.00 - 15.30	Coffee break
15.30 - 17.00	**Global Amphibious Policy Symposium (GAPS) 2023** Panel member 1: Łukasz Piątek Panel member 2: Elizabeth English Panel member 3: Nanma Gireesh Panel member 4: Colin Ashby Panel member 5: Eike Albrecht Moderator: Łukasz Piątek
17.00 - 17.15	Conference closing: Frank Hoefler
18.30 - 21.00	Final Conference Dinner at Lindner Hotel

Global Amphibious Policy Symposium (GAPS) 2023

We are excited to announce the 2023 Global Amphibious Policy Symposium (GAPS) panel, taking place in Cottbus, Germany, during the fourth International Conference on Amphibious and Floating Architecture, Design, and Engineering (ICAADE) in October 2023. The symposium, hosted by the Institute for Floating Buildings (IfSB e.V.) and Brandenburg University of Technology (BTU), aims to continue the vital discussions initiated at previous ICAADE 2015, GAPS 2017 and GAPS 2019 regarding the challenges posed by government policies, absence of standards and codification, and the lack of insurance schemes that hinder the development of amphibious construction.

Despite the growing global concern for floods, certain effective flood risk reduction approaches remain unimplemented due to significant policy barriers. One such approach is amphibious construction, which enables ordinary structures to float temporarily during flooding. Unfortunately, it is not yet a mainstream flood risk reduction method due to regulatory, insurance industry, and codification barriers. While a growing body of research and several built projects have showcased the significant potential of amphibious architecture to reduce flood damage to buildings, the lack of government policies and insurance industry guidelines hampers its effectiveness as a flood damage reduction technology. Flood management and insurance practices continually evolve to adapt to changing circumstances. However, the pace and direction of these changes vary significantly between countries. Flood risk and damage are addressed differently worldwide, resulting in a diverse range of insurance and compensation systems to handle losses.

To address these challenges, the Global Amphibious Policy Symposium will bring together key stakeholders, including leaders in amphibious architecture research and implementation, academics specializing in flood damage reduction research, and insurance industry experts. This collaborative platform will foster discussions to develop innovative strategies and solutions for overcoming the major obstacles to the global implementation of amphibious construction. Building upon existing international collaboration, the symposium will also discuss the future of ICAADE and GAPS. Given the growing concern for flood damage, we have a unique opportunity as leaders to navigate beyond the roadblocks and make progress toward the widespread implementation of these innovative technologies and approaches. At ICAADE 2023, hosted in Germany, the focus will be on addressing governments' lack of recognition of the technology, the absence of codes and standards, and the insufficient insurance schemes that rely heavily on legal and policy regulations. These constraints pose significant obstacles to the development and adoption of amphibious construction. By actively engaging with experts and stakeholders during the symposium, we can collectively work towards overcoming these challenges and unlocking the full potential of amphibious architecture and engineering in flood risk reduction.

Starting point: university main campus/ Lindner Hotel

Lake & Marina Geierswalde (Floating Homes)

Lake Bergheide

The Bergheider See impresses with the impressive backdrop of the F60 visitor mine. The former overburden conveyor bridge is without a doubt the most spectacular relict of opencast lignite mining in Lusatia. It is the largest moving machine in the world. From a height of 74 meters you can see the Bergheider See and the neighboring NABU nature reserve "Naturparadies Grünhaus".

AUTARTEC house

The autartec house is a research and demonstration object of the Fraunhofer Institute for self-sufficient life on the water. As part of the AUTARTEC consortium, a research group from BTU and the Institute of Floating Architecture (IfSB) planned this floating house, which is situated on Lake Bergheide.

Lake Grossraeschen

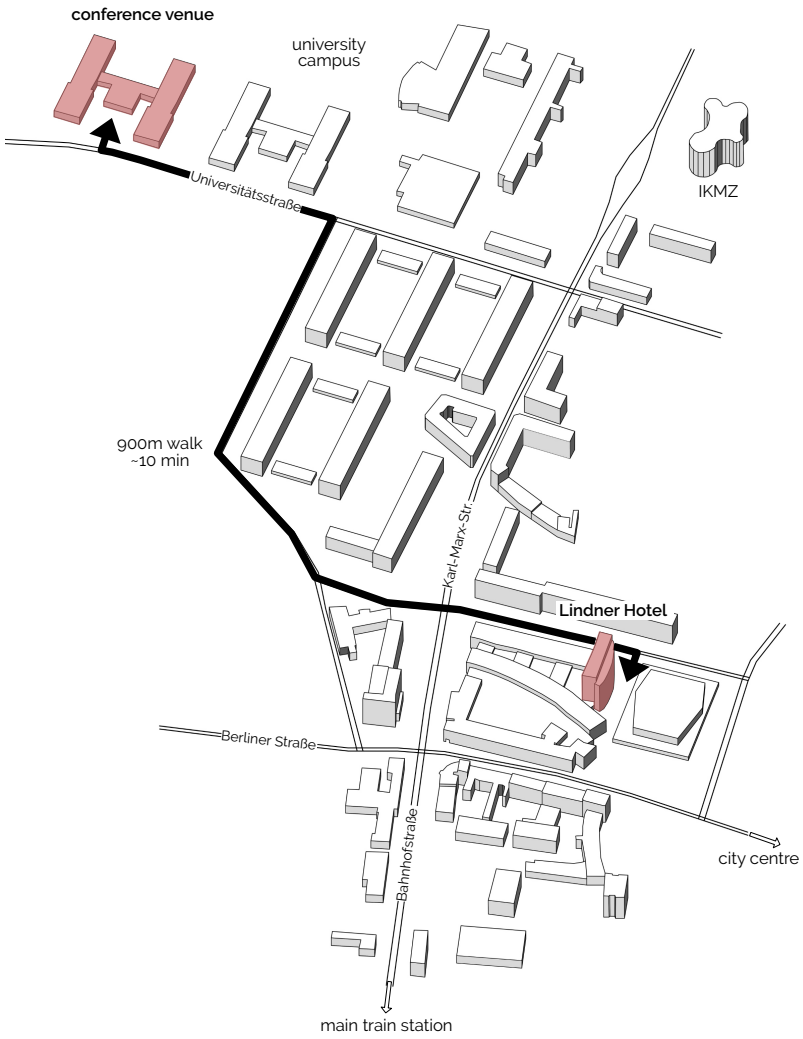
The lake of Grossraeschen is one of ten lakes in the heart of the Lusatian Lake District that will be connected by canals in the future. The lake has been flooded since 2007 and is expected to reach its final level in 2024/2025. The city harbor in Großräschen was built while it was still dry. After the end of the flooding, guests can expect a harbor with approx. 130 boat berths, a harbor promenade and all the important services for water sports enthusiasts.

Lunch at Seehotel

In the middle of the Lusatian Lake District, directly on the Großräschener See, we warmly welcome you to the Seehotel Großräschen, where we invite the participants of our conference to lunch at the end of our tour.

transfer by bus to Berlin International Airport (BER) and Cottbus

Lindner Hotel and conference venue orientation



The Welcoming Reception of ICAADE 2023 will take place in Lindner Hotel Cottbus, close to the city centre and in walkable distance of the university campus and conference venue.

ICAADE 2023

4th International Conference on Amphibious and Floating Architecture, Design and Engineering

CONFERENCE ABSTRACTS

A-Z by first author

Keynote Speakers, Oral Presentations and Poster Presentations

ICAADE 2023 will feature international participants from 12 countries across the world!

List of Authors form a-z (last name)

(K) - Keynote Speaker
(O) - Oral Presentation
(P) - Poster Presentation

A

Eike Albrecht
Carolina Jimenez Amador
Colin Ashby (K)

B

Carolina Binder

C

Livia Calcagni
Mark Cassidy

D

Barbara Dai Bo Zanon (K)
Kate Donovan

E

Elizabeth English

G

Ben K. George
Nanma Gireesh
Ahu Gurler Akdeniz
Ebru Gurler

H

Frank Hoefler

I

Usha Iyer-Raniga

J

Juliane Jentsch
Mattan Jin

K

Artur Karczewski
Rolf Kuhn (K)

L

Wei Lin

M

Maria Mendez Guijarro

N

Robert Newman-Brooke

O

Koen Olthuis

P

Fernando Pabon
Edmung Penning-Rowsell (K)
Minh Tuan Pham
Lukasz Piatek
Roslyn T. Prinsley

S

Yaraslau Sliavin
Peter Song
Sridhar Subramani
Horst Stopp
Peter Strangfeld

T

Yinghui Tian

V

Bart J.A. Van Bueren
Eduard Voelker

W

Wijanarka Wijanarka

Z

Chris Zevenbergen

Keynote Speaker

COLIN ASHBY

Amphibious House built in New Zealand

Colin Winslow Ashby is now a semi-retired New Zealand Chartered Professional Engineer, born and educated in New Zealand he gained a Bachelor of Civil Engineering at Auckland University. He has broad experience across a number of fields including roading and waters, having worked for Government, Local Government, and Engineering Consulting firms in the North Island, before setting up his own general practice consulting firm but tending to specialise in geotechnical and structural residential work. When the Canterbury Earthquakes occurred, Colin volunteered to go to the South Island and assist Civil Defence. However, after the immediate crisis was delt with, there was a need for engineers to assist with the rebuild so Colin moved down permanently and opened up a branch of his consultancy in Christchurch.

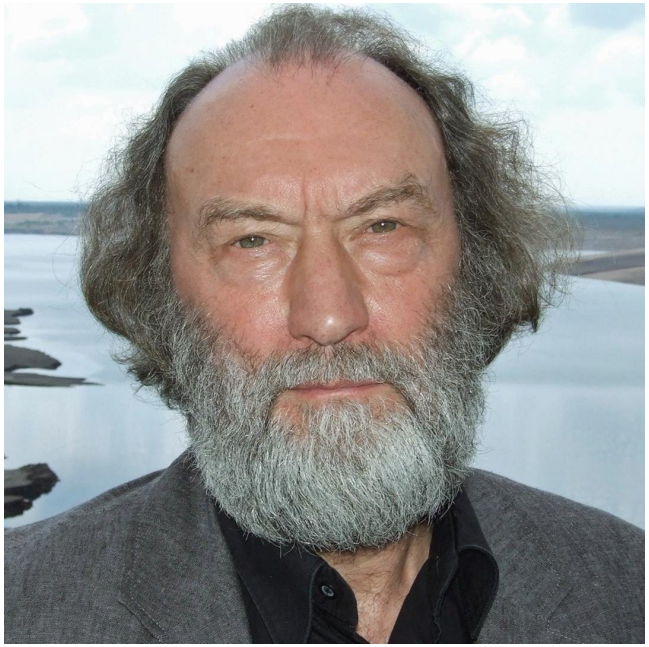
Through his Geotechnical and Structural experience, he was asked to assist with redeveloping a residential site. However from his broader experience he recognised the risk of flooding, and offered to design an amphibious house if the client were prepared to build it.

Keynote Speaker

BARBARA DAI BO ZANON

Rise with the challenge: Realizing floating projects with a positive impact

Barbara is architect and project leader at Blue21, a Dutch multidisciplinary team of experts in water-based urban development. She graduated in 2010 from the IUAV University of Venice (Italy) with a master's degree in Sustainable Architecture. Since 2011 she has been working on research and concept design for several (inter)national projects related to floating development. Her research focuses on environmental design, urban metabolism and resource efficient systems in water-based urban development.



Keynote Speaker

ROLF KUHN

Floating builidings fit to the Lusatian Lake District

After the reopening of the Bauhaus in Dessau, Rolf Kuhn was appointed director in 1987. After German reunification, the "Bauhaus Dessau Foundation" was established. Rolf Kuhn was director of the foundation from 1994 to 1998. In 1998 he moved to Großräschen to take over the management of the preparation company for the IBA Fürst-Pückler-Land. From 2000 to 2010 he was managing director of the IBA Fürst-Pückler-Land. The ideas of the IBA continue to be supported by the Association for the Promotion of the Lausitz Cultural Landscape in the IBA-Studienhaus e.V.

Keynote Speaker

EDMUND PENNING-ROWSELL

Don´t sterilise our floodplains: Use them creatively

Edmund has over 40 years' experience of research and teaching in the flood hazard field, analysing floods and investment in flood alleviation, river management, water planning and landscape assessment. He is full professor at Middlesex University, UK and founder of Flood Hazard Research Centre (FHRC), as a specialist Centre where they focus on the socio-economic and policy dimensions of floods. This Centre must be one of the oldest of its type in the world. He is also a Distinguished Research Associate at Oxford University Centre for the Environment.

Building on the water - a legal perspective

Eike Albrecht, Juliane Jentsch

BTU Cottbus-Sentenberg, Germany

Oral Presentation

Monday the 9th, Session 1

Author Keywords: Legal uncertainty | Building & water laws | Concentration effect

Even though building on water is not new, it leads to legal uncertainty, especially for the approval authorities due to the applicability of different laws. In concreto, the question is, if building law or water law provides for the relevant legal basis in German Law and in the Law of the Federal State's. Or, to formulate it differently: is floating architecture more linked to building law, including its planning, licensing and assessment procedures or is it closer to the usage of a water body which would lead to a priority of water law. There are good arguments for the priority application of both law fields. The question which laws need to be complied with, seems to be – on the other side – less problematic, because – at least in the Federal State of Brandenburg – both legal matters provide the authorities with the so called "concentration effect" which means that one license includes others as well. Nevertheless, this question is not trivial, because this decides which authority is competent. Finally, this question needs to be assessed and decided in a case-by-case decision.

Resilient Post-Disaster Architecture: Beyond a shelter

Carolina Jiménez Amador

Berlin International University, Germany

Oral Presentation

Tuesday the 10th, Session 1

Author Keywords: Resilient Architecture | Floating and amphibious shelter | Post-disaster | Circular economy | Sustainable materials | Self sufficiency | Community integration | Novel design | adaptability | upgradability | Global climate crisis

In recent years, the world has witnessed a surge in water-related natural disasters, particularly floods, driven by the climate crisis, resulting in significant human and economic losses, affecting billions of people globally. Among the worst-affected regions is Pakistan, experiencing frequent and devastating floods, leading to a growing number of displaced populations seeking shelter solutions. However, the current approach of relying on temporary tents for prolonged periods of even years proves insufficient in addressing the long-term housing needs of affected communities, emphasizing the urgency for resilient architecture.

This research proposes an innovative solution in the form of post-disaster amphibious shelters, combining principles of adaptability, sustainability, and resilience. These shelters transcend the limitations of temporary tents, bridging the gap between transitional and core housing options. Key features of the proposed shelter include circular economy principles, leveraging sustainable materials, and floating capabilities. The design incorporates a series of systems to ensure self-sufficiency, from passive climatization techniques, solar energy, and a rainwater capture system. Moreover, the shelters can be repurposed and are scalable, allowing for easy upgrades with locally-sourced materials, fostering community involvement and ownership.

To address the specific context of Pakistan's flooding challenges, the study examines the country's vulnerability and the impacts of recent catastrophic floods, focusing on the two mayor ones in 2010 and 2022. The project seeks to minimize the recovery period by its capability of being easily towed to affected communities or areas with destroyed homes, providing temporary housing during high water periods.

By utilizing novel materials like recycled plastic lumber and eco-friendly fiber-reinforced polymer composite substrate, the research enhances structural requirements and durability in challenging environments. The proposed design aims to revolutionize shelter solutions globally, effectively responding to rising flood risks and promoting long-term resilience in the face of the climate crisis. Furthermore, this project explores an exciting and novel amphibious shelter city arrangement, aimed at addressing the challenges posed by extended stays in grid-like temporary tent layouts. By prioritizing thoughtful design considerations that incorporate individuality and cultural aspects, the project aims to foster organic social connections and create communal spaces, ultimately enhancing community cohesion and resilience.

Amphibian House Built in New Zealand.

Colin Ashby

Engineering New Zealand

Keynote Speech

Monday the 9th, Keynote Session

Author Keywords: Amphibious House Built | Construction of floating houses | Christchurch New Zealand | Mitigate flooding risk | Seismic & liquefaction resilient design

In 2016, following the Canterbury Earthquakes, I was approached by a client to undertake a geotechnical investigation, north of Christchurch and design the foundations and structural components of his planned house.

There had been bad liquefaction in the area, and in addition there was a river stop bank across the road which if overtopped was predicted to result in a 2m depth of flood water. The design needed to not only mitigate flood risk but be seismic and liquefaction resilient.

While the District Plan acknowledged the potential risk, it was put in the "Too hard Basket" and ignored by others. Properties in the neighborhood had been built with house floor levels close to ground level. However, as a Chartered Professional Engineer, I had a professional duty to mitigate the risk. A house on poles with a floor level 2.6m above ground was considered but would have been out of place in the neighborhood contravened daylight requirements and necessitate dangerous and not normally needed stairs to fall down to safeguard against a 1 in 100 year event.

Fortunately, I was able to talk my client into building an amphibious house. Although there was the NZ Light Timber Code for designing timber buildings, there was no New Zealand Standard covering the construction of floating houses. We researched what we could on the internet overseas, and working from first principals, as I could as a Chartered Engineer, we completed the design. The Local Authority was not keen as it was outside anything they had dealt with before and potentially showed them up for allowing construction of low-lying neighboring houses which could potentially be flood prone. We had to get the design peer reviewed, and it came back with flying colors and the house was subsequently built.

My paper will cover the technical aspects of this interesting design in more detail.

Floating Cities - a possible future way of life in view of the global climate change?

Carolina Binder

Universität Augsburg, Germany

Oral Presentation

Monday the 9th, Session 3

Author Keywords: Floating Cities | Global Climate Change | Future way of life | Criteria for a floating city

The theme of this thesis is whether Floating Cities represent a possible future way of life with regards to climate change. In order to answer this question, an empirical study was carried out in form of guided expert interviews. The survey was intended to outline and define generally valid criteria that are prerequisite for a Floating City as a future way of life in view of global climate changes. The analysis of the expert interviews resulted in 11 main categories and 42 subcategories. A catalogue of crit eria with 30 conclusions and measures taken could be derived from these categories, which forms the prerequisites for a successfully existence of a Floating City.

The large number of categories and criteria outlines the complexity of the topic: Whether a Floating City is a possible future way of life in the view of climate change is determined by a number of factors, which in turn are individual for each Floating-City-Project which need to be validated and adapted to local conditions. In theory, the realization of an environmentally and climate-friendly Floating City as a way of life is therefore possible, provided that the established criteria are met. In reality, however, the fulfilment of these criteria will prove to be too complex and consequently not feasible. However, a partial solution through partial compliance with the criteria is more realistic. Floating Cities thus represent a partially possible future way of life regarding climate change, but do not offer a complete environmentally and climate-friendly living, social and urban concept. The study also leads to the conclusion that research into a possible future habitat on water in the context of global climate change should be extended to include Floating Villages and Floating Expansions.

The main advantages of Floating Cities amount to the creation of urgent required living space against the background of advancing urbanization and their resilience to rising sea levels. For these two aspects, Floating Cities represent a possible solution. On the other hand, there is the incompatibility of an environmentally, climate-friendly Floating City with the consumption-oriented Western lifestyle, as well as the still insufficient state of research on Floating Cities, and the lack of a completely environmentally and climate-friendly living, social and urban concept for them. Floating Cities therefore, do not represent a single solution for a future way of life with regard to global climate change, but requires a combination of new housing and living concepts that are individually adapted to local conditions. Examples include the combination of Floating Cities with Floating Villages, Floating Expansions, amphibian houses, dykes and dams, land purchases and cities on land. Further research in these subject areas is therefore essential

Towards a comprehensive Design Support System for floating architecture

Livia Calcagni

Sapienza University of Rome, Italy

Oral Presentation

Monday the 9th, Session 1

Author Keywords: Floating Architecture | Performance Based Design | Multiple criteria decision making | Design support | Decision support system

Amongst the major obstacles to the global implementation of near-shore floating solutions, is the lack of a common design framework or blueprint capable of guiding technicians, practitioners and researchers in the design process. The research aims at laying the groundwork for a comprehensive design support system for floating architecture. The process of solving one problem in the design process can cause the other functions or performances to worsen. As a result, in order to identify these variables and perform targeted quantization and trade-off of functions, algorithm thinking is needed. A Decision Support Tool is developed in order to increase the effectiveness of design support by reducing the number of parametric variations a designer may need to explore and by enhancing the designer's understanding of the interactions between various design and performance variables for a given design solution. To approach the development of a design support framework from a global perspective, rather than limiting it to site-specific applications, a performance-based approach is followed. First of all, an evidence-based assessment of guidelines and regulatory systems that are effective in different countries around the world is carried out to identify performance requirements specifically tailored for floating architecture. The identification and categorization of the requirements takes the architectural standards and norms as the starting point, while addressing the missing aspects from the perspective of offshore and nautical regulatory frameworks. Then a case study analysis is used to further integrate the framework. Ultimately, the shift from the performance requirement framework to a design support platform is outlined. In addition to being flexible, the platform undergoes constant development, thus allowing the inclusion of new metrics to improve multi-criteria optimization and accuracy. Overall, the work intends to provide a proof of concept for incorporation of a web-based multi-aspect interactive tool to effectively support performance-based reasoning in floating building design.

Developing Mega Artificial Shelter Using Big Cylinders for the Effective Use of Offshore Continental Shelf

Marc Cassidy, Wei Lin, Yinghui Tian

University of Melbourne, Australia

Oral Presentation

Tuesday the 10th, Session 2

Author Keywords: shelter Big cylinders Continental shelf aquaculture VLFS

Continental shelves cover 8.1% of the area of entire ocean surface. Its space utilisation, e.g aquaculture and the Very Large Floating Structure, is still underdeveloped but is foreseen with great potential considering the growing global population and stringent carbon emission policies. This study introduces a solution to build mega artificial shelters using concrete-steel big cylinders in 20~40 m water depth on continental shelf. This will make the enclosed area and allow some water exchange like a safe inland lake. Design philosophy, construction concepts, novel structural forms, and system physical model tests for validation are elaborated.

The Buoyant Foundation Project: Amphibious Construction for Indigenous and Marginalized Communities

Elizabeth English

University of Waterloo, Canada

Oral Presentation

Monday the 9th, Session 2

Author Keywords: Amphibious Architecture | Buoyant Foundation Construction | Flood Risk Reduction | Climate Change Adaptation | Community Resilience | Indigenous Traditional Knowledge | De-colonization

As global climate change causes sea levels to rise and weather events become more extreme, severe flooding will become more commonplace around the world. The large populations living in deltaic or riverine floodplain regions will be particularly severely affected. Many Indigenous communities, in Canada and globally, are located in flood-prone areas as a result of policies imposed on them by a colonial government, the impacts of climate change, or for economic benefit. Reducing debilitating flood impacts without causing displacement is crucial for Indigenous peoples who are culturally, generationally, and spiritually connected to the land. Government flood risk reduction policies often involve top-down structural strategies that do not consider community input and have the potential to cause environmental harm. The current Canadian policy of "managed retreat" (assisted relocation) is an insensitive reminder of the practices of colonialism. Amphibious housing presents intriguing possibilities in the quest for sustainable responses to the impending global climate change crisis. Amphibious architecture can be integrated with local building techniques and traditional knowledge. Amphibious foundation systems have great potential to benefit populations in flood-prone regions that currently face the difficult choice between leaving their communities or living in fear of the devastation and trauma that severe flooding can impose. This paper will explore the Buoyant Foundation Project's work to develop amphibious architecture as a flood risk reduction and climate change adaptation strategy for Indigenous communities. A current project, working in partnership with Peguis First Nation in Manitoba, is combining Indigenous Traditional Knowledge with western engineering practices to co-create a de-colonized process to design and implement amphibious flood adaptation solutions for the Peguis community. Current projects in Canada will be featured in this paper as well as case studies in Nicaragua, Vietnam and the USA.

Amphi Nest: India's Pioneering Amphibious Building Prototype with Concrete Buoyant Foundation in Simulated Water Conditions

Ben K. George, Nanma Gireesh

NestAbide Kerala, Australia

Oral Presentation

Monday the 9th, Session 2

Author Keywords: Amphibious architecture | Concrete buoyant foundation | Pavilion prototype | floods | Kerala | India

In the flood-prone state of Kerala, India, conventional flood protection methods have proven inadequate, prompting the exploration of alternative solutions. The 2018 Kerala floods highlighted the vulnerability of communities and infrastructure in such areas. In response to this, amphibious buildings have been proposed as a potential solution. Amphibious buildings, which are designed to float during floods, remains grounded during normal conditions. These structures offer protection to communities and infrastructure while adapting to the water system. This poster showcases the design and development of India's first working prototype of an amphibious pavilion called 'Amphi Nest'. The pavilion, with an area of 100 square feet, features a concrete buoyant foundation capable of accommodating 10 people on board at a time. This foundation, weighing 9 tonnes, is reinforced with steel and wire mesh. The prototype rests on a reinforced concrete wet dock that can be filled with water to simulate flooding conditions and showcase the functionality of the structure. The successful creation of 'Amphi Nest' serves as an influential example for initiating further amphibious developments in India. The pavilion demonstrates the potential of amphibious buildings as a temporary floating solution in flood-prone areas like Kerala. The study also presents the various challenges involved in the construction process, and components including guidance posts, the wet dock, and the materials used. Overall, the article explores the potential of amphibious buildings as a promising solution for flood-prone regions in India..

Afloat in Regulations: An Overview of Key Factors for a Regulatory Framework for Amphibious and Floating Urbanism

Nanma Gireesh, Koen Olthuis, Chris Zevenbergen

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Oral Presentation

Tuesday the 10th, Session 2

Author Keywords: Amphibious architecture | Floating urbanisation | Delta urbanism | Regulatory framework | Law and Policy

As the threat of climate change continues to grow, the concept of "living with water" has emerged as a crucial principle in delta urbanism. This principle emphasizes the need for innovative solutions, such as floating and amphibious architecture, to adapt to rising sea levels and increased flood risks. However, the development of such structures is hindered by a lack of comprehensive policies, legislation, and regulations that specifically address the unique challenges and opportunities presented by these floating and amphibious developments. This research aims to fill this critical gap by investigating the factors necessary for the development of a comprehensive regulatory framework for floating and amphibious architecture. By analyzing established floating developments and examining current legal and policy frameworks from around the world, this study seeks to identify gaps and inconsistencies in existing regulations that impede sustainable development in this field. To achieve the same, this research will employ a combination of case studies and stakeholder engagement to map out the key factors required to implement an effective regulatory framework. By involving relevant stakeholders, including engineers, architects, urban planners, policymakers, and community members, this research will ensure a holistic approach considering multiple aspects of floating and amphibious architecture. By addressing the current gaps and inconsistencies in regulations, this research will contribute to the broader goal of mitigating the impacts of climate change and creating resilient, water-adaptive cities.

Systemic Resilience for "Hybrid-Scapes" at the Land-Water Nexus: Blue-Green-Smart Positive Energy Districts

Ahu Gurler Akdeniz

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Oral Presentation

Monday the 9th, Session 3

Author Keywords: Land-water nexus | Amphibious and floating architecture | Climate-resilient strategies | Cyber-physical management systems | Integrated coastal zone management (ICZM) | Positive energy districs (PEDs)

The pivotal role of energy, ranging from existence to extinction spectrum in the life cycle of (a)biotic entities and the ecosystems, is a fast-tracking mainstream issue at the land-water nexus due to rising energy crisis and the destructive impacts of global climate change. Systemic Resilience mutually provides resistance capacity for intact-stability and robust dynamism for quick recovery in these ecosystems. Therefore, climate resilient “hybrid-scapes” encompass the multi-dimensional design and engineering issues along with planning and management strategies for sustainable development from a framework of systemic resilience. This study focuses on integrating self-sufficient amphibious and/or floating architecture into urban planning system by a multi-disciplinary perspective on sustainable urban development for low-lying cities, delta cities, cities with river systems and areas of flood risk zones. The aim is not only evaluating the potential of blue-green strategy for planning positive energy districts (PED), but also unlocking the climate-resilient strategy for facilitating integrated coastal zone management (ICZM) at the land-water nexus. (Re)considering the value of resilience in ecosystems is essential to codify an integrated approach on "hybrid-scapes" by avoiding risks of being left fragmented from the (main)land as floating cities, amphibious settlements and/or decentralized coastal communities. Consequently, either planning or regenerating a blue-green-smart PED at the land-water nexus is emphasized by an integrated and sustainable approach both in visible and invisible dimensions.

The Commons under Resilience Lenses: The (Un)Bounded Policy Challenges in Floating Urban Development

Ebru Gurler

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Oral Presentation

Tuesday the 10th, Session 2

Author Keywords: multi-lateral policy (MLP) frameworks | multi-level governance (MLG) | multi-scalar planning and management systems | policy coherence for development | floating urban development

The dynamic relations in changing boundaries between land and water highlights the importance of bridging the Kantian Science that provides critical and regulatory restructuring from whole to parts with the Goethean Science that enhances explanatory and exploratory reprogramming from parts to whole for assuring a resilient future.The United Nations –which focuses on the shifting boundary issues in global marine governance and oceans management–, and the European Union –which focuses on cross-boundary as well as trans-boundary issues of land and water in territorial governance and urban management–, are in collaboration in order to achieve the 2030 Agenda for Sustainable Development. Therefore, multi-dimensional frameworks organized by multi-lateral policies (MLP) at international scale converge on integrated and sustainable approaches for heritage-, (re)development-, and regeneration-based urban processes operated by multi-level governance (MLG) at regional scale. The multi-lateral pro-active collaboration acts as an instrumental framework to leverage the policy coherence for development (PCD). Nevertheless, the issues of fragmented urban growth, ecological impact of development, types of ownership, maritime zones and jurisdiction are the major challenges in floating urban development to be addressed and resolved. This study discusses the emerging multi-dimensional policy challenges in floating urban development. The aim is not only classifying the concept of commons in diverging resilience scenarios but also exploring the margins of (un)bounded policies on floating urban development in multi-scalar planning and management systems. (Re)evaluating the systemic value of collaborative policy frameworks in accordance with the top-down, bottom-up and relational approaches in integrated and sustainable urbanization processes is critical to provide policy coherence for development. Consequently, the relationship between land and water as the eco-systemic components of the natural entity is emphasized by debating the conflicts between the common heritage of humanity principle and the environmental social governance frameworks.

Solution approaches to secure individual mobility within large floating settlements

Frank Hoefler

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Oral Presentation

Tuesday the 10th, Session 2

Author Keywords: Floating architecture | Mobility | Floating Infrastructure | Mobility as a Service

The entire mobility offer on and within a floating settlement should be designed without exception as an integrated offer in the sense of "Mobility as a Service (MaaS)". The land connection is to be seen as a transfer point between the existing land infrastructure and the newly designed floating infrastructure. From this access portal, the mobility offer is settlement-related and uniformly organized. All necessary mobility offers are linked to each other. This results in an integration of the most diverse traffic modes in seamless route chains with integrated booking and payment functions for all sections of this route chain. The available mobility solutions are based on the individual requirements of the user and provide them with the right offer from flexible mobility and service solutions. "Mobility as a Service" (MaaS) is not limited to individual mobility, but is equally suitable for freight and delivery traffic. It is precisely the self-contained structure of a floating settlement that makes it possible to design an integrated system in an excellent way.

An amphibious floating building as response to river floodings in Lismore Australia.

[1]Usha Iyer-Raniga, [2]Roslyn T. Prinsley, [3]Bart. J. A. van Bueren

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Oral Presentation

Tuesday the 10th, Session 1

Author Keywords: Amphibious floating | Climate adaption | Flood resilient building | River flooding

Climate change will lead to more frequent and bigger more impactful climate extremes, resulting in a higher death toll and economical losses. Lismore (Australia) is a small city located in a flood-basin where two rivers merge. As it has a historical flood record, its city center is protected by a levee of 10.5m and the lower suburbs have raised Queenslander stilt-homes. However, in 2021 the levee was overtopped twice, with one peak of 14.4m resulting in the inundation of 3,000 homes, of which many were flooded up to the ceiling of the second floor. Observations indicate that flood-damage was caused by: muddy water inundating building materials (and inventory); pressure from strong current, and: impact from debris floating and crawling along the current.

Lismore Council, the Northern Rivers Reconstruction Corporation and the Resilient Homes program from the state-government are working on flood-safe solutions, including relocating the community. Amphibious buildings currently receive little consideration, therefore this paper applies 'research by design' to test if this option is worth more consideration.

A design was made comprising three floors standing on ground level, that can float up during a flood as protection from inundation. The floors use two heavy sidewalls as mooring columns along it can slide 11m upwards, which is sufficient for a one-in-a-hundred-year flood for a site of at least 5m above river level. These sidewalls also shield the floors from strong current and floating debris. The floors rest on some concrete pedestal that holds a semi-submerged and sloped parking garage. This pedestal protects from crawling debris and prevents debris from getting stuck below the floors after the flood. These, and other flood-protection elements are integrated with daily functionalities, which makes it arguably more functional and economical than considered alternatives. The design was widely covered in conventional and social media, sparking debate with many proponents from Lismore community. No structural calculations have been made for this design, although this is likely only to affect the thickness and rebar of the sidewalls. Limitations are regulations, insurance industry, and codification barriers.

From Civil to Naval Architecture. The Typology of Aquatecture

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Oral Presentation

Monday the 9th, Session 1

Author Keywords: Amphibious architecture | floating architecture | Architectural typology | aquatecture | aquastructure

The design and construction of aquatic structures (water-related built forms) is a wide field of action for many creative professions like architecture, hydraulic, offshore, and naval engineering. Due to the substantial growth of the aquatic sector, these specialists more often start to work together on new interdisciplinary projects like flood-proof homes, floating buildings, seasteads, megayachts, ocean cities, and others, and bring their own jargon and classifications into their design teams. This transdisciplinary cooperation results in new forms of hybrid aquastructures, but also shows that definitions and typologies of different origins do not blend smoothly into one clear image of aquatecture. A new typology, covering structures of different environments, functions, and sizes, is needed not only for interdisciplinary research and design but also for perfecting the definitions and amending the existing legislation.

This review presents a broad spectrum of aquatic structures used in amphibious environments. As a result, a new common interdisciplinary typology that organizes existing types used in civil, offshore, and marine engineering, is proposed. Using the buoyancy, foundation type, and mobility as the basic organizing factors, the following array of aquatic structures was defined: (1) non-buoyant ground-based: floodable and overwater; (2) buoyant hybrid: amphibious, gravity-based, and self-elevating; (3) buoyant water-based: floaters, conveyors, and vessels. One of the important findings is the problem of distinguishing between the ships' mobility and the floaters' "redeployability". In conclusion, a central position of amphibious and floating architecture as a fusion between civil and naval design is discussed.

Puerto Rico: A Case Study Initiative on Amphibious Infrastructure for the Caribbean

Oral Presentation

Tuesday the 10th, Session 1

Maria Mendez Guijarro, Fernando Pabon

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Author Keywords: Amphibious infrastructure flooding Disaster risk reduction Sea level rise

This research paper proposes Puerto Rico as a case study for the implementation of amphibious infrastructure to mitigate flooding in coastal communities in the Caribbean. The island has a history of natural disasters, and its coastal municipalities have suffered significant damage in recent years due to flooding. Amphibious infrastructure is a type of infrastructure that can adapt to changing water levels, float or rise with water levels, or even resist flooding without damage. The Netherlands is an example of a country that has successfully implemented amphibious infrastructure in innovative ways.

Puerto Rico's unique context makes it an ideal candidate for a case study on amphibious infrastructure. The island is located in a region prone to natural disasters, and its socio-economic situation and political status as a US territory give it access to resources and funding that other Caribbean nations may not have. By undertaking a case study in Puerto Rico, researchers and policymakers can gain valuable insights into the feasibility and potential benefits of amphibious infrastructure.

The reviewed research highlights the significant impact of sea level rise (SLR) on Puerto Rico, with projections indicating higher levels of SLR in the region than the global average. Mangroves and other coastal ecosystems have been shown to be effective in mitigating the impacts of storm surges and flooding, which supports the implementation of amphibious infrastructure. The Sendai Framework for Disaster Risk Reduction emphasizes community participation and social inclusion in disaster risk reduction efforts, which could be integrated into the development of amphibious infrastructure in Puerto Rico.

Overall, this paper suggests that implementing amphibious infrastructure in Puerto Rico could be an effective strategy for mitigating flooding in coastal communities. The unique context of the island, including its vulnerability to natural disasters and its access to resources and funding, makes it an ideal case study for understanding the feasibility and potential benefits of this approach. The Sendai Framework for Disaster Risk Reduction provides a framework for integrating community participation and social inclusion into the development of amphibious infrastructure in Puerto Rico.

Resilience and longevity of Amphibious homes: Two UK Case Studies.

Robert Newman-Brooke

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Oral Presentation

Monday the 9th, Session 2

Author Keywords: Amphibious floating U.K. Residential Resilience

When looking at amphibious projects, is resilience about the longevity of the building or longevity of the planet, or both?

As the world looks at a future of increased flooding and adverse weather, amphibious buildings may offer a remedy. They offer the possibility for building longevity, in that an amphibious build can continue to function through and after a flood, when a traditional building would need to be repaired or rebuilt at great environmental cost. However, the highest environmental impact a building has throughout its lifetime is when it is first built. Building in resilience and making our buildings last is the best driver to protect the planet and safeguard future generations. As with any new construction, amphibious buildings have an initial, upfront environmental impact. The questions industry professionals need to ask themselves are: 'Will designing buildings with a long shelf life offset their initial carbon footprint?' and 'Can amphibious buildings provide longevity?'. To better analyse these questions, we must look the environmental impact of building, and interrogate the meaning of longevity in a wider context. A core goal of future development is to provide safe, liveable homes for the growing world population. We want to provide longevity not only to the building's fabric, but to communities and their inhabitants. If the argument is that new homes need to be built to meet the demands of a growing planet, one benefit of an amphibious build is that brownfield land or sites at risk of flooding can be utilised and upcycled, rather than requiring forest, field and natural green-space for new development. Updating and future-proofing existing sites and infrastructure also helps to preserve existing communities.

These concepts will be looked at through the lenses of two ground/water breaking amphibious projects currently being developed by Baca Architects. The world's largest amphibious home in Henley on Thames and an amphibious riverside home, joining a burgeoning floating community in Sunbury on Thames.

FREQUENCITY: A data-driven tool for urban resilience of the delta region through modular floating platforms in the context of sea level rise.

Koen Olthuis, Sridhar Subramani

Waterstudio.NL, Netherlands

Oral Presentation

Monday the 9th, Session 3

Author Keywords: Floating solutions | frequency | scenarios | Data-driven tool | Reinforcement learning

Cities are intricate open systems characterized by unpredictable behavior resulting from the actions of local and global entities. Global agents such as sea level rise and rapid urbanization in delta cities, along with local agents like seasonal flooding, urban infrastructure densification, insufficient living conditions, and housing demands, contribute to this complexity. One potential solution to address the uncertainty of sea level rise is the concept of "living with water," which involves designing modular floating platforms as part of city programs. These floating solutions offer adaptability and flexibility to relocate and transform according to human dynamics. By employing a data-driven approach, urban systems gain the capacity to survive, adapt, and thrive amidst the dynamic interplay of these diverse factors.

The objective is to develop a planning tool that facilitates the transition towards "living with water" by creating scenarios that enable delta cities to respond and coexist with uncertainty. The initial stage involves designing a planning system based on the frequency of human activities in different functional spaces. Rotterdam is chosen as the experimental site due to its strategic advantages and existing knowledge of floating solutions to combat the threats posed by rising sea levels. A time-use survey reveals the patterns of user activity on a given day. This information is translated into different object types on floating platforms, with their distribution determined by the frequency of use. Overlaying user flows with the accessibility of various services helps identify the demand for specific objects in different locations over time.

The planning system utilizes a reinforcement learning process to simulate and learn from the responses of floating infrastructures to varying demand locations. Consequently, the system measures factors such as de-densification, proximity, and availability of different objects over time. By incorporating location-specific scenarios, such as seasonal flooding, the tool redefines thresholds for object distribution and demand locations. Following these steps, the tool evaluates the performance of different locations, facilitating the identification of specific implementation strategies for cities to gradually develop their presence in the water, thereby addressing the uncertainties of the future.

Old River Landing: How a small fishing community became amphibious and resilient

Peter Song

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Oral Presentation

Monday the 9th, Session 2

Author Keywords: Old River Landing | Fishing community | Louisiana | Morganza levee system | Styrofoam blocks | Community resiliency

In a small community two hours north of New Orleans, Louisiana, is Old River Landing – an idyllic summertime fishing location filled with ATVs, playing children, small fishing boats, and annual July 4th fireworks. However, the same water that makes Old River Landing an ideal fishing town expands and overflows each year. Located outside of Louisiana's Morganza levee system, overflow from the Mississippi River engulfs the collection of some 200 structures and fishing camps that constitute Old River Landings. And with each passing year, residents report the flood frequency and duration increases, with the flood lasting from weeks to sometimes months every year. This requires residents to find solutions to protect their homes, businesses, and fishing camps.

Resiliency and the ability to work with water are synonymous for the fishermen at Old River Landing. Drawing on the vernacular traditions of swamp living in the region, the area's part and full-time residents have gone amphibious. They use modern hurricane proofing and industrial materials like steel guidance posts and Styrofoam blocks to outfit their homes, trailers, and even a bar-restaurant, allowing the structure to float off their foundations, while resisting lateral movement and wave action. This method decreases vulnerability to hurricane winds in comparison to the conventional solution of raising homes on stilts. Residents live without compromise even when the river crests to 35 feet or higher, using boats to access their houses, and avoiding disruption due to flood damage.

Old River Landings is a testament that amphibious architecture does not need to be tectonically intricate or complicated to serve its purpose – all it takes is a small community to look inwards, find a contextual solution, learn from one another, and become resilient to our changing environment.

CAAL – Founding of a centre for floating architecture and amphibious buildings in the Lusatian Lakeland

Horst Stopp, Peter Strangfeld

BTU Cottbus-Senftenberg, Cottbus

Oral Presentation

Monday the 9th, Session 1

Author Keywords: Centre for floating architecture | Activities of the institute | Need for space | Call for partnerships

First it is explained what the center should be, how and why it should be created. Current climate change is causing a reduction of the settlement areas due to desert migration and sea level rise. On the other hand the need for housing in developing and emerging countries as well as the expansion of infrastructure and the sense of entitlement in industrialized nations induces a further need for space. This contradiction can be resolved through the future settlement of water areas.
This means a lot of tasks for the future colonization of water areas.
Numerous examples of this work are demonstrated visually. The examples focus on activities of the Institute for Floating Buildings at the BTU Cottbus-Senftenberg. They range from the choice of materials, attacks of water waves and water chemistry, outdoor climate components and moving objects to energy self-sufficiency through different types of heat exchangers in the adjacent water. The passive air conditioning of the room climate through hygrothermally active boundary surfaces is also demonstrated.
Some regional, national and international partnerships already exist. A call is made to complement the partnerships for the center to be established.

Simulative investigations of the geometric shape for the stability of a pontoon

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Oral Presentation

Monday the 9th, Session 3

Author Keywords: Floating bodies waves stable stable movement

The stability of floating bodies is one of the most important aspects of building on water. External forces such as wind and waves can cause these structures to vibrate, and as a result, their movement must remain stable even against the random frequencies of waves. This is not only necessary for keeping the building upright, but also for the well-being of its occupants. Changes in acceleration can irritate the organ of balance and result in seasickness due to the human body's reaction to the motion. By studying the movement behavior of floating bodies, measures can be proposed to reduce rocking and transform the excitation spectrum to higher frequencies. The possibilities of numerical investigation must be re-evaluated.

Based on the study on optimizing the shape of a floating body [1], simulative investigations into movement behavior were carried out using the ANSYS Aqwa software. The different geometric forms were examined for their movement behavior and compared with each other.

Kalimantan Amphibious House

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Oral Presentation

Tuesday the 10th, Session 1

Author Keywords: Kalimantan Amphibious house

Amphibious House in Kalimantan, formerly called lanting, batang or raft house. Amphibious Houses in Kalimantan used to be in rivers or on river floodplains. Currently, in Kalimantan there is also an Amphibious House built outside the river. This happens because the area outside the river often floods, and the flood reaches more than 2 meters. With flood disasters in Kalimantan increasingly threatening, there is a need for houses that are more adaptive to flood disasters, so innovative amphibious houses in Kalimantan need to be created. Therefore, this article aims to describe the results of the 2021 and 2022 Kedaireka grants regarding the Kalimantan Amphibious House Innovation. The description begins with the history of the form of amphibious houses in Kalimantan

Wetland Radio: Towards Amphibious Worldings

Kate Donovan

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Poster Presentation

Author Keywords: amphibious wording | political and ecological extremes | radio-making | cultural practice

The current moment is one of extremes. We see this in weather patterns and environmental conditions, in political and societal views. Brandenburg is known for its extreme ecologies of dry grasslands and wet moors, as well as political polarity shown in the recent rise in popularity of the far-right party AfD. The repercussions of both of these examples entail mass species extinction and loss of biodiversity, climate-change denial and opposition to immigration. It could be argued that the prevalence of uncertainty—ecological, societal, economic, political—has also lead to the rise of the far-right.

This project intends to take Brandenburg's wetlands as a starting point and work with the uncertainties of multiple simultaneous worlds. The term wetland is "an in-between term, denoting a zone of mixture or transition where land and water, solidity and liquidity transform and intermingle" (McCLean 2011: 608-9). As such, it lends itself as a figure not only to the elemental entanglements of these sites, but also to the cultural complexities of changing rural areas. Wetlands are multifaceted sites of ambivalence, in which amphibiousness is a useful tool with which to navigate the interminglings of modern binaries such as water/land, nature/culture, nation/other. Becoming ontologically amphibious (Aranda and Kirksey 2020) is not only to move between elemental paradigms or environments, but also between social and cultural worlds. This projects takes the figure of amphibiousness—in particular a move towards amphibiousness worldings—as a means to reckon and adapt with changing socio-political-ecological circumstances. From the wet and dry extremes of Brandenburg, as well as extreme planetary weather conditions due to climate change; from the connection between the situated stories of Brandenburg's wetlands to planetary ecologies; from the elemental mixtures of wetland areas themselves, as an undoing of defined separateness of materiality. Beyond simply moving into and between different spheres, worlding amphibiously means adapting to another by making space, by being generously receptive. This is particularly pertinent in terms of the socio-cultural and it aligns with ideas of transception (Donovan 2023): placing importance not only on speaking—enunciating, transmitting—, but also on listening—receiving, receptive generosity (Scott 2017).

Wetland Radio turns to amphibious practices—academic, creative and performative—drawing on a mixture of theory, local and planetary scientific knowledges on wetlands, and oral (hi)stories. Working across ecological and political landscapes through research with people, sites, texts and sound, is to come to terms with amphibious ontologies and epistemologies. Through the concept of amphibiousness, this project uses radio-making practices as a method for knowledge-making and exchange. Embracing the boundary-crossing potential of radio-making, it will work across multiple scales—from site-specific micro FM transmissions, local radio broadcasts via Free Radios Berlin Brandenburg transmitting in Berlin and Potsdam, as well as digital and streamed audio worldwide.

Advances in amphibious retrofit construction for flood risk reduction and climate adaptation

Poster Presentation

Elizabeth English

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Author Keywords: amphibious construction | flood risk reduction | climate change adaptation | Buoyant Foundation Project

Protecting vulnerable communities from the increasing risk of flooding wrought by climate change is a challenging prospect. Unpredictable future flood levels require innovative solutions that can adjust to our changing environment. Large populations living in deltaic or riverine floodplain regions will be particularly severely affected.

Amphibious architecture offers an inexpensive, adaptable and resilient approach to flood mitigation. A buoyant foundation refers to a specific type of amphibious architecture—a retrofit to an existing building that enables the structure to remain in place until the event of a flood, when it then rises completely passively and floats on the surface of the water until the floodwater recedes, when it resettles onto its original foundation. Amphibious construction is an adaptive flood risk reduction strategy that works in harmony with a flood-prone region's natural cycles of flooding. A buoyant foundation retrofit is capable of providing protection from flood damage with minimal change to the appearance of a home or the surrounding landscape. For some circumstances it is a viable, if perhaps temporary, alternative to relocation or managed retreat. In environmentally sensitive locations, amphibious construction suggests how to sit lightly on the land and live WITH the flooding, temporarily, when it occurs. Although amphibious retrofits are a solution that is not universally suitable for all types of flooding or building construction, they nonetheless provide a flood risk reduction and climate change adaptation strategy that in appropriate situations has much to offer.

This poster will feature case studies of affordable, low-impact prototypes implemented in Louisiana, Ontario, Bangladesh and Vietnam, and visionary projects designed for other flood-vulnerable locations around the world.

Planned Project « AquaBus in the Lusatian Lake District »

Frank Hoefler

BTU Cottbus-Senftenberg, Germany

Poster Presentation

Author Keywords: amphibious vehicle | tourism | Hop-on/Hop Off-Sightseeing | mobility

In addition to the motor boats and sailboats, another vehicle could be travelling on the Lusatian Lakes in the future: The AquaBus is a hop-on/hop-off exploration tour through the Lusatian Lakes. The bus could visit interesting spots in the region, where visitors can freely decide whether they want to stay longer at their destinations or continue their journey. From swimming fun for young and old, features of the Lusatian lignite culture, to symbols of structural change and culturally rich castle complexes, the destinations should be varied to support a bigger interest group and present the history and culture of the Lusatian Chain of Lakes.

Once you get off at one stop, you can easily hop on the next bus and continue your journey, enabling you to explore Lusatia freely according to your own interests! The AquaBus is designed as an amphibious vehicle, it also covers part of the route in the water, thus serving as a symbol for innovation in the region.

Project for a Floating Canadian Shield Watershed Conservation Institute

Mattan Jin

University of Waterloo, Canada

Poster Presentation

Author Keywords: Canadian Shield | Student Design Project | Freeze-Thaw Cycle | Climate Adaption | Light-Wood Framing

The French River is an estuary river system connecting Lake Nipissing into the Georgian Bay, in Ontario, Canada. Historically, it has been a key passageway for indigenous groups and early French settlers who used the river as a complex trading network. Its landscape consists of a geologic shield containing exposed Precambrian igneous and high-grade metamorphic rocks in which is a part of the Canadian Shield, also known as the Laurentian Plateau.

This project is a design-research study of floating architecture on an existing game fishing and hunting lodge site. The site is only accessible by boat and requires materials and food to be transported along the Hartley Bay channel. The program consists of temporary lodging for thirty people, and a dock for commercial and recreational boats.

The design investigates how vernacular light-wood framed buildings fare in cold climates. The French River on average has below freezing temperatures for half of the year between November to April. As such, the floating docks are removed for the winter season when the water begins to freeze over.

ICLR Quick Response Report: Investigating the impacts of the November 2021 - February 2022 Atmospheric River Events in British Columbia, Canada

Minh Tuan Pham

Buoyant Foundation Project, Canada

Poster Presentation

Author Keywords: ICLR Quick Response | Institute for Catastrophic Loss Reduction | 2021-2022 Atmospheric River Events | Fraser Valley | Accumulated Rainfall Mapping | British Columbia | First Nations in Canada | Flood Damage Report | High Precipitation Area | Buoyant Foundation Project

Over the course of three months between November 2021 and February 2022, six atmospheric river events took place in British Columbia, Canada, resulting in deaths, loss of properties, and displacement of inhabitants. These events were characterized by extreme, rapid rainfall in large quantities that resulted in floods and landslides. This report focused primarily on the effects on First Nations communities in the region who were disproportionally affected by these weather events as a consequence of colonial policies in Canada that forced them into remote and flood-prone zones. The study consisted of three phases: Phase 1 identified affected First Nation communities and related information about them, e.g. their location, size, population, number and type of homes, etc.; Phase 2 gathered information about the types and magnitudes of the damages suffered by these communities; Phase 3 provided further analysis of communities that were most affected through more in-depth investigation, as well as field research in the Fraser Valley to discuss the project with members of the communities and provide a basis for recommendations about which communities are in greatest need of flood-risk reduction solutions. As extreme natural events like the atmospheric rivers and the wildfires that may precede and exacerbate them will likely worsen as the effects of global warming persist, this report serves to provide real, immediate examples of communities that could benefit from flood-resilient interventions to prevent loss and displacement.

Insights into the institute´s research and development work

Institute of Floating Architecture

BTU Cottbus-Senftenberg, Germany

Poster Presentation

Author Keywords: Institute´s research | Future development | Floating architecture | Climate and social change

Presented Posters show insights into the institute´s research and work. Posters on Floating Architecture in Europe, Adaption to climate and social change, design and future planning, technologies and others will be presented.

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Brandenburg
University of Technology
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We are a university of technology and develop practical application oriented solutions for the major global issues and transformation processes of the future with scientific competence. We are aware of our special responsibility when it comes to forward-looking and sustainable progress in our region. Interdisciplinary clusters and close collaborations with our partners from the business and science communities have promoted the emergence of a highly focused profile, international liaison and successful projects to overcome these challenges.

We offer our students an outstanding education, individual support and the opportunity to learn together as well as from each other with curiosity and an open mind. Students from Germany and all over the world contribute to our varied and inspiring campus life. We already offer you the chance to prove your mettle whilst still at university, and to actively contribute to shaping the future.

We believe that we are part of an international knowledge community. The source of our cultural diversity is our international outlook. It enriches the social interaction at BTU and promotes diversity in teaching and research.

As a university community, all of us are working towards shared goals. Each and every one of us is essential for the success of our institution. We promote the skills needed by our students and staff so as to provide creative, effective and competent input, and encourage enthusiasm. All interaction at our university is founded on mutual respect and open-mindedness.

Institute for Floating Buildings e.V.

https://www.b-tu.de/schwimmende-bauten/

IfSB e.V.
Institut für schwimmende Bauten

The skills developed in Lusatia in the areas of open-pit post-mining landscapes, floating architecture and their structural implementation are to be pooled and further developed in the region. The climatic and limnological boundary conditions, including the water wave parameters, as well as the constructional and resulting material developments and economic studies play a decisive role. It is assumed that floating buildings are not only of regional interest, but that the growing world population will depend on alternative land-use potentials in the future as a result of growing demands as a result of climate change.

The IfSB sees itself as an organizational unit at the interface of research, teaching, consulting and practical implementation. The Institute has a coordination office with the following tasks:

- prepare and support consultations as well as specialist events and symposia in terms of content and organisation,
- informing partners about new developments in floating buildings and related topics,
- develop suitable funding lines at regional and supra-regional level and prepare and, if necessary, develop corresponding applications on a pro rata basis,
- Carry on developing and visibly presenting the competencies in the cooperation between the institute and external partners

In a regular cooperation with partners from industry, science and administration, the institute forms a competent centre for topics related to floating buildings. In addition to environmental protection and safety issues, this includes social issues and infrastructure issues.

The Buoyant Foundation Project

https://www.buoyantfoundation.org/

The Buoyant Foundation Project (BFP) is a non-profit based at the University of Waterloo that focuses on amphibious architecture, which allows otherwise-ordinary structures to float on the surface of rising floodwater. Whether working on homes or civic buildings, the BFP aims to safeguard heritage and promote social justice with low-cost, visually unobtrusive retrofits. The BFP was founded by Dr. Elizabeth English in Louisiana, USA in 2006 to support the recovery of post-Katrina New Orleans' traditional cultures by providing a strategy for the safe and sustainable restoration of historic housing. She proposed that the city's traditional elevated wooden shotgun houses could be retrofitted with amphibious foundations to prevent flood damage, acting as an alternative to permanent static elevation that diminishes a neighborhood's character. Since then, the BFP's mission has broadened to apply to numerous other floodsensitive locations worldwide. The team recently completed four amphibious retrofits in Vietnam's Mekong Delta using locally familiar carpentry skills, construction techniques, and building materials. They are currently developing prototypes in Ontario with the goal of exploring buoyant foundation retrofits as a potential climate change adaptation strategy for Canadian communities. The BFP co-initiated the first International Conference on Amphibious Architecture,nDesign, and Engineering (ICAADE) to convene the world's leading experts in amphibious approaches. The BFP has been proud to be an ongoing partner as the momentum builds around this growing innovative field of investigation

Department of Mobility Planning, BTU

https://www.b-tu.de/fg-mobilitaetsplanung

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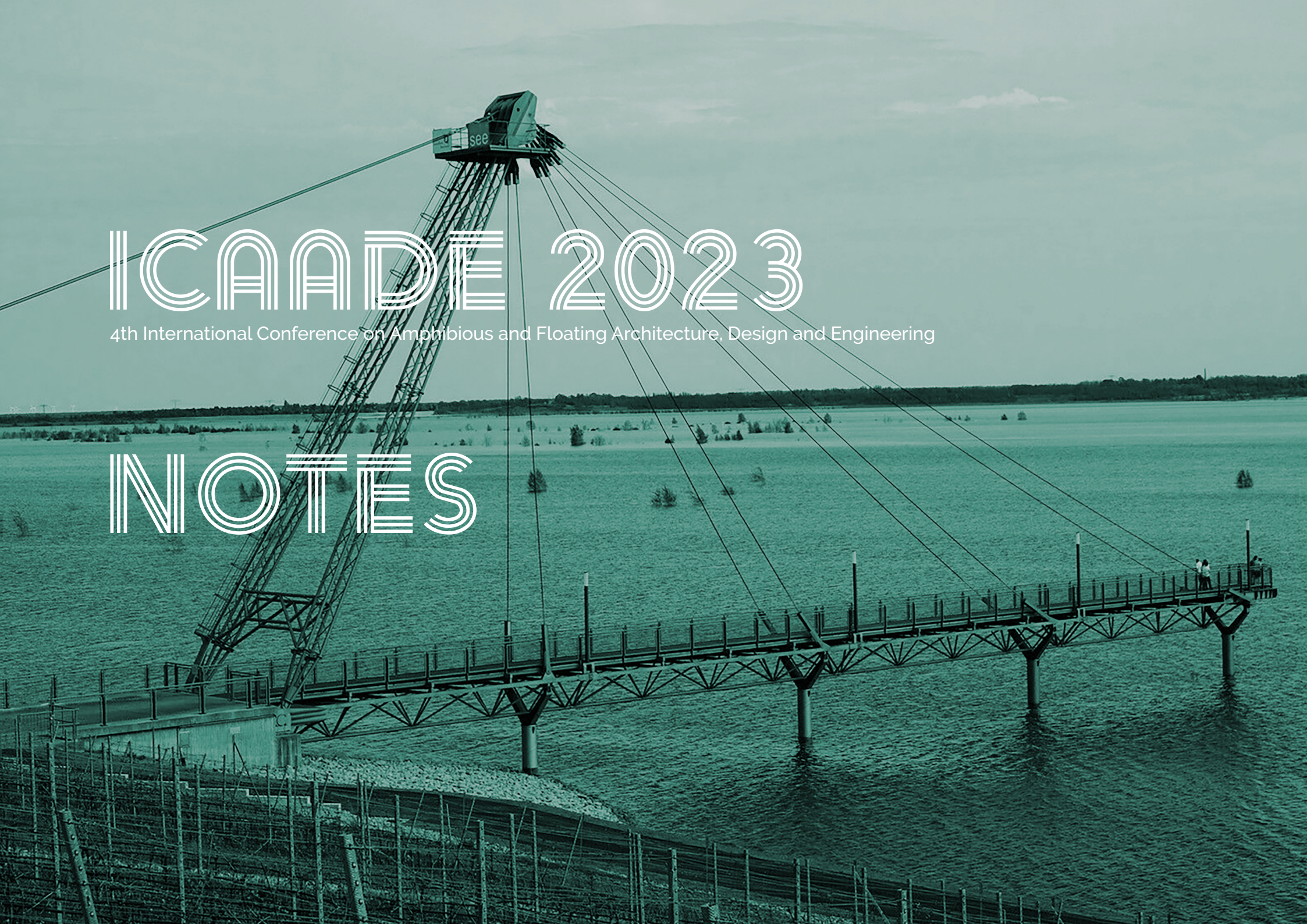
The higher education of the mobility planner involves complex tasks: transport facilities and networks, appropriate services and conflict-free and safe processes. The broad training is oriented towards the requirements in execution and design.

Professor Höfler has been working in transport and urban planning since 1985, and in teaching since 1994. Research and project work focuses on the conceptual planning of transport facilities, the elaboration of transport development plans and studies on sustainable urban development.



ICAADE 2023

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