

DIGITAL PRACTICE

emerging possibilities in a shifting architectural profession

The seventh session of DR_SoM (Design Research Series on Method) takes place at Graz University of Technology. This event is also the fifth Annual Conference of the Architectural Research European Network Association (ARENA). For the third time DR_SoM focuses on architectural research in practice, but for the first time with an emphasis on the digital. In particular, we invited projects and practices that see digital technology as a new way to think and conceive of design.

In the call for papers we stated:

“Digital technology is nothing if not malleable. It can take on the most surprising forms because, in and of itself, it doesn’t have one. It’s just bits. So it’s always its own alternative. It provides a plethora of opportunities.

[...] digital technology also empowers those that dare to build their own tools, to design their own workflows, their own ways of doing things. It rewards those that create their own ways of working, that use the digital to design the way they design.”

The contributions selected for presentation provide a variety of interesting approaches to this theme. They were grouped into four sessions: ‘Digital Fabrication’, ‘AI and Machine Learning’, ‘BIM and Simulation’ and ‘Augmented and Virtual Reality’. In the DR_SoM tradition of having no parallel sessions each of the presentations is a plenary presentation – the perfect setup for a continuous debate. They are framed by keynotes and a panel discussion about the forthcoming ‘Atlas of Digital Architecture’ that provide a larger picture. The presenters are from around the world: some are academics, some are practitioners, some are both. Some are PhD students working on novel concepts, some are seasoned professionals that have published widely. Taken together the presentations reflect the breadth not only of the technical developments that are impacting the field, but of the new ways of thinking and practicing that are opening up – just as we hoped when we published the call for papers. We look forward to interesting, possibly controversial, hopefully productive and inspiring discussions and debates.

In this booklet you find the program of the conference. It contains the list of presenters and panelists and short bios of the keynote speakers.

DR_SoM is a project within the ARENA network for architectural research. ARENA is an open, inclusive and comprehensive network for architectural researchers across Europe.

ARENA offers a shared platform that aims to promote, support, develop and disseminate high-quality research in all fields of architecture in the widest sense, including its links to building technology, environmental design, sustainable development, interior design, landscape architecture and urban design/urbanism, operating in domains from science and technology to arts and humanities. To do so it works alongside all existing bodies to promote the quality, breadth and significance of architectural research to the key institutions involved. For more information go to www.arena-architecture.eu.

The conference website can be found at digitalpractice.arena-architecture.eu.

Scientific Panel and Keynotes

DR_SoM panel:

Urs HIRSCHBERG, TU Graz (organizer and host)
Johan DE WALSCHE, UAntwerpen (project leader)
Oya ATALAY FRANCK, ZHAW Winterthur (project leader)
Roberto CAVALLO, TUDelft (project leader)
Murray FRASER, UCL Bartlett
Bernard KORMOSS, ULG, Liège
Flora SAMUEL, SoA Reading
Torsten SCHRÖDER, TU Eindhoven
Pieter VERSTEEGH, ESA PSYCHE
João SEQUEIRA, UBI-Covilhã

Keynote speakers:

Kristina SCHINEGGER, University of Innsbruck / soma
Colin FOURNIER, UCL Bartlett / TETRA X, Hong Kong
Michael HENSEL, TU Vienna / OCEAN Architecture | Environment
Shen-Guan SHIH, NTUST, Taipei

Panel Discussion ‚Atlas Of Digital Architecture‘:

Oliver FRITZ, HTWG Konstanz
Sebastian MICHAEL, London
Ludger HOVESTADT, ETH Zürich
Urs HIRSCHBERG, TU Graz

Presenters

Ajla AKSAMIJA, University of Massachusetts Amherst
Diana ALVAREZ-MARIN, ETH Zürich
Shany BARATH, Technion - Israel Institute of Technology
Panagiotis CHATZITSAKYRIS, AUTHessaloniki / UNStudio
Charlotte DAUTREMONT, University of Liège
Frederic DELVAUX, University of Liège
Michal DENGUSIAK, Buro Happold
Thomas DISSAUX, University of Liège
Wolfgang DOKONAL, Graz University of Technology
Martin EMMERER, Hope of Glory Architects, Graz
Florian FEND, Institute of architecture and media, Graz University of Technology
Oliver FRITZ, University of Applied Sciences Konstanz / user generated design GmbH
Alexander GRASSER, Institute of architecture and media, Graz University of Technology
Yasha J. GROBMANN, Technion - Israel Institute of Technology
Wassim JABI, Cardiff University
Ibe Chinedu JUSTICE, Akanu Ibiam Federal Polytechnic Unwana, Nigeria
Marina LIMA MEDEIROS, Graz University of Technology / VRVis
J.P. MARUSZCZAK, University of Texas at Arlington, Heron Mazy Architects
Camilla MARINI, Politecnico di Milano
Ali MIRAKBARI, Schmidt Hammer Lassen Architects
Jorge OROZCO, ETH Zürich
Jose PAIXAO, Institute of architecture and media, Graz University of Technology
Miro ROMAN, ETH Zürich
Robert SCHMID, Institute of structural design, Graz University of Technology
Adam SEBESTYEN, TU Vienna IEMAR & New Design University St. Pölten
Defne SUNGUROGLU HENSEL, TU Munich / TU Vienna
Georg THEISEN, Gottfried Wilhelm Leibniz Universität Hannover
Johan VAN ROMPAEY, University Antwerp
Yi ZHOU, Center for Housing Innovations, The Chinese University of Hong Kong
Verena ZIEGLER, Zurich University of the Arts, University of Applied Sciences Konstanz

Keynote 1



Kristina SCHINEGGER

Kristina Schinegger is an architect, researcher and educator. Together with Stefan Rutzinger she is founder and principal of soma architecture. She holds a professorship for structure and design at the University of Innsbruck where she is co-head of the research group i.sd_ structure and design together with Stefan Rutzinger. She is dean of studies at the Faculty of Architecture and scientific director of the advanced studies program "Designing Future Realities". She studied Architecture at the University of Applied Arts Vienna (Studio Prix) and the Bartlett School of Architecture in London. From 2012 to 2016 she was a teaching fellow at the Bartlett, UCL London and taught at the TU Vienna. soma's work has been awarded numerous prizes in international competitions and featured in renown exhibitions, such as the Venice Architecture Biennale, Archilab or the recent Tallinn Architecture Biennial.

"State and Ability"

In real life buildings are never enclosed and finished – they are reorganized, refurbished, altered, changed. If we watch the city from far distance in rapid motion we would create a completely different picture of the permeability of architecture – it is a living habitat. Likewise designing is not seen as a targeted process with clearly defined objectives and constraints. Instead, an architectural proposal is an explorative speculation and projection into the future which considering the lifespan of a building cannot be taken for granted. Consequently, design becomes a prognosis about future lives, realities and inhabitation.

Although different in scale and function, soma's projects all share a common approach towards form, state and ability. Aesthetic and experiential qualities, performance, programme, relations between interior and exterior are not treated as separate or pre-determined, but emerge out of malleable geometrical operations that are informed by – and simultaneously alter – structural, functional, programmatic, typological or urban conditions. The practice's design processes explore the whole spectrum between a macro-approach that deals with a figure or form and a micro-approach that focuses on structure and its spatio-temporal arrangements, which intersect with the top-down versus bottom-up polarity.

Keynote 2



Colin FOURNIER

Colin Fournier was educated at the Architectural Association (AA) in London. He is Emeritus Professor of Architecture and Urbanism at the Bartlett School of Architecture, University College London (UCL), where he was Director of the Master of Architecture course in Urban Design and of Diploma Unit 18. He was an associate of Archigram Architects in London and Planning Director of the Ralph M. Parsons Company in Pasadena, California, USA, developing Urban Design projects in the Middle East, in particular the new town of Yanbu in Saudi Arabia. He was Bernard Tschumi's partner on the Parc de la Villette project in Paris and co-author, with Sir Peter Cook, of the Graz Kunsthaus, 2003. His "Open Cinema" project was realised in Guimarães, Portugal, in 2012, with a second edition produced in Lisbon in 2013 and a third one in Hong Kong, in 2016. He is a Director of TETRA X, an architecture and urbanism firm based in Hong Kong.

"Digital Design, Innovation and the Graz Kunsthaus".

In this lecture, Professor Colin Fournier will discuss the extent to which digital design, in conjunction with other innovative concepts and experimental processes, has contributed to the architecture of the Graz Kunsthaus.

Keynote 3



Michael HENSEL

Michael U. Hensel is a registered architect, researcher and writer. He co-founded OCEAN in 1994 and was founding and acting chairperson of OCEAN Design Research Association from 2008 to 2018. He now co-directs OCEAN Architecture | Environment. He is professor at Vienna University of Technology where he heads the department for digital architecture and planning. Previously he taught at the Architectural Association School of Architecture in London, BIA Berlage Institute Amsterdam, Rice University in Houston, and Technical University in Munich. He was founding and acting director of the Research Center for Architecture and Tectonics in Oslo, Norway, innovation fellow at the University of Sydney and honorary fellow of the Institute of Advanced Studies at the Technical University in Munich. He has co-pioneered research by design, experimental and computational design in architecture since 1994. Primary research interests include performance-oriented architecture, embedded architectures and architecture and environment integration, advanced data-driven design, as well as alternative approaches in sustainable and regenerative design. His work is multi-scalar and located in the intersection of architecture, landscape architecture, urban design, micro-climatology and ecology.

Embedded Architectures

Data-driven Design en Route to Architecture and Environment Integration

This talk introduces the notion of embedded architectures which links architecture, landscape architecture, urban design, micro-climatology and ecology in a multi-scalar and multi-domain approach. While performance-oriented architecture frequently addresses architecture and environment interactions, the notion of embedded architectures takes this approach further towards architecture and environment integration. This extends the question whether architecture can be in the service of the bio-physical environment to how architecture may be an integral part of the bio-physical environment. At the same time environmental data that can support computer-aided analysis, simulation, modelling and design becomes increasingly available or reasonably easy to acquire. The talk discusses potentials and difficulties of data-driven design en route to architecture and environment integration.

Keynote 4



Discussion about the forthcoming book

ATLAS OF DIGITAL ARCHITECTURE

Ludger Hovestadt, Urs Hirschberg, Oliver Fritz (Editors)
with Sebastian Michael

Digital technology and architecture have become inseparable, with new approaches and methodologies not just affecting the workflows and practice of architects, but shaping the very character of architecture.

In this compendious work, two dozen university professors and lecturers share their vast range of expertise with writer Sebastian Michael who assembles it into an array of engaging, episodic chapters.

Structured into six parts, the Atlas offers students an orientation to the myriad ways in which computers are used in architecture today, such as: 3D Modelling and CAD; Rendering and Visualisation; Scripting, Text & Code; Digital Manufacturing and Model Making; GIS, BIM, Simulation, and Big Data & Machine Learning, to name but these.

Throughout, the Atlas provides both a historical perspective and a conceptual outlook to convey a sense of continuity between past, present and future; and going beyond the confines of the traditional textbook, it also postulates a theoretical framework for architecture in the 21st century.

The Atlas of Digital Architecture then understands itself as an invitation to the rich feast of possibilities and professional profiles that digital technology puts on the table today, and hopes to whet the reader's appetite for exploring and sampling their great potential.

Keynote 5



Shen-Guan SHIH

Shen-Guan is a professor teaching in the department of architecture in National Taiwan University of Science and Technology. His research interest is diverse, but information is always the driving force for all works. He is the chairman of Chinese Public Work Engineering Information Association. The association has been continuously developed and maintained the Geographic Information System for Taipei city government since 1989. From 2009, they developed a building information modelling code checking system for Taipei and New Taipei city governments. They integrated GIS and BIM to check building codes that depends on urban context, provide and analyze information that is derived from the integrated system for city governance. The development continues onto the administration of construction and operation phases of construction projects. The vision is to build up an information platform for smart city.

Coding and Decoding of Architecture

Architecture is a process of communication that involves multi-level coding and decoding. The talk proposes a view of architecture based on the model of communication proposed by Claude Shannon and Warren Weaver in 1948. Information is the driving force of everything. Information is a kind of quantifiable property of data, which has to be stored and transferred by physical substances such as photons, electrons, papers, pigments, and buildings. The entire building life-cycle can be understood as nested processes of encoding and decoding. Coding is for finding the most efficient way to uncover the uncertain. Decoding is to build up the certain based on what is coded. Design can be viewed as a coding process that converts the client's request to drawings, and construction is the decoding that converts drawings to buildings. Shannon-Weaver's communication model and measurement of information inspires thoughts about architectural programming, design process project collaboration, constructability... and so on.

DAY 1 Thursday October 24th

5th ARENA Annual Conference | DR_SoM Session 7
October 24th – 27th 2019 Graz University of Technology, Austria

- 13:00 Welcome
- 13:30 Keynote 1
 "State and Ability"
 - Kristina SCHINEGGER
- 14:30 Session 1
 Digital Fabrication
- COEBRO
 Robert SCHMID, Georg HANSEMANN
 - Hands On
 Florian FEND
 - Fab Toolbox, replicating of crafts in digital prototyping workflows
 Ali MIRAKBARI
- 15:45 *coffee break*
- Sensitive design education in a digital environment: construction of a novel framework for design and fabrication issues
 Frederic DELVAUX
 - Shape Grammar Study on the Geometry Formation of Chinese Ice-ray Lattice
 Yi Joy ZHOU
 - InBetween - a post-digital turn
 Verena ZIEGLER
- 18:00 Keynote 2
 "Digital design, innovation and the Graz Kunsthaus"
 - Colin FOURNIER
- 20:00 Dinner at Restaurant Laufke

DAY 2 Friday October 25th

- 09:00 Keynote 3
 "Embedded Architectures"
 Data-driven Design en Route to Architecture
 and Environment Integration
 - Michael HENSEL
- 10:00 Session 2
 BIM + Simulation
- A New Workflow for Generating Energy Simulation
Models using Topologic and BHoM
Wassim JABI, Michal DENGUSIAK
 - Deep Architecture Machine
Martin EMMERER
 - Innovations in Architecture: Role of Digital Technologies
and Research in Contemporary Practice
Ajla AKSAMIJA
- 11:15 *coffee break*
- A collaborative eco-design process using
parametric tools with BIM.
Charlotte DAUTREMONT
 - Data-driven materials research on ecological prototypes
for architecture
Defne SUNGUROGLU HENSEL
 - Mies meets Bytes
Johan VAN ROMPAEY, Camilla MARINI, Georg THEISEN
- 13:00 Lunch

DAY 2 Friday October 25th

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- 14:30 Session 3
AI + Machine Learning
- A shift from modes of representation to modes of simulation in the architectural design process
Yasha GROBMANN
 - Atlas of indexical cities: Articulating specific city models on generic infrastructural ground
Diana ALVAREZ-MARIN
 - Panoramas of Cinema
Jorge OROZCO
- 15:45 *coffee break*
- Machine Learning for Architects and Designers
Adam SEBESTYEN
 - Alice
Miro ROMAN
 - Generative Design Software
How does digitalisation change the professional profile of architects?
Oliver FRITZ
- 18:00 Keynote 4
editors and authors talk about the forthcoming book:
ATLAS OF DIGITAL ARCHITECTURE
with
Sebastian MICHAEL
Oliver FRITZ
Ludger HOVESTADT (per skype)
Urs HIRSCHBERG (moderator)
- 20:00 Conference Dinner

DAY 3 Saturday October 26th



14:30 Guided Architecture Tour Graz

or

ARENA Meeting

20:00 15 YEARS IAM
celebration and party at Kronesgasse 5 DG



Excursion to Steinhaus by Günther Domenig



On Sunday October 27th conference participants are invited on a bus trip to visit the Steinhaus at Ossiachersee (Carinthia) by Günther Domenig (1934-2012). Domenig was an alumnus and a faculty member of Graz University of Technology. He gained international fame for his idiosyncratic expressionist buildings, such as the Z-Sparkasse in Vienna (1979), or the Documentation Center Nazi Party Rally Grounds at Nürnberg (2001), for which he was awarded the Golden Lion at the Venice Architecture Biennale in 2004. The Steinhaus, a long-time personal project he worked on between 1986 and 2008 is considered his opus magnum. The visit will feature a guided tour and a musical performance.

Time permitting we will make a stop at the Wörthersee Football Stadium in Klagenfurt, which is currently host to Austria's largest public art installation to date. Titled 'FOR FOREST – The Unending Attraction of Nature', the artwork transforms the stadium into a native central European forest.

DAY 4 Sunday October 27th

EXCURSION TO STEINHAUS

at Ossiachersee by Günther Domenig

- 09:00 BUS LEAVES FROM TU GRAZ
please arrive on time!

- 11:00 FOR FOREST ART INSTALLATION
at Wörthersee football stadium

- 12:00 STEINHAUS GUIDED TOUR
at Ossiachersee

- 13:00 MUSICAL PERFORMANCE

- 14:00 DEPARTURE

- 16:30 ARRIVAL GRAZ
(drop-off at Graz airport possible)

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