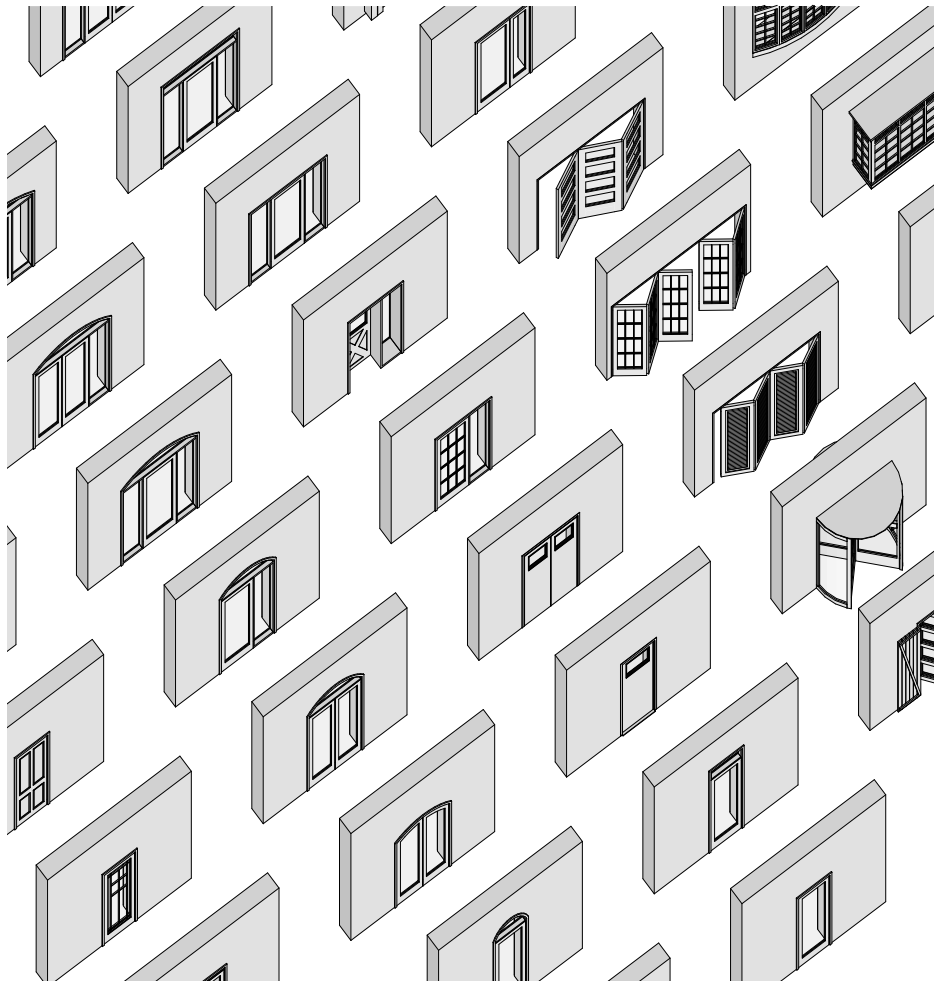


# Standard Architecture From Durand to BIM

Friday, 20th October - Sunday, 22nd October 2017

Deutsches Architekturmuseum, Frankfurt am Main

Department of Architectural Theory and Design, University of Kassel



## Impressum

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Schaumainkai 43  
60596 Frankfurt/Main  
[www.dam-online.de](http://www.dam-online.de)

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Department of Architectural Theory and Design  
Universitätsplatz 9, Gebäude ASL 1  
University of Kassel  
[www.uni-kassel.de/go/ath](http://www.uni-kassel.de/go/ath)

Concept: Prof. Philipp Oswald, Dipl.- Ing., Mag. Phil. Jan Bovelet, Dipl.-Ing. Kilian Enders

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# Introduction

Standardization has played a key role in architecture and construction since the Enlightenment. It accelerates building production, reduces costs, and assures quality control, at least in theory. The classical modernists of the twentieth century treated standardization and normalization as engines of social and technical progress. Despite claims to cultural specificity, standards continue to shape processes and products all around the world through the formalization of cognitive and material processes.

This symposium event will trace the development of standardization in architecture over the last two hundred and fifty years; with this as a basis, it will also address contemporary developments such as BIM (Building Information Modelling). With a focus on how standards influence or shape the design process, the symposium is organized in thematic sessions.

## Standardized Design Processes

Modernity has given rise to processes that rationalize, systematize, and accelerate the designing of buildings. More structures need to be built more quickly all the time. Designs are often executed by unskilled or semiskilled workers. Buildings are being erected in disparate places around the world through the use of identical specifications. To make all this possible, design tools have been created that enable people to generate and implement a great number of design-related tasks simultaneously. Today, Building Information Modeling Systems (BIM) use standardized forms of information to automate planning and design and to supplement human with artificial forms of intelligence.

## Standardized Building Elements

Ernst Neufert tried to standardize architecture at all scales, from the very small to the very big. Adopting paper formats as his model, he sought to systematize building components using (among other means) his octametric

system of dimensional coordination. This project reached its climax in the 1970s, but lost a good deal of its currency in the years thereafter. Today, there are more standards than ever—and they often operate on a national and international level—but their influence on form-making has proven harder to trace. It goes without saying that they continue to shape the design of spaces that have a great number of technical needs and requirements (kitchens and offices, for example), as well as temporary buildings and storage facilities (containers and container ports, for example).

### **Standardized Building Processes**

While knowledge rested squarely with the individual producer in pre-modern societies, it can be said that it is anchored today in objectified rules and specifications, many of which are sanctioned by liability concerns and multi-national contractual agreements. Arguably, standardization ensures that products that are manufactured by different companies are in fact compatible. This is important where the manufacturing of building components is concerned. According to some, however, it can also stifle innovation and compromise the exercise of know-how and common sense. Drawing on the results of the symposium, ARCH+ will publish a special issue dedicated to the topic.

Drawing on the results of the symposium, ARCH+ will publish a special issue dedicated to the topic.

# Conference program

## Friday, 20th October 2017

10.00 a.m.

**Welcome**

Peter Schmal, Director DAM; Prof. Philipp Oswalt

10.15 a.m.

**On the ambivalence of standards. From normality to norm and back again?**

Dr. Robert Kaltenbrunner

## Young Researcher Forum

### 1. Standardized Construction

10:45 a.m.

**Beaux-Arts Esperanto: Toward a Universal Language of Global Polity, c. 1913**

David Bijan Sadighian, M.A.

11:05 a.m.

**The industrial treatise: how nineteenth-century pocketbooks built the architect**

Erik Carver, M.Arch., M.Phil.

11:50 a.m.

**The Standard Vernacular: Processes and Practices Beyond the Plan Factory**

Paula Lupkin, PhD

12:10 p.m.

**Vyacheslav Oltarzhevsky's 1947 Dimensional Handbook for the Architect: Espionage and Reconstruction in the USSR**

Samuel Delehanty Omans, M.A.,

12:30 p.m.

**Discussion. Moderation: Kilian Enders and Nader Vossoughian**

## 2. Standardized Planning

2:00 p.m.

**Standardizing the Business of Building: Management and Marketing in The Architect's Handbook, 1963–1988.**

Michael Abrahamson, M.Arch.S. in Criticism

2:20 p.m.

**Experimental school construction and the logic of the grid. The schools of Jean Prouvé after 2nd World War**

Adrian Leander Pöllinger, MSc.

2:40 p.m.

**Cold War Prefabrication Fever.**

Juliana Kei, M.Arch.

3:00 p.m.

**Standardizing Jurisdictional Interlock: Prefabricated Steel Houses, Labor, and Automation in Postwar America, 1943–1968**

Manuel Shvartzberg Carrió, M.A., M.Phil.

3:20 p.m.

**Open Prefabrication / Open Specification: Freedom for Aesthetic Concerns, or Freedom from Social Liability?**

Tijana Stevanović, M.A., Grad.Eng.Arch. (M.Arch)

3:40 p.m.

**Discussion. Moderation: Philipp Oswalt and Jan Bovelet**

## 3. Effects and Deviations

5:20 p.m.

**Minimal Standards: the South African Building Research Institute and the NE-51/6 House, 1947–1952**

Rixt Woudstra, M.A.

5:40 p.m.

**Deviations from a standard: exposing a greenboard ceiling at the McCormick Tribune Campus Centre**

Mhairi McVicar, PhD

6:00 p.m.

**Germany's most normal town**

Dipl.-Ing. Marcin Daniel Ganczarski, M.Phil.

6:20 p.m.

**Discussion. Moderation: Philipp Oswalt and Jan Bovelet**

# Saturday, 21 October 2017

9:30 a.m.

**Introduction**  
Prof. Philipp Oswalt

## Designing Standardized

### A. Historical Foundations

10:00 a.m.

**The Introduction of Standard Systems of Measurement in the Enlightenment**  
Prof. Dr. Aashish Velkar

10:30 a.m.

**Jean-Nicolas-Louis Durand's Development of Standard Types**  
Prof. Dr. Antoine Picon

11:00 a.m.

**The DIN Format**  
Prof. Dr. Markus Krajewski

11:45 a.m.

**Processes of Standardization / Standardizing the Standard (History of DIN)**  
Dr. Matthias Witte

12:15 p.m.

**Discussion. Moderation: Prof. Philipp Oswalt and Christa Kamleithner, Institute for Art History and Historical Urban Studies UDK**

### B. From Neufert to BIM

2:30 p.m.

**Rapid Design with Ernst Neufert**  
Dr. Gernot Weckherlin

3:00 p.m.

**Expert systems**  
Prof. Dr. Christian Kühn

3:30 p.m.

**BIM—the architect's perspective**  
Dr. Alexander Rieck

4:00 p.m.

**Standardization by Scripting**  
Prof. Thomas Auer



5:00 p.m.

**BIM - the engineer's perspective**  
Prof. Manfred Grohmann

5:30 p.m.–6:30 p.m.

**Discussion. Moderation: Jan Bovelet and Kilian Enders**

## **Sunday, October 22, 2017**

### **Building standardized**

#### **A. Standardized Building Elements**

9:30 a.m.

**Ernst-Neufert and the Octametric System**  
Prof. Dr. Nader Vossoughian

10:00 a.m.

**Standardization in hospital design and construction**  
Dipl.-Ing. Hieronimus Nickl

10:30 a.m.

**The Normed Office**  
Assistant Professor Hyun-Tae Jung, PhD

11:30 a.m.

**Fritz Haller and Total Planning**  
Prof. Dr. Georg Vrachliotis

12:00 p.m.

**Discussion. Moderation: Kilian Enders and Christa Kamleithner**

#### **B. Standardized Processes**

2:00 p.m.

**The Container Principle**  
Alexander Klose

2:30 p.m.

**Standards and regulations in the design of innovative facades**  
Prof. Dr. Daniel Pfanner

3:00 p.m.

**Standardization on Site: skill and the construction process in mid-twentieth century Britain**

Dr. Christine Wall

4:00 p.m.

**Failed Standard: The Case of Grenfell.**

Samuel Webb

4:30 p.m.

**Discussion. Moderation: Jan Bovelet and Philipp Oswalt**

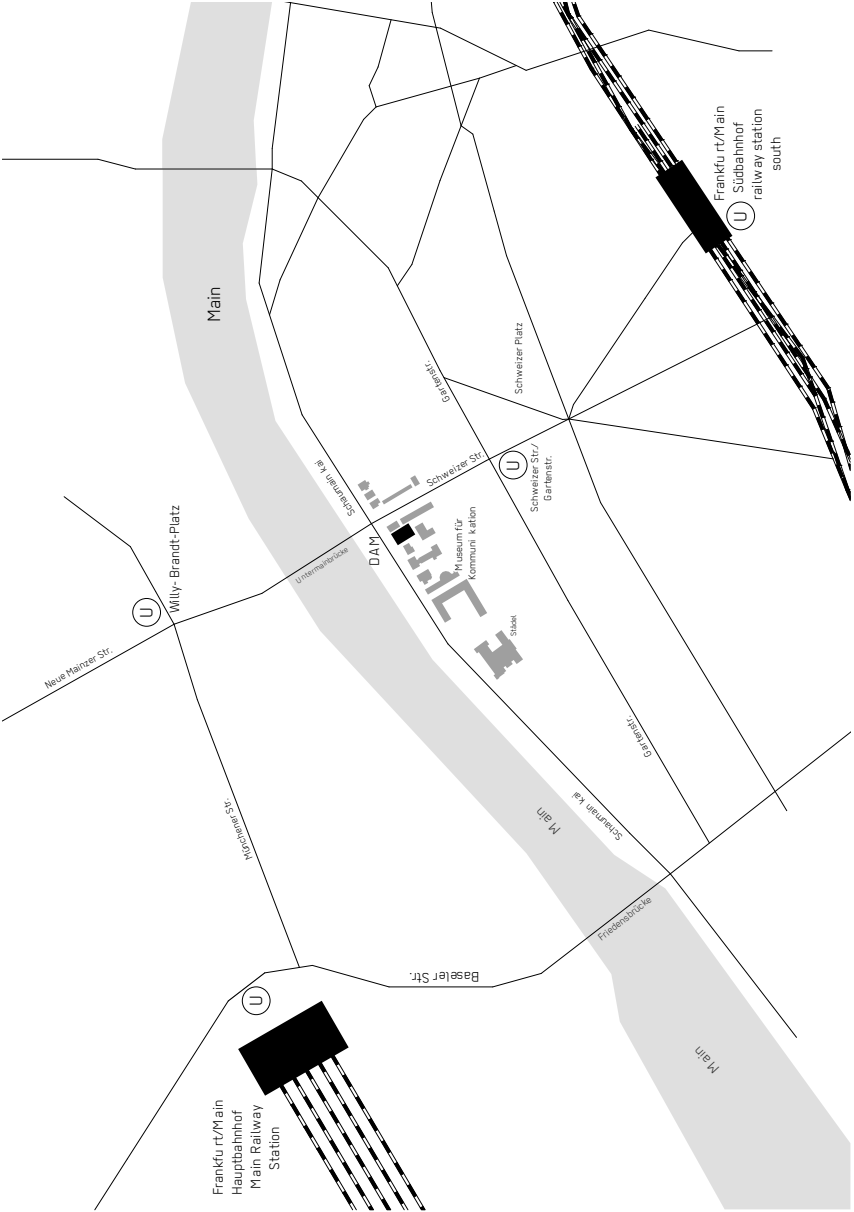
6:00 p.m.

**Standardized thinking? Introductory notes: Georg Augustin**

The presentation will be followed by a discussion with Ministerialdirektorin Monika Thomas (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit), Prof. Manfred Grohmann, and Prof. Dr. Antoine Picon. Moderators: Kilian Enders, Philipp Oswalt

# VENUE

Deutsches Architekturmuseum  
Schaumainkai 43  
60596 Frankfurt/Main



**Abstracts 1st Day**

**Young Researcher Forum**

## Opening address

# On the ambivalence of standards. From normality to norm and back again?

Dr. Robert Kaltenbrunner, BBR

This event is focused on standardization in the design and building process and its effect on the production of architecture. The Federal Institute for Research on Building, Urban Affairs and Spatial Development (Bundesinstitut für Bau-, Stadt- und Raumforschung, BBSR) is supporting this symposium as part of its Future of Building Research Initiative, because we hope it will contribute to technical and ecological improvements in the quality of building. And because we too find it necessary to question the effect of normative guidelines, especially against the backdrop of the introduction of Building Information Modeling (BIM). Moreover, questioning the regulation mania has, after all, undergone a kind of institutionalization even in politics, for example, on the federal level, the cost-reduction committee as part of the Alliance for Affordable Building and Housing (Bündnis für bezahlbares Wohnen und Bauen ). At least rhetorically, norms and standards are being put to the test everywhere. But astonishingly little is happening.

I would first like to approach the subject by encircling it. When scientists publish their data, they are typically average values. But as human beings we are much more interested in deviations than in averages. And something else: in the sociopolitical sense, “norm” is no longer a fictive quantity. That is significant because we tend to translate “average” with “norm” and then with “normal” or “ideal.” As a result, everything we regard as normal or ideal will always be outside our reach. All of us deviate from the norm, from a value that is ultimately an artificial, static construct that does not actually exist.

Admittedly, other rules apply in the human sphere than in the technical realm. Just try sometime to build a tower by stacking irregular stones. Take fairly round stones from a riverbank. A two-year-old child will be able to stack two stones; a three-year-old with better-developed eye-hand coordination will manage three. It requires experience to get to eight stones. Only with enormous skill and a lot of trial and error, will you get to more than ten. Dexterity, patience, and experience reach their limits at some point. Now try the same experiment with Lego bricks. You can build things much taller, and more important: your three-year-old can build them just as tall as you. Why?

Thanks to standardization. The stability results from the standardized geometry of the individual parts. The advantage that dexterity provides shrinks enormously. The geometry of the Lego bricks corrects the imperfections of the hand. But structural stability is not the biggest bonus of standardization by far. The benefit to collaboration between people is incomparably more important.

Recently, however, standardization has gotten a bad reputation: the euro, standards for teaching materials, standardized tests—suboptimal standards seem very tenacious. Standardization hampers creativity, it is said, and it reduces diversity. But perhaps that is just a myth or a prejudice. Are we systematically underestimating the power of standardization?

Here are two examples:

(1) Program of standards for the environment: Ernst Neufert

I think that exposing this strand in the roots of our architectural culture is long overdue. For more than anyone else, Ernst Neufert (1900–1986) embodies the contradictions of the modern era, between emancipation, social hygiene, and totalitarianism. A student of the Bauhaus who later rose into the ranks of the experts working for Albert Speer, the chief building inspector of the National Socialists, but the one thing was linked to the other: the visual sobriety and well-thought-out functionality of his architecture conveyed a faith in the future, the victory of rationality, minimum standards of prosperity for all, and cultural emancipation for people by means of technology. And standards were for him a decisive tool to make the avant-garde dream of the 1920s—the unity of technology and culture—reality.

Neufert's mania for standards had unmistakable consequences: Without having any specific responsibility to do so, or even wanting to have it, he was an important trailblazer for the oft-maligned construction functionalism from the 1950s to the 1970s. His *Bauelemente* (translated as *Architects' Data*) can be read as reduction to the most concrete: the human need for buildings in the most diverse contexts of use and space. It may be that the fundamentals of measurements for his standardized floor plans—for example, the turning radius of a housewife with a frying pan—no longer conform to our self-image as a society. But: "Efficient structures and qualified machines for living in" are still desired. Neufert the man and his work demonstrate that the "heroic" history of modern architecture cannot be separated from normative aspects.

(2) To address the severe housing shortage after the destruction of the Second World War and the inflow of refugees and displaced people from the German-speaking regions of the East to West Germany, as part of and with funds from the Marshall Plan, and as decided by the American military administration, several housing projects were built in the early 1950s. In 1951, the Federal Ministry of Housing organized a project competition for teams of architects and construction companies. The goal of the competition was to introduce cooperative working practices and to test innovative construction technologies that could not previously be employed in Germany because of building codes and requirements.

It was held in fifteen German cities (Aachen, Reutlingen, Stuttgart, and Nuremberg, among others). Zones exempt from building codes and standards were created in these cities to maximize the freedom to develop innovative working practices and construction technologies. New technologies were established as a result (aerated concrete, prefabricated ceiling systems, light construction, etc.). The elimination of the separation of planning and building could not be introduced as an organizational form in Germany because of resistance from the Chambers of Architects, among other reasons. On the whole, however, the results of these competitions did not greatly influence the formulation of the Housing Act of 1956. I am of the view that this competition should be repeated in a similar form to explore innovative approaches and test them in practice (living labs).

In summary, a condensation into two questions:

(1) Does standardized construction represent the death of individuality? Under the headline “Imagination contra Norm: Alternative Construction,” one could recently read in *Die Zeit*: “The critique of off-the-rack, boxy residential architecture, which is expensive, boring, and slavishly bound to standards, has long since been an integral part of the new youth culture.” That may seem terribly exaggerated but presumably many people see it that way. Is the accusation justified? Or to put it another way: What place does standardized building have in a social environment that is striving for individuality and personalization?

(2) Is digitalization the beginning of the end of norms? Norms in the construction industry have, after all, been introduced in part to make planning and building processes consistent and to speed them up. Mass-produced construction elements are considered especially cost-effective and guaranteed quality. Uniform installation also lowers the susceptibility of a structure to

damage. Digitalization is not, however, subordinate to these ideas: Construction components can be manufactured quickly and cheaply as unique objects in similarly large runs; repetition as the basis for inexpensive manufacture is superfluous in a digitalized construction world. With advances in automation, installation will become less imperfect as well. In other words: Will we need standardized design and construction at all in the future?

Ultimately, a completely digital processing chain will permit “mass production of single pieces.” In contrast to the approaches of the mass-produced construction of the twentieth century, for the first time we will have the opportunity to harmonize industrial production methods with the always individual interaction of building, site, and user. The question of how the building industry, with its specific requirements and conditions, will respond to these possibilities will have to be explored, as well as the effects on the design principles of architecture in the twenty-first century. What role can planning still play in a networked production made possible by computerized and self-optimizing design? Or will, on the contrary, the greater complexity made possible by digitalization lead to architects having more control over processes?

Conclusion: With this question, we are moving on disputed and somehow uncertain ground. But it certainly pays to keep at it ...

Dr. Robert Kalttenbrunner studied Architecture and Urban Development at TU Berlin. Between 1990 and 1999 he was project manager for residential constructions at a large scale for the Senate Administration for Building and Housing in Berlin. Since 2000 he is the head of the Department for Building and Housing at the Federal Institute for Building, Urban and Regional Research (BBSR) at the Federal Office for Building and Regional Planning (BBR).



## Beaux-Arts Esperanto, ca. 1913

Fr., 10:45 a.m.

### David Sadighian, M. Env. Des., M.A.

This paper explores the cultural perception of Beaux-Arts design as a universal language in the decades prior to the First World War. By the early twentieth century, methods of “composition” taught in the architecture section of the Paris École des Beaux-Arts provided the standard pedagogy for new architecture schools throughout Europe and the Americas. I situate Beaux-Arts composition in relation to other so-called universal languages and systems of the period, most notably Esperanto: a constructed European language intended to counter rising nationalist tensions. I argue that Beaux-Arts composition and its principles of organization acquired a similar agency, becoming the lingua franca for the design of new institutional buildings and complexes devoted to supranational knowledge, communication, and governance. Offering case studies from my in-progress dissertation, I elucidate how architecture set a horizon for internationalism and its vision of a global polity—while Europe was on the brink of total war.

David Sadighian is a Ph.D. candidate at Harvard University – expected to be completed in 2019 – with Alina Payne as his primary advisor. He holds a Master in Environmental Design from the Yale School of Architecture, History of Architecture and Urbanism, and a Master of Arts in History of Art and Architecture from the Harvard University Graduate School of Arts and Sciences.

## **Imperial Standards: the industrialization of architectural facts c.1810-1870**

Fr., 11:05 a.m.

Erik Carver, M.Arch., M.Phil.

Standardization, whether de facto or de jure, begins by translating local knowledge. Nineteenth-century architects achieved this via a communication system that centralized information and consolidated construction practices in the service of imperial and neo-imperial commerce.

From the 1810's in England and 1860's in the US, state-led shifts to general contracting meant the quantification and transformation of construction documents, as details and specifications proliferated to determine buildings in advance. Key to this were architect and engineer's pocketbooks. They combined vade mecums with treatises and catalogs to mediate between theory and practice with advice, formulas, and data for mobile professionals. They later formed the basis of graphic standards and, with specifications, of early architectural computing.

But even as this process homogenized practice, it proliferated variety and inspired elite architects to draw upon personal images as they sought to recover the local.

Erik Carver holds a Master of Philosophy in Architectural History at the Columbia GSAPP and a Master of Architecture from Princeton. Between 2006 and 2010 he taught design and theory at the Rensselaer Polytechnic Institute (RPI). He has taught at the Rhode Island School of Design (RISD) since 2016. He led research for the exhibitions "Living in America" at the Wal-lach Gallery in 2017 and "House Housing" at the MAK Center in LA in 2016. He and Janette Kim published the book *The Underdome Guide to Energy Reform* in 2015.

## **The Standard Vernacular: Processes and Practices Beyond the Plan Factory**

Fr., 11:50 a.m.

Assistant Professor Paula Lupkin, Ph.D.

In the first two decades of the twentieth century a new approach to design emerged in the United States: the standard vernacular. This term refers to a set of processes, organizational strategies, and codifications intended to quickly and efficiently produce the everyday landscape of modernity. A range of professionals in architecture, interior decoration, contracting, and accounting rationalized the design and building process, introducing bureaucratic methods, graphic standards, and bulk purchasing. Historians have dismissively referred to these innovative adaptations as “plan factories.” This paper seeks to reassess this cultural and economic phenomenon as an important chapter in the history of standard architecture. It traces the development of the standard vernacular through three interconnected examples: the Hoggson Building Method (1910), the YMCA’s in-house Building Bureau (1919) and Ramsay and Sleeper’s Architectural Graphic Standards (1932).

Paula Rachel Lupkin, Ph.D., is an Assistant Professor at the University of North Texas at the Department of Art Education and Art History since 2012. Before she was Assistant Professor at the Washington University in St. Louis between 2000 and 2009. She holds a Ph.D. in History of Art from the University of Pennsylvania and an A.B. degree awarded cum laude.

## **Vyacheslav Oltarzhevsky's 1947 Dimensional Handbook for the Architect: Espionage and Reconstruction in the USSR**

Fr., 12:10 p.m.

Samuel Delehanty Omans, M.A.

Building codes are the legal matter of architecture, government bylaws that endorse some designs while forbidding others. As such, code occupies a unique position on the interface of design and architecture social contract; mapping the system of constraints in which designers knowingly work. During the immediate aftermath of World War II, several European architects (including Ernst Neufert in Germany and Italian members of the Consiglio Nazionale delle Ricerche) published national standards for the reconstruction of war-torn cities. In the Soviet Union, this task fell to architect Vyacheslav Oltarzhevsky, head of the Federal Bureau of Scientific and Technical Information. His 1947 *Gabaritnyi spravochnik arkhitekatora* (Dimensional Handbook for the Architect) illustrated codes and recommendations for new construction. Mostly forgotten today, the book was the first Soviet Union-wide effort to standardize the construction of public buildings, a practical but also ideologically significant task in architecture's promise to communism.

My paper explores the substance of Oltarzhevsky's compelling manual in its context of creation: a surprising story of architectural espionage. U.S. government documents (requested by me under the Freedom of Information Act) attest that from 1924-1943, the years leading up to the manual's publication, Oltarzhevsky lived as a Soviet spy embedded in New York city's architectural culture, working at the firm of Helme, Corbett and Harrison and teaching on the design faculty of Columbia University. Oltarzhevsky honed intimate knowledge of American technical and planning standards. One of the primary tasks of his 1947 manual was to translate these into the context of Soviet post-war austerity. Oltarzhevsky's case attests to the perceived value of building standards as intellectual property in the cold war geopolitical arena and gives us an early view to efforts at realizing architectural standardization in the USSR.

Sam Omans is a PhD candidate and Robert Lehman Fellow at the Institute of Fine Arts, New York University. His dissertation, entitled *El Lissitzky: Architecture as Spatial Form 1909-1941* is supervised by Prof. Jean-Louis Cohen. Prior to beginning his PhD Sam trained as an architect at the Cooper Union for the Advancement of Science and Art

## **Standardizing the Business of Building: Management and Marketing in The Architect's Handbook, 1963-1988**

Fr., 2:00 p.m.

### Michael Abrahamson, M.Arch.S. in Criticism

For US architects, The Architect's Handbook of Professional Practice has since its appearance in 1920 provided basic instructions for the day-to-day functioning of architecture firms. It contains standardized forms and contracts that serve as the rudimentary business tools of the architect's trade, alongside narratives that routinized the role of architects within the building process. Tracing revisions and updates to the Handbook from 1963-88, I analyze it as a bellwether of standardization in the business of building design. During these years, significant changes arose within the realms of marketing and management. Providing new guidance on internal firm issues like hiring and payroll, as well as outward challenges like client relations and litigation, Handbook revisions reveal the waning of the standard professional ideology guiding US architects. This was an ideological redesign of architecture, so that success depended less on technical expertise and more on business acumen.

Michael Abrahamson is a PhD Candidate at the Taubman College of Architecture and Urban Planning, University of Michigan. Trained as both a designer and critic, his writing has appeared in magazines like The Architectural Review and CLOG, academic journals like San Rocco and Project Journal, and newspapers including The Sunday Times. Michael's dissertation project is the first rigorous critical analysis of the important Detroit based architect Gunnar Birkerts (1925-).

## **Experimental school construction and the logic of the grid. The schools of Jean Prouvé after 2nd World War**

Fr., 2:20 p.m.

Adrian Leander Pöllinger, MSc.

Norms, standards and types are mainly not result of isolated individual decision but the accumulation of long-term developments. This presentation will trace how elements of the avant-garde school buildings from the early decades of the 20th century are linked to what was defined as «standard type» school buildings in the postwar era in France by looking at the œuvre of the constructeur Jean Prouvé.

From his collaboration with the architects E. Beaudouin and M. Lods in the project of the open-air school in Suresnes (1931 to 1934) to the «École Standard» (from 1950), his contribution can be mainly seen in the conception of buildings as confined units, the shifting of the definition of building parts and the functional correspondence of the classroom and its furniture.

Jean Prouvé's proposed a method of selection, limitation and exclusion that differs from most processes of standardization in its constant revision of the output.

Adrian Leander Pöllinger studied architecture at the ETH Zurich from 2008 to 2014. Since 2014 he's a research assistant at the Chair for Architecture and Construction by Prof. Markus Peter at ETH Zurich and is responsible for several research topics. In April 2017 he started writing his dissertation on the topic Jean Prouvé - Experimental school constructions 1932 -1972, supervised by Prof. Markus Peter and Prof. Dr. habil Anne-Marie Châtelet and funded by the Swiss National Science Foundation.

## Cold War Prefabrication Fever

Fr., 2:40 p.m.

Juliana Kei, M.Arch.

In 1961, the International Union of Architects (UIA) held its 6th Congress in London, under the theme “Architecture of Technology.” At a time of high Cold War tension, the UIA hoped to foster an “architectural diplomacy” through standardisation.

Standardisation in architecture, for the participants, exemplified genuine rationality, efficiency, and flexibility. More significantly, it offered a way for architects, from both “blocs”, to evaluate and evade past stylistic blunders: International Style architecture in the West and Social Realism of the Stalinist era. They reached a consensus that standardisation would be the predominant architecture of the future, and it was coined “the style of truth.” The problem at stake was that due to this semantic and ideological shift, standardised architecture later became the scapegoat for various injustices in planning and housing policies. This paper, through examining the historical forces that articulated standardisation as “the style of truth,” hopes to offer a cautionary tale on the blatant pursuit of “truth” and “rationality” in architecture.

Juliana Kei is a PhD candidate in History of Design at the Royal College of Art. Her research explores the role of tradition in Post-War British architecture, through an intellectual biography of Theo Crosby, founder of Pentagram design. Her other research interests include animals escapes from zoos as a means of unfolding our changing modernity. Her was awarded the M+ Museum Design Research Fellowship in 2016. Juliana is a registered architect in Hong Kong, has teaching experience from the University of Hertfordshire, the University of Hong Kong, and Columbia University.



## **Standardizing Jurisdictional Interlock: Prefabricated Steel Houses, Labor, and Automation in Postwar America, 1943–1968**

Fr., 3:00 p.m.

Manuel Shvartzberg Carrió, M.A., M.Phil.

This paper explores the division of architectural labor through the case study of steel prefabricated housing, positing that the role of the architect in postwar America was chiefly one of standardizing and homogenizing distinct areas of jurisdiction. As such, the key jurisdictional interlock achieved by modernist architects was that of turning the traditionally-rarefied skills of architects into a standardized master-science of logistical coordination that would be capable of assembling corporate growth seamlessly into the growth of the national economy. The promise of this interlock was not only national jurisdictional coherence across markets and territories (from particular design skills, to labor markets, to building components, to regional housing markets), but also, to enshrine the architect at the top of the design process hierarchy. In its most extreme form, this coherence came at the expense of unskilled manual labor in general, through the deployment of design techniques for automating construction in the factory and the building site.

Manuel Shvartzberg is an architect and a scholar, currently based at Columbia University in New York City where he runs the Architecture Thesis for the Masters of Science in Critical, Curatorial, and Conceptual Practices in Architecture (CCCCP) program. At Columbia, he is also a researcher at The Temple Hoyne Buell Center for the Study of American Architecture, a candidate in the PhD in Architecture program, and a Graduate Fellow of the Institute for Comparative Literature and Society.

## **Open Prefabrication / Open Specification: Freedom for Aesthetic Concerns, or Freedom from Social Liability?**

Fr., 3:20 p.m.

Tijana Stevanović, M.A., Grad.Eng.Arch. (MArch)

IMS system of 'open prefabrication' has been a synonym for booming housing construction in post-war New Belgrade. In 1958, its engineer, Branko Relj, reasoned that construction industry in most countries did not produce specific technical regulations but only instructions due to the belief that thus, freedom in design would be less limited by technologies. Belgrade architects insisted that limited number of standardised components in 'open systems' provided more design choices for diversity of finishes and materials, thus evaluating IMS as inherently superior to any 'closed system'. This paper analyses architects' debates on housing in New Belgrade centred on self-managed user, arguing that favouring open prefabrication then as much as the open (performance) specification today cannot be regarded as mere reflections of freedom for the designer's poetic gesture or user's participation. Rather, they demonstrate wider social relations and architects' reluctance to engage in legislation akin to ideological mistrust in regulation.

Tijana Stevanović is a Lecturer at the Canterbury School of Architecture, University for the Creative Arts and a Teaching Fellow at the Bartlett School of Architecture, University College London. Her current PhD thesis in Architectural Theory and Criticism at Newcastle University researches Yugoslav self-management's conditioning of architectural industry in post-war New Belgrade. Tijana works in art collaborations and, among other places, exhibited her work at Venice Biennale of Architecture.

## **Minimal Standards: the South African Building Research Institute and the NE-51/6 House, 1947–1952**

Fr., 5:20 p.m.

Rixt Woudstra, M.A.

How much space does a person need to live? This paper examines the relation between the standard and the idea of a ‘minimum’ in affordable housing design. Between 1947 and 1952, the South African National Building Research Institute conducted extensive research on minimum standards for housing nie-blankes, or ‘non-whites’. Moving towards a developmental attitude after the end of the war, the government assumed responsibility for housing the rapidly growing black population in cities such as Johannesburg. This paper explores how architects like Betty Spence, Paul Connell and Douglas Calderwood, using tools from sociology and drawing on European ideas about minimum standards—specifically the first CIAM conference in Frankfurt in 1929 on the Existenzminimum—translated human needs into spatial standards. As such, the concept of minimum standards, serving to cut down expenditure as much as possible as well as to preserve a minimum level of ‘decent human living’ occupied a precarious balance between a *modus vivendi* and a *modus non moriendi*.

Rixt Woudstra is a Ph.D candidate in the History, Theory and Criticism of Architecture at MIT, and currently a junior fellow at the Paul Mellon Center for British Art in London. Her work focuses on twentieth-century architecture, planning and design, with a specific interest in sub-Saharan Africa. She received a B.A. and M.A. in art and architectural history from the University of Amsterdam. Before coming to MIT, she worked on a variety of exhibitions at the Netherlands Architecture Institute in Rotterdam and Studio Lukas Feireiss in Berlin.

## **Deviations from a standard: exposing a greenboard ceiling at the McCormick Tribune Campus Centre**

Fr., 5:40 p.m.

Mhairi McVicar, Ph.D.

'The picturesque is now wrested from the homogenized, the singular liberated from the standardised', Rem Koolhaas wrote in 2001, as a six-page specification for a greenboard ceiling at OMA's IIT McCormick Tribune Campus Centre was in development. OMA's application of a prefabricated product eschewed the standard finish layer of paint, instead exposing the unfinished greenboard and spackled joints and screws. 'The installation', a Request for Information stated, 'is contrary to the manufacturer's recommendations. Please advise.' In response, the team specified the spacing, dimensions, tools and hand movements for the application of each spackled joint and screw, changing installers' roles from 'rough' to 'finish' craftspeople. Scrutinising precise documentations accompanying one OMA ceiling detail over a fifteen month period, this research examines the extraordinary care employed between a team as they sought to 'wrest the picturesque from the homogenized' in deviating from a standard.

Dr. Mhairi McVicar is a Senior Lecturer at the Welsh School of Architecture, Cardiff University, and practiced in the US and UK. Her research includes 'God is in the details/The detail is moot: A meeting between Koolhaas and Mies' in *Reading Architecture and Culture*; 'The production of the Commons: Mies van der Rohe and the art of industrial standardisation' in *Industries of Architecture*; 'Specifying intent at the Museum of Childhood' in *ARQ*; and a PhD on 'Precision in Architectural Production.'

## Germany's most normal town

Fr., 6:00 p.m.

Dipl.-Ing. Marcin Daniel Ganczarski, M.Phil.

The spatial appearances of norms and standards have been the subject of many research efforts. So far, they have been discussed mainly as idealized and isolated systems and not as complex and contextualized entities.

Within the urban discourse the impact of standards and norms on the development of urban peripheries has been widely recognised (Sieverts, Angélil), however, the underlying specific mechanisms and processes have rarely been investigated.

In fact, standards and norms have performed as the leading guides emancipating the urban space between the city centre and the rural landscape in the recent past.

The city of Siegen is an illustrative case study to investigate the qualities and potentials of such normative urban area. Due to its geographic location, topography, and particularly the specific history in industrial production and building culture, standards and norms have led Siegen to develop into what could be called "Germany's most normal city".

Marcin Ganczarski holds a Diploma in Architecture from the Technical University of Darmstadt and a Master of Philosophy in urban design and architecture theory from the Architectural Association in London. He worked as an architect with the Office for Metropolitan Architecture in Rotterdam, agps architecture, and E2A Architekten in Zurich. In 2014, he joined Reto Caminada Architekten and started teaching at the Chair of Prof. Dr. Marc Angélil at ETH in Zurich.



**Abstracts 2nd Day**

**Designing Standardized**

# Introduction of Standard Systems of Measurement in the Enlightenment

Sa., 10:00 a.m.

Prof. Dr. Aashish Velkar

The creation of decimal metric system of measurements c1790 was a watershed event in human history. The metric system is also one of the enduring legacies of the French Revolution and was a product of the Enlightenment. This lecture engages with four aspects that connect this history of measurement systems to design standards.

By creating the metric system 18th century scientists devised a measurement system based on fundamental 'natural constants', an Enlightenment goal. Measurement systems were historically largely anthropocentric, i.e. based on human artefacts or form. The metric reformers disconnected legal and scientific measures from human artefacts for the first time. Metric standards also became a truly 'global' measurement system used by majority of humans, with notable exceptions.

The obvious impact of the metric system on humanity was in science and technology. This 'technology of precision' also enabled material advances that most humans experience directly. The social, cultural and economic impact is less well understood. Metric standards have unalterably changed the way humans interact, communicate and relate to each other everyday. The standards are also a 'technology of coordination.' Governments have devised newer ways to rule, and govern public and private life. Here, standards act as a 'technology of governance.' Standards enabled a shared cognition and structure how most humans make measurements.

The quest for an absolute measurement system only began during the Enlightenment. This quest has contributed to the culture of objectivity and values of precision in science, technology, government administration and industrial enterprises. Standards made calculations more 'moral', i.e. equal and impervious to personal characteristics. But measurements lost the humanness with which humans measured objects they interacted with. The price of standardisation was the soul that connected objects with humans.

Modern societies can create infinite variety of design from a finite number of measurement standards, efficiently and productively. Global measurements



standards make designs culturally portable. Design standards may be developed from 'first principles' using basic mathematical tools. But measurement systems ensure the replicability of design if not its uniqueness.

Dr. Aashish Velkar is Lecturer in Economic History, University of Manchester, with a PhD from London School of Economics. He specialises in history of measurement systems and has published a monograph, *Markets and Measurements in Nineteenth Century Britain*. He has also published in various international journals and was Research Fellow at Princeton University (2014-15). His recent article in *Past & Present* 'Inching Towards the Metre', explores the cultural and political economy of measurement systems

Designing Standardized

# **Jean-Nicolas-Louis Durand's Development of Standard Types**

Sa., 10:30 a.m.

Prof. Dr. Antoine Picon

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Prof. Dr. Antoine Picon is the G. Ware Travelstead Professor of the History of Architecture and Technology and director of research at the Harvard Graduate School of Design GSD. He teaches courses in the history and theory of architecture and technology. Trained as an engineer, architect, and historian, Picon works on the history of architectural and urban technologies from the eighteenth century to the present. He has received a number of awards for his writings, including the Médaille de la Ville de Paris and twice the Prix du Livre d'Architecture de la Ville de Briey, as well as the Georges Sarton Medal of the University of Gand. In 2010, he was elected a member of the French Académie des Technologies. He is Chevalier des Arts et Lettres since 2014. He is also Chairman of the Foundation Le Corbusier.

## The DIN Format

Sa., 11:00 a.m.

Prof. Dr. Markus Krajewski

Since the age of the printing press, the preferred basis of thinking is paper. Paper comes in different formats – as do the thoughts. Unlike thoughts, however, the paper format was subjected to be standardised in the Belle Epoque, in the age of global cooperation before World War I. In my talk I will develop a (short) story about the problems of transforming various paper sizes into a specific format, the first global paper format finally named DIN A. Its final measures as well as its distribution are the result of an entangled dispute, witnessing parasitic adoption of ideas, failure, and unjustified triumphs among the protagonists, the Nobel prize winner in Chemistry, Wilhelm Ostwald, and his secretary (for a while), Walter Porstmann.

Prof. Dr. Markus Krajewski is Professor for Media Studies with focus on Media Theory and Media History at the University of Basel. Before he had been research assistant at Hermann von Helmholtz Center for Cultural Techniques at the Humboldt University of Berlin (2001 – 2002) and at the Gerd-Bucerius-Stiftungsprofessur for History and Theory of Cultural Techniques, Bauhaus University Weimar (2002 - 2008). He received a doctor's degree in 2005 for his thesis about „restlessness. Worldprojects around 1900“. Following his degree he was an Assistant Professor for Media History of Science at the Bauhaus University Weimar (2008-2013) as well as a Visiting Professor at the History of Science Department at Harvard University (Spring 2009) and at Leuphana University Lüneburg (Autumn 2012 – Summer 2013).

## **Processes of Standardization / Standardizing the Standard (History of DIN)**

Sa., 11:45 a.m.

### Dr. Matthias Witte

Since its founding in 1917, the Deutsches Institut für Normung (DIN; German Institute for Standardization) has been an independent platform for standardization. The idea of companies managing themselves was already extremely important for its founders. Our task has not changed over the past century. Very specifically, we are concerned with exploring, designing, and strengthening regional and global markets. Standardization designs the future; it describes the current state of technology and how things will function in the future. That is also a central element of the German strategy for standardization.

The basic conditions have, of course, changed. At the time of our founding, the goal was to support industrialization by creating relevant standards. Today, norms and standards form the basis for the fourth industrial revolution, as can be seen very well in the construction industry when it comes to Building Information Modeling, or BIM for short. What has not changed, however, is that DIN/NABau sees itself as a service provider and responds flexibly in order to support the success of German companies in international competition. Standardization is more significant now than ever before. Further digitalization of the construction industry can only be managed with common standards.

This confronts us with new tasks. For example, it demands cooperation on various levels. For us, that begins in house: boards are networked to one another in ways that transcend the committees. In addition, even more emphasis is placed on collaboration among different organizations. Because digitalization blurs the boundaries between sectors, tasks can no longer be assigned specifically to one organization and be mastered by it alone. For that reason, we also work with regulators, forums, and consortiums that set their own standards. Our goal is to find common solutions with these partners.

Dr. Matthias Witte is the group manager of the Technical Group 2.1 and the managing director of the Standards Committee for Building Technology of DIN e.V. since 2011. Prior to that, he was project manager of GuD (Geotechnik and Dynamik Consult GmbH), project manager of "URS Deutschland GmbH" between 2004 and 2008 and project manager of "LGA Landesgewerbeanstalt Bayern" between 2003 and 2004.

## Rapid Design with Ernst Neufert

Sa., 2:30 p.m.

### Visiting Professor Dr. Gernot Weckherlin

The design knowledge of architects is based on mastery of standardized communication; it has long since become “catalog knowledge.” The available tools, reference objects, collections of object data that help shape the standards of communication and also their depth of detail have clearly changed since the heyday of modernism in the 1920s. This may sound strange at first to the ears of architects, who even today like to regard themselves as the autonomous creators of previously unknown artistic spatial inventions.

In my talk, therefore, I wish first to show in detail, using the example of one of the most controversial but at the same time most successful architects and bestseller authors of the heyday of modern trends in standards and norms, Ernst Neufert, the author of *Bauentwurfslehre* (translated as *Architects’ Data*), how design knowledge was formed based on catalogs, norms, and standards and how the standards themselves changed under the historical conditions of the time. Then a brief, comparative look at the current standardization of communication in the area of BIM can expose the discourses on standardization communication that have an influence but are not always explicitly visible.

*Bauentwurfslehre* can be a useful historical reference if only because this book as always been harshly criticized by architects for its allegedly technocrat habitus. And that has been true despite it being faithfully based on “norms and guidelines on the layout, construction, design, space requirements, spatial relationships [...] with the human being as scale and goal,” as asserted in the German subtitle. The line of ancestors of the hoped-for positive effects of standardization of today’s digital communication is presumably just as long as the line of their supposedly or actually negative consequences. Almost always, however, the dissimulation of communicative standards seems to be a natural constant of the foregoing design knowledge in each case.

Dr. Gernot Weckherlin completed an apprenticeship as a carpenter and a journeyman's examination. He studied at the TU Munich and had a scholarship at the PCL London. He worked at the studio Raoul Bunschoten, London, and was project manager at the office W. Wentzel, BDA, Berlin. He was lecturer respectively research assistant at the Department of History and Theory of Architecture at the TU Dresden, at the Bauhaus University Weimar, the UdK Berlin, the Beuth University of Applied Sciences Berlin. Since 2002 he is building and writing architect. In 2014 he received his doctor's degree. Weckherlin is co-founder and chair member of the „Netzwerks Architekturwissenschaft e.V.“ and since April 2015 he is Visiting Professor for Architectural Theory at the Brandenburg University of Technology Cottbus-Senftenberg.

## Expert systems

Sa., 3:00 p.m.

### Prof. Dr. Christian Kühn

Expert systems were a reaction to the first great failure of research on artificial intelligence: the approach of a General Problem Solver (GPS) developed by Herbert A. Simon and Allen Newell in the late 1950s. Its basic assumption was the idea that the human being, regarded as a behavioral system, proceeds according to rather simple basic rules that are perceived as complex behavior only because they play out in a complex environment. In practice, this approach proved successful only for a limited number of well-defined problems. In his *Sciences of the Artificial*, written in the late 1960s, which included a chapter entitled “The Science of Design,” Simon expanded on his idea by declaring the “cocoon of information, stored in books and in long-term memory, that we spin about ourselves” to be part of the complex environment as well. The modeling of this cocoon led to the development of so-called knowledge-based systems in which expert knowledge is supposed to be modeled in a way that makes it understandable and extendible. Research on the use of digital technologies in architecture adopted this approach in the 1980s. “Decision Support Systems” were intended to help designers to accomplish planning tasks both by analyzing and by generating solutions. The success of these systems was largely limited to the sciences, where they could offer material publications and conferences. In practice, these systems never caught on, not least because of the work required to formalize knowledge, which was not counterbalanced by any economic use.

Currently, expert systems are experiencing a revival in a different form, namely, as part of certification systems that seek to establish de facto standards to evaluate projects and buildings, thus serving a market worth hundreds of millions of euros. In combination with the use of BIM for the planning and facility management of buildings, new standardization structures are emerging based not only on expert knowledge but also on data sets, which are increasingly being used to measure the performance of buildings. The consequences of this development for architecture—a discipline that is accustomed to deriving its normativity from itself—could be massive.



Prof. Dr. Christian Kühn studied at the TU Vienna (Dipl. -Ing.) and the ETH Zurich (Dr. sc. techn.). He is Professor at the TU Vienna since 2001, head of the Architectural Foundation Austria since 2000, member of the OECD study group for educational buildings between 2005 and 2011, and Dean of Academic Affairs of the Faculty for Architecture and Spatial Planning since 2008. His research focuses on history and theory of architecture, and on building studies with a focus on educational buildings. He also works as an architectural critic for various magazines (e.g. "Architektur- und Bauforum", "Architecture d'aujourd'hui", ARCH+, "Die Presse"). Commissioner for the Austrian contribution at the Architecture Biennale in Venice 2014; Chairman of the Advisory Council for Building Culture at the Federal Chancellery since 2015.

## **BIM - the architect's perspective**

Sa., 3:30 p.m.

### Dr. Alexander Rieck

Building Information Modeling will significantly change the planning of buildings in the coming years.

The reason is not so much—as is generally believed—the underlying modeling of three-dimensional geometries and the collision control of building parts that it makes possible but rather the linking of these geometries to information. We still do not really know how to use this information, but it represents the cornerstone of a new world in planning.

In the future, not only will it be possible to integrate facility management data into the planning from the outset and use them again during operation, but it will also clearly be possible to optimize all distribution and logistics on the building site. As these data continue to be used systematically, they will also be useful for automated prefabrication.

All of this is very interesting for the future of the entire process chain on the building site and hence for everyone involved. Nevertheless, it is still left to architects to integrate these data into the planning—an enormous increase in effort.

Architects are now trying to minimize this effort by turning to groups of prefabricated construction parts and hence, as it were, clicking together the data from the existing catalog. These construction parts are certified and standardized by their manufacturers. This makes planning considerably easier and quicker but it also reduces the latitude for new developments. This effect will be amplified if in the future insurance companies will only insure planning based on demonstrably prestandardized groups of construction parts.

This process will have to be countered by parametric planning that certifies not just the construction part of the system, hence giving architecture the necessary freedom to innovate our living environment.

Architecture, as a mirror image of society, must not simply react to the needs of the future but also actively guide them and thus constantly challenge them with extraordinary solutions to the standard.

Dr.-Ing. Alexander Rieck is a researcher at the Fraunhofer Institute for Labor Economics and Organization (IAO) in Stuttgart and partner and director of the international architecture office LAVA. After finishing his studies he worked, amongst other things, on the improvement of digital planning methods at the Virtual Reality Laboratory of the IAO. His current research focuses on digital planning and fabrication as well as the city of the future. He teaches at the University of Zurich and is, as an expert for BIM, a member of the consulting committee of the architectural association Baden-Württemberg, the German Federal Chamber of Architects and the DIN standardization committee for BIM.

Designing Standardized

## **Standardization by Scripting**

Sa., 4:00 p.m.

Prof. Thomas Auer

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Thomas Auer is partner and managing director of Transsolar, an engineering firm with offices in Stuttgart, Munich, Paris and New York. He collaborated with world known architecture firms on numerous international design projects. He is a specialist in energy efficiency and environmental quality. Thomas has developed concepts for buildings and districts around the world noted for their innovative strategies. Thomas taught at various universities around the world. Since 2014 he is full Professor for Building Technology and Climate Responsive Design at the TU of Munich with a focus in bridging academia and environmental design. His research focuses on form and materiality and their influence on performance and environmental quality at different scales.

## **BIM - the engineer's perspective**

Sa., 5:00 p.m.

### Prof. Manfred Grohmann

The paradigm shift in the fields of architecture, planning, and building occurring today under the name Building Information Modelling (BIM) will influence our daily lives much more than the introduction of CAD did at the end of the last century. At that time, with more than forty years of work to look back on, we put down the Rapidograph and picked up the mouse. But nothing about our actual work changed: we put lines to paper, and nothing but lines.

These days, we are beginning to stop drawing lines altogether and instead arranging objects in space. The objects know themselves: they know whether they are a wall, a ceiling, or a railing. The scope of these object properties is open upward; in addition to measurements and materials, additional definitions of diverse properties are possible. In practice, however, we are still far from having consistent models that are advanced enough to produce bids or construction schedules at the push of a button. I even doubt whether that will be possible in the foreseeable future. The positive thing about the development thus far is that in the meanwhile everyone is talking about coordinated, transdisciplinary 3D planning and trying to practice it.

Already today, we can sit down in our car and tell it where it should take us. Hence it is reasonable to expect that in the near future we can tell our computer which objects it should use to create our designs. The question is where these objects will come from. Only those who do not begin by developing these objects themselves or by refining existing ones will be limited to working with what others have already conceived.

So the German fear that with BIM only standardized buildings will be produced is as little justified as the fear shared by many thirty years ago that with the introduction of CAD everyone would plan only standards.

Manfred Grohmann is co-founder of Bollinger + Grohmann Ingenieure. Since 1983, the office provides a complete range of structural design services for clients and projects worldwide. With their offices in seven countries they are involved in challenging projects all over the world. In response to the complexity of contemporary architecture Bollinger + Grohmann Ingenieure links the high level of interdisciplinary competences of architectural geometry, the development of specialized software, new material and fabrication technologies with expert knowledge as engineers. Manfred is also teaching as professor for structural design at the University Kassel, Germany. He is honorary professor at the University of Melbourne and the University of Nottingham.

**Abstracts 3rd Day**

**Building Standardized**

## Ernst-Neufert and the Octametric System

So., 9:30 a.m.

### Prof. Dr. Nader Vossoughian

The history of forced labor is inseparably tied to the history of the built environment. In modern times, the burden of executing L'Enfant's plans for Washington, D.C. fell disproportionately on the shoulders of African slaves, as Clarence Lusane has shown (2011). Similarly, the Soviet Union relied on forced labor for the construction of Ernst May's design for Magnitogorsk. The Nazis used concentration camp prisoners, prisoners of wars, and conscripted workers to execute the building of military bases, public infrastructure, factories, housing settlements, camps, government buildings, and civic monuments. Moreover, some of the very methods and techniques that they used to normalize the systematic and murderous exploitation of workers continue to shape the way architects think, design, and build today. The history of standardization in Germany bears out this influence, and one particular standard, DIN 4172, will be the focus of my inquiry.

I will show how the Nazis developed DIN 4172 - and the so-called „octametric“ system of dimensional coordination - to globalize and normalize their forced labor practices; I will also consider how this effort proved instrumental to the subsequent history of what we sometimes call „quality control.“ I will argue that this case study helps us understand the logic of what Keller Easterling has called „Extrastatecraft.“ It also deserves contemplating in the light of geopolitical and technological shifts that are underway, particularly when we consider the threats posed by automation, ultranationalism, and economic neoliberalism.

Nader Vossoughian is an architectural historian, theorist, and curator whose work focuses on the relationships among architecture, information, and urban landscapes. A former Fulbright Scholar, he studied philosophy, cultural studies, and German literature at Berkeley, Swarthmore, Albert-Ludwigs-Universität (Freiburg), and Humboldt University (Berlin) before receiving a master's degree in German studies, and both a Master and a Ph.D. in architecture from Columbia University. He has curated exhibitions at Stroom Den Haag, the MAK Center for Art and Architecture in Los Angeles, and the Museum of Applied Arts in Vienna. He is the recipient of grants and awards from the Graham Foundation, the German Academic Exchange Service (DAAD), the Jan van Eyck Academie in Maastricht, and the Canadian Centre for Architecture in Montreal.



## Standardization in hospital design and construction

So., 10:00 a.m.

Dipl.-Ing. Hieronimus Nickl

Modern hospital architecture is in large part based on standardization. This applies to both the planning process and the standardized building elements and building processes. The level of development of standardization can be attributed – amongst other things – to the historical development of the use of this particular building type, which led to the formation of a distinct building typology rather early. This typology has always differed from other building types, even though it has been subject to change through the decades itself.

The patient rooms in nursing care and the high-tech procedure rooms each have their own standards, the characteristics of which hardly vary in modern European buildings/hospitals and, as a basic module, determine the internal organization of hospitals.

How far can this standardization be driven and reduced to one „core“, i.e. to a maximum reduced functional module of a hospital? With the concept of the „Health Box“, we have attempted to provide all functions for medical primary and secondary care out of one standardized module.

Hieronimus Nickl graduated from the degree course in architecture at Erfurt University of Applied Sciences in 2003. In 2008, he completed an MBA programme in International Hospital and Healthcare Management at the Frankfurt School of Finance and Management with a master's degree. Hieronimus joined Nickl & Partner Architekten in 2003 and has worked since 2005 as a project manager and team leader specialising in international projects. Since April 2015 he is general manager of Nickl & Partner Architectural Design Consulting Co.,Ltd in Beijing, China. In the same year Hieronimus became board member of Nickl & Partner Architekten AG.

## The Normed Office

So., 10:30 a.m.

### Assistant Professor Hyun-Tae Jung, Ph.D.

Skidmore, Owings, and Merrill (SOM) designed prominent examples of modern glass and metal curtain wall buildings in the 1950s. Many of these became institutional icons while illustrating a new type of modern workplace. However, there is still little known about how SOM obtained the technical and theoretical expertise required for the new building technology and what the new space was meant to be. By reviewing SOM's activities beginning in 1939, this paper illustrates that the "Normed Office" of SOM in the 1950s resulted from its prior architectural experimentation spanning from the late 1930s to mid-1940s. The primary concern of this research was in exhibition and lighting, as well as the prefabrication of buildings.

Crucial to SOM's early development as a young architecture firm was its collaboration with the John B. Pierce Foundation from 1939 to 1944. The Foundation specialized in prefabrication, physiological and psychological research in the domestic environment, and ergonomics. SOM learned a significant amount from the Foundation's research.

Based on its experience with the Foundation, SOM proposed the idea of "Flexible Space" in 1942. The firm intended to offer a formula for spatial organization in which a building was conceived as a collection of disassembled parts and separable functions. "Flexible Space" prefigured the idea of mass customization, justifying and facilitating mass-production of a building through standardization.

Like a prefabricated house, SOM's curtain wall offices were designed to provide a mechanism for inherent spatial flexibility. They generated spectacles of the modern urban workplace. The Union Carbide Headquarters (1957-61) illustrates this technical ingenuity. The architects employed a module in the design of the entire building. The stainless steel curtain wall and the bright interior were a culmination of SOM's pursuit of prefabrication and flexibility. Modernization and industrialization of architecture through a scientific and systematic understanding of individual and family life resulted in the standardized office in the Union Carbide Building as well as other buildings.

Hyun-Tae Jung, PhD., studied at the University of Seoul and the Columbia University and has a Ph.D in Architecture from Columbia University. He wrote his dissertation about Organization and Abstraction: The Architecture of Skidmore, Owings & Merrill From 1936 To 1956. From 2006 to 2009 he was Assistant Professor at the University of Nebraska-Lincoln, College of Architecture. Since 2009 he is Assistant Professors of Architecture at Lehigh University.

## Fritz Haller and Total Planning

So., 11:30 a.m.

### Prof. Dr. Georg Vrachliotis

In the 1920s, thirty years before the “invention” of the standardized shipping container by a shipping company in the United States, Le Corbusier developed a new concept of architecture with the mobile spatial cell as basic unit: “A man his happy, carries on all the functions of domestic life, sleeps, washes himself, writes, reads, invites his friends, within 15 square meters.” Corbusier experienced the immediate model for this “cell at human scale” on an ocean liner. Historically, however, he also derived it from older architectural cell forms: the monk’s cell, the prison cell. These spatial cells are places of temporary closing off and concentration—that is to say, places that serve intensification more than increasing efficiency or quantity.

The stories of the origin of the container that constitute the history of technology in the narrower sense are more prosaic and pragmatic: traffic regulations; material requirements; international legal frameworks; physical conditions on streets, on rails, in harbors, and at sea; and systematic features of creating infrastructure. But there is yet another historic strand, an older genealogy, the history of the containers as the history of the crate: the bridal chest, the large trunk, mobile objects for storage of personal belongings. A history, moreover, of furniture that has split off from real estate, from houses, and become autonomous. Overstating it somewhat, it could be said that architecture becoming a container brings together the history of interior furnishings with that of housing construction. A house as container is at once fixed real estate (immobilier) and movable furniture (mobilier).

Corbusier’s cells were inserted into the framework of the house just as, forty years later, containers would be inserted into the cellular framework of container ships: a type of ship that was completely redesigned around the requirements of the standardized steel vessels. There has never been any awareness that the modern logistics of transportation may have had a backstory in architecture. Conversely, the cell as modular, mass-produced spatial unit and the framework as its static holding element are still today haunted by the history of architectural designs. As was already the case for Corbusier, this strand of radical design practice is focused less on increasing logistical efficiency by introducing standardized industrial technologies for building

and assembling volumes than on the promises of freedom and intensification associated with the mobilized cell. So what value do standardization, modularization, and automatization have in this history of modern architecture? By superimposing the history of the spatial cell and that of the shipping container, this lecture follows the ambiguities and contradictions of the principle of the standardized unit of space between an (economically based) ideology of rationalization and a (political ideology) of individual freedom.

Dr. Georg Vrachliotis is professor for architectural theory and head of the southwest German Archive for Architecture and Engineering (saai) at the Karlsruhe Institute of Technology (KIT). Before he taught and researched at the Institute for History and Theory of Architecture and the Institute for Technology in Architecture at ETH Zürich, where he also got his doctor's degree in 2009. He has been visiting professor for architectural theory at TU Wien and deputy professor for architectural theory at KIT. His research and publication focuses on architectural theory and history of the 20th and 21st century, especially the post war period and the interface between the history of media, of technology and of cultural history. He curates the exhibition „Frei Otto. Denken in Modellen“ (Frei Otto. Thinking in models), a joint project of saai and the Wüstenrot foundation in cooperation with the ZKM Karlsruhe.

## The Container Principle

So., 2:00 p.m.

### Dr. phil. Alexander Klose

In the 1920s, thirty years before the “invention” of the standardized shipping container by a shipping company in the United States, Le Corbusier developed a new concept of architecture with the mobile spatial cell as basic unit: “A man his happy, carries on all the functions of domestic life, sleeps, washes himself, writes, reads, invites his friends, within 15 square meters.” Corbusier experienced the immediate model for this “cell at human scale” on an ocean liner. Historically, however, he also derived it from older architectural cell forms: the monk’s cell, the prison cell. These spatial cells are places of temporary closing off and concentration—that is to say, places that serve intensification more than increasing efficiency or quantity.

The stories of the origin of the container that constitute the history of technology in the narrower sense are more prosaic and pragmatic: traffic regulations; material requirements; international legal frameworks; physical conditions on streets, on rails, in harbors, and at sea; and systematic features of creating infrastructure. But there is yet another historic strand, an older genealogy, the history of the containers as the history of the crate: the bridal chest, the large trunk, mobile objects for storage of personal belongings. A history, moreover, of furniture that has split off from real estate, from houses, and become autonomous. Overstating it somewhat, it could be said that architecture becoming a container brings together the history of interior furnishings with that of housing construction. A house as container is at once fixed real estate (immobilier) and movable furniture (mobilier).

Corbusier’s cells were inserted into the framework of the house just as, forty years later, containers would be inserted into the cellular framework of container ships: a type of ship that was completely redesigned around the requirements of the standardized steel vessels. There has never been any awareness that the modern logistics of transportation may have had a backstory in architecture. Conversely, the cell as modular, mass-produced spatial unit and the framework as its static holding element are still today haunted by the history of architectural designs. As was already the case for Corbusier, this strand of radical design practice is focused less on increasing logistical efficiency by introducing standardized industrial technologies for building

and assembling volumes than on the promises of freedom and intensification associated with the mobilized cell. So what value do standardization, modularization, and automatization have in this history of modern architecture? By superimposing the history of the spatial cell and that of the shipping container, this lecture follows the ambiguities and contradictions of the principle of the standardized unit of space between an (economically based) ideology of rationalization and a (political ideology) of individual freedom.

Dr. phil. Alexander Klose conducted a research project about the history and theory of the container and the rise of logistics, first as an artistic project, then for doctoral degree purposes at the Bauhaus University Weimar. Meanwhile he had teaching assignments for Cultural Studies and Design Theory in Weimar, Dessau and Karlsruhe. Between 2010 and 2014 he worked as a research assistant in the department of project funding of the federal culture foundation (Kulturstiftung des Bundes). Today he works as freelancing publicist, concept developer and curator in Berlin. His current projects deal with reformation, revolution and media as well as the ambivalences of the oil age.

## **Standards and regulations in the design of innovative facades**

So., 2:30 p.m.

Prof. Dr. Daniel Pfanner

The requirements for building shells have changed enormously in recent decades: from aesthetic cladding that protects against weather to one of the most complicated construction tasks. In addition to the classical functions of sealing and insulating, the modern facade has to satisfy very different, sometimes contradictory requirements, from admitting natural light and providing views and solar protection by way of air sealing, natural ventilation, and smoke removal all the way to protection from noise and security functions such as preventing break-ins as well as protecting from bullets and explosives. At the same time, there is no other building task with a greater diversity of materials and products available. These points lead to the current state of the rules of technology in modern facade construction having well over a thousand norms and guidelines. This naturally creates enormous challenges for those involved in planning, since, first, a wide-ranging knowledge of current state of standards is necessary and, second, the categorization and evaluation of the relevant requirements demands highly specific expert knowledge. The latter is especially indispensable to developing a competence to assess that will result in buildings that do not simply meet the standards but are also good and comfortable. Even after several decades, they should not be simply “habitable” but still fulfill the fundamental necessities of their users for physical and psychological comfort and at the same time be “modern” in terms of energy use and operability. This essay reveals potential traps and design strategies to the conflicting requirements of natural light, open views, and solar protection. In particular, it sheds light on the sources of design mistakes that can result from rigid, poorly coordinated, and ill-considered adherence to normative guidelines. The not inconsiderable influence of today’s standards on the modern language of architecture is examined critically.



Dr. Daniel Pfanner is professor for structural engineering at the Frankfurt University of Applied Sciences. There, he teaches mechanics and structural analysis for civil engineers and lectures on façade engineering in higher semesters. He is a partner at the office Bollinger + Grohmann in Frankfurt where he was head of façade planning until 2014. Prior to this he was part of the office as a project manager and managing director in Paris, where he co-founded the local office of Bollinger + Grohmann. He has experience in project management for various building types from sports facilities to museums, commercial buildings and high-rises. In addition to his expertise in the design of steel and glass constructions, he has many years of experience in conception and interdisciplinary planning of energy-efficient building envelopes.

## **Standardization on Site: skill and the construction process in mid-twentieth century Britain**

So., 3:00 p.m.

Dr. Christine Wall

At the end of the Second World War, constrained by materials and labour shortages, the British government promoted industrialisation of the building industry. This involved rationalising the processes required to produce buildings with the expectation that they would also be cheaper. For many architects this promised a shift from traditional materials and methods to a building process where, ideally, prefabricated, standardised, interchangeable components were assembled on site. However the profession, generally, had a non-existent relationship with labour and poor understanding of construction skill outside the traditional crafts. In 1946 Mark Hartland Thomas, together with a group of eminent British architects, investigated the wartime German building industry. After personally interviewing Ernst Neufert, and impressed with the extent of standardization implemented, he returned to campaign vigorously for a similar approach in Britain. In 1953 he set up the Modular Society to promote the use of a standardised module as the key to industrialised building.

At the opposite end of the political spectrum were those architects with a moral commitment to the social enterprise of re-building a better Britain. Also enthusiastic supporters of standardisation they regarded it not as a means for dispensing with skilled labour but as an opportunity for new technical processes to improve site conditions and increase collaboration between architects and builders. This paper examines these two positions using the examples of temporary structures erected and analysed by the Modular Society to assert the universal principles of standardised, modular design. This is compared to accounts by architects who worked on the standardised CLASP system of school building and represented a different approach to building labour in their attempts to eradicate site hierarchies and recognise the different skills necessary for building using non-traditional methods.

This paper uses archive sources together with oral history testimony to reveal how the actual skills used, disjunction with existing training system, changes in the form of employment and the increasing distance of architects

from the production process undermined the rhetoric of standardization. The conviction that building can be split into a series of simple, separate tasks, undertaken by a semi-skilled workforce underpinned the approach of the Modular Society. This has become the hegemonic understanding of the British construction process despite historical evidence that suggests otherwise. The potential for a highly skilled workforce, working with technologically advanced products, remains dependent on wider social reforms.

Dr. Christine Wall is Reader in the School of Architecture, University of Westminster. She recently led the Leverhulme Trust funded project *Constructing Post-War Britain: building workers' stories 1950-70* and has published widely on the history of the built environment including, *An Architecture of Parts: architects, building workers and industrialisation in Britain*, (2013); *Constructing Brutalism: in situ knowledge and skill in post-war Britain*, (2017) in *Producing Non-Simultaneity: construction sites as places of progressiveness and continuity* eds., Heine, E-C, and Rauhut, C.; *Sisterhood and squatting in the 1970s: feminism, housing and urban change in Hackney*, (2017) *History Workshop Journal*, Spring (82) 1, OUP. She is co-editor of the *Construction History Journal* and the *Oral History Journal*.

## **People in High Places** (Formerly: Failed Standard: The Case of Grenfell)

So., 4:00 p.m.

### Samuel Webb, RIBA (Royal Institute of British Architects)

If you ask too many questions, in any hierarchy, why do you end up like Galileo?

“He raises his telescope to the stars and delivers himself to the rack” Bertold Brecht.

When everything that can go wrong, does, why do we end up with Grenfell Tower?

How did we get here? Politicians never ask that question. They cover their tracks, look for scapegoats and appoint those below them to cover up. Politicians who know they have something to hide are part of the problem. The lower orders act like human shields to the politicians. Truth gets buried.

In 2009, I stood in front of Lakanal House where 6 people died the day before. I was asked how it happened, “This building doesn’t comply with the Buildings Regulations. If it does there is something wrong with them.” So, it proved, on both counts.

Few learned from Lakanal, though many, including the Parliamentary All-Party Fire & Rescue Group which wrote many letters to the DCLG Minister, were ignored. The politicians turned to their advisors. Like Pavlov’s dogs, they nodded.

In 1979 Thatcher was elected PM. She adopted Reaganomics, based on Hayek’s and the Neo-Cons’ ideas. Everything was deregulated, including building control. In 1983, she announced she was abolishing the GLC by 1986. As it went, the London Building Acts dating back to the Great Fire, were repealed. The Inner London District Surveyor system ended.

Local authorities, responsible for building control, tend not to inspect their own buildings. They set their own terms. This has led to many disasters, Ronan Point 1968, Edouard-Pailleron School fire Paris 1973, Summerland fire IOM 1973, Fairfield OPH fire 1974, Bradford City Football Ground fire 1985, Kings Cross fire 1987, Hillsborough 1989, Lakanal House fire 2009, Shirley Towers fire 2010 and Grenfell Tower fire 2017.

Grenfell is shorthand for everything that could go wrong.

Hemingway said the mark of a good reporter was an inbuilt human crap

detector.

So why did no one ask, “What if?”

Sam Webb is a member of the Royal Institute of British Architects. In 1968, he produced joint evidence for the Ronan Point Inquiry and published articles in *Private Eye*, *AD* and the *Journal of the Institute of Structural Engineers*. He worked with Joan Littlewood & the Theatre Workshop on a production called, “The Projector” and published an article in *Private Eye* in 1970, with Paul Foot, that led to exposure of the Poulson Affair, UK’s biggest corruption scandal. His research led to the demolition of Ronan Point in 1986. From 1971 to 1973 he was a member of the AA Council and became a nationally elected member of RIBA Council. In 2009, he was an Expert Witness in the Lakanal Fire Inquest and in 2013 he became an advisor to the All-Party Parliamentary Fire & Rescue Group. He is a founder member of the President of the RIBA’s Expert Advisory Group, investigating the Grenfell Tower Fire.

# Standardized thinking?

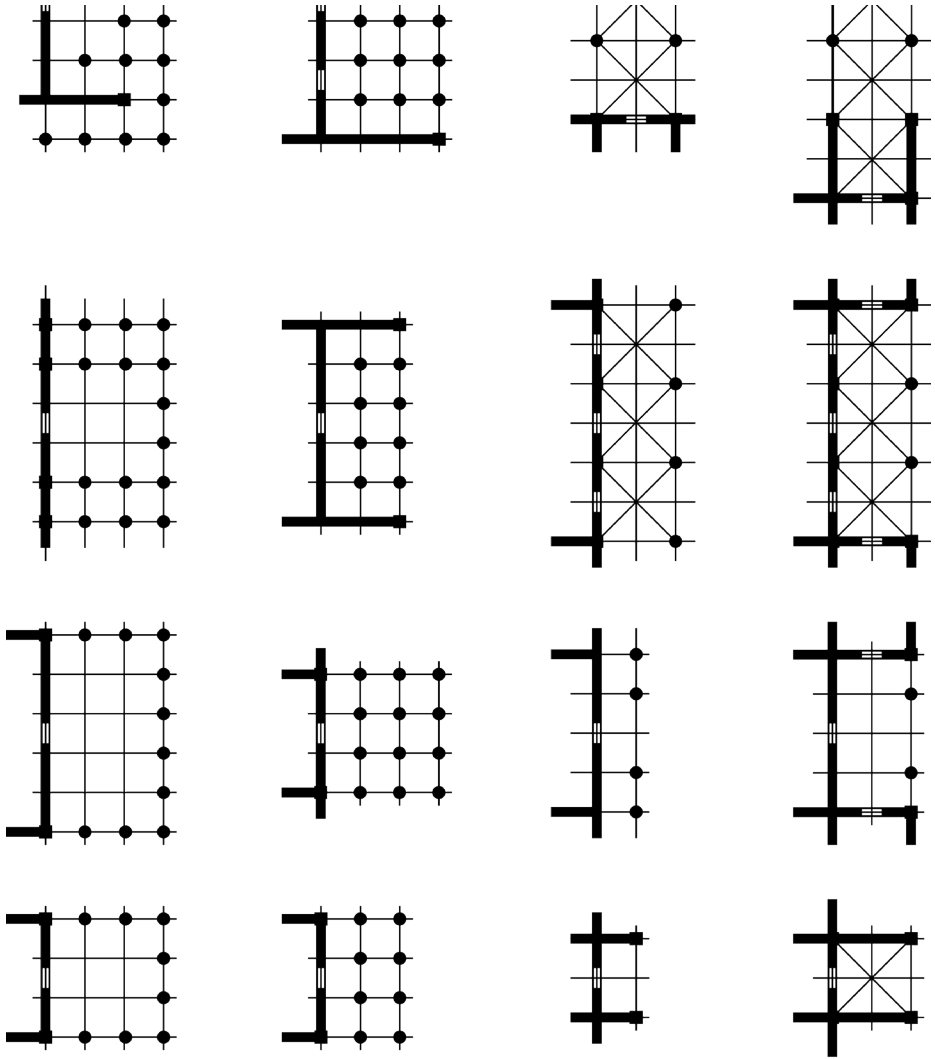
So., 6:00 p.m.

## Introductory notes: Prof. em. Georg Augustin

The presentation will be followed by a discussion with Ministerialdirektorin Monika Thomas (Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit), Prof. Manfred Grohmann, and Prof. Dr. Antoine Picon. Moderators: Kilian Enders, Philipp Oswalt

Georg Augustin was born in 1951 in Schaffhausen, Saarland (Germany). Between 1972 and 1979 he studied architecture at TU Karlsruhe and TU Berlin. After his graduation he worked for various architectural offices in Berlin until 1986. He began his teaching at TU Berlin in 1986, where he was visiting professor in 1997 and 1998 in the Department of Design, Structural Design and Building Praxis. Co-Founder of the architectural office Augustin und Frank in Berlin together with Prof. Dr. Ute Frank in 1986. He was professor and chair of the Department for Architectural Design at the University of Kassel between 2003 and 2016.





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