

WEDNESDAY, JUNE 20, 2012 BARCELONA

CHANGE  
ARCHITECTURE  
EDUCATION  
PRACTICES

2012 ACSA INTERNATIONAL CONFERENCE  
ABSTRACT BOOK

Abstracts from the Association of Collegiate Schools of Architecture  
2012 International Conference in Barcelona, Spain

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## **CO-CHAIRS**

Xavier Costa, Northeastern University + Martha Thorne, IE University  
Amy Murphy, University of Southern California

## **THEME LEADERS**

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## ACADEMIA I: PEDAGOGICAL AFFORDANCES OF THE DESIGN STUDIO

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **EROSIVE CARTOGRAPHIES**

Karl Wallick, University of Wisconsin-Milwaukee

Our objective with this studio was to invent new techniques for observing, recording, analyzing, and synthesizing the inexplicit histories of architectural weathering and properties of erosion within the city. Linking the past to the present within the activated media of drawing is one way that students can start to synthesize cultural aspirations with the formal desires of architecture. The drawings from this studio show that it is possible to communicate ethereal and intangible qualities of erosion using the explicit media of architecture.

Decay is ever-present. The perpetual modification of our civic fabric is legible in the detailing of joints for amendment, remediation, or erasure. The work from this studio investigates the positive potential of decay in the production of architectural joints through layered drawings with special emphasis given to marginal details. Marginal details are authored by the non-architect participants that engage with our built environment. Qualities such as stains, time, erosion, vandalism, decay, and general wear are all types of marginal details. Potentially, such details can register continuity within the city's fragmented historic episodes of wear. Manifesting strategies of improvisation and multiplicity, these fragments define contemporary issues of reuse and renewal and may range in scale from the micro to the room to the city-landscape. A record of student research gradually accrued in a series of drawings that describe and reconcile material, chronological, compositional, and programmatic differences in prominent and discrete joints. Drawn at multiple scales, this drawing series was developed in a manner similar to the intentional and improvisational, the technical and conceptual, and the explicit and implicit qualities of our world's marginal details.

Our goal was to challenge the disciplinary assumptions about the instrumentality of decay by gradually uncovering a new aesthetic of sustainable ethics where the tangible and intangible are linked through the agency of slow drawing. Questions we sought to respond to in this studio include: what is the productive potential for decay? What is the effect of erosive properties on inner and outer worlds? Furthermore, how do we communicate the nature of such forces that many times are invisible or evident only over long periods of time? In terms of architectural consequences for the city, the projects in this paper show that from the fantastic to the everyday, the destructive power of erosion can be harnessed for its productive potential.

### **NEITHER INDIVIDUAL, NOR GROUP: A FIRST YEAR DESIGN STUDIO EXPERIMENT**

Sevgi Türkkkan, Istanbul Technical University  
Onur Sonmez, Istanbul Technical University  
Burçin Kürtüncü, Istanbul Technical University

Architectural schools, particularly design studio is where conventions of practice are exercised and developed. Modes of operating in the design studio, as well as in architectural practice, conventionally vary between individual or group work. Although groups operate with a collective brain, they are eventu-

ally expected to perform as an individual body as well. This tendency towards individuality could be read in relation with the singular, heroic, genius conception of the author-architect, which was critised by Barthes in "The Death of the Author". When collectivity is packaged into a rigid, single-minded persona, potentials generated by relationality, encounters and conflicts are put at risk. On the other hand, certain modes of collectivity bear the danger of eroding the individual, which is just as problematic.

Today, as the world becomes more connected and modes of production get more relational, there is a need to go beyond the myth of the individual independent designer in all creative fields. In "Relational Aesthetics", Bourriaud talks about the possibility of an art, taking as its theoretical horizon the realm of human interactions and its social context, rather than the assertion of an independent and private symbolic space. This points to a radical shift in the aesthetic, cultural and political realms, also in architecture, where conventional modes of organization and roles of authorship fall into question.

Hence, this paper employs a particular design game in architectural education which explores potentials beyond individual or group work, challenges conventions of collaboration, therefore roles of authorship, and promotes other paths of coming together, negotiating and designing.

"Karaköy x2", was the final project of first semester of the first year design studio at Istanbul Technical University's Faculty of Architecture in 2010-2011. This six week long design game aimed to study, understand and intervene into a historic district of Istanbul, namely Karaköy, at the verge of massive urban transformations.

Besides reading a complex urban fabric, understanding its dynamics, developing architectural programs and proposing spatial interventions, this project was mainly designed as an experiment to facilitate and monitor different modes of collective design.

The experiment was structured as a platform where students were given a 50x50m square each, in which they propose their architectural interventions individually. Simultaneously, they had to form a programmatic and physical network overrunning Karaköy, which forced them to negotiate with their neighbors in building connections. Due to multiplicity and complexity of negotiations, gatherings were constantly formed and reformed, concurrently. Neither as a group, nor as fully individualistic, an open platform facilitated collectivity as a fluid function guided by the choices of designers and requirements of design subject. Different from having to choose between individuality and collectivity, individuality was reinforced in a collective manner.

Meanwhile, as tutors, we had the chance to observe modes of negotiation among designers, behavioral divergences in their roles of authorship and their impacts on design subject itself.

Through this particular design studio experiment, its outcomes and evaluations, by challenging conventions of collaboration and authorship, we aim to discuss potentials for an alternative 1st year architectural education.

# WEDNESDAY, JUNE 20, 2012 - 2:30PM - 4:00PM

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## ACADEMIA: I: PEDAGOGICAL AFFORDANCES OF THE DESIGN STUDIO (CONT.)

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **REFLECTING ON REFLECTIVE CONVERSATION: CURRENT PERSPECTIVES ON THE ARCHITECTURAL DESIGN CRIT**

Jolanda De Villiers Morkel, Cape Peninsula University of Technology

The architectural design critique (commonly known as the crit) stands at the centre of architectural design studio learning and teaching. It facilitates an immersive learning experience where architectural students, as members of a community of practice, formulate a design proposal. This is achieved by students constructing realities based on a range of conversations (Pask, 1976 in Laurillard, 2008, 2009), dialogues (Osborne et al, 2007) or arguments (Hasirici & Demirkan, 2007) with themselves, their peers and educators (tutors).

It is a social and collaborative process that occurs in a variety of formats: informally and formally; traditionally and virtually; in small groups or larger groups; at tables or desks or the pin up environment, but always through various media, including actions, words (written and spoken) and, most importantly, the drawn diagram. By means of overlays, the diagram is reworked and through this reworking and the exploration of alternatives, the students' thoughts are developed.

However, since the architectural design studio learning environment was first established in the early 19th century at the École des Beaux-Arts in Paris, the context of architectural practice and learning has drastically changed (Osborne et al, 2011; Mallgrave, 2011). Although a lot is being written about the impact of digital technologies on the generation of architectural CAD visualization, there is limited literature on the impact of technology on the studio learning environment, the creative processes in which architecture students engage with educators and peers, and the character of these interactions.

A multiple case study research design is employed to investigate the perception of three architectural educators involved in studio teaching in South Africa. The rich data set is analysed as conversation in context (Sharples, 2005) against Laurillard's conversational framework (2002, 2009) in order to understand the complex interactions (Austerlitz, Aravot and Ben-Ze'ev 2002; Silen 2006; Webster, 2004, 2007, in Quanlan et al, 2007) in current architectural education contexts.

This paper presents work that is part of a current doctoral study by the author.

## CITIES I

Jeffrey Johnson, Columbia University  
Yung Ho Chang, Massachusetts Institute of Technology

### **CHANGING POVERTY POCKETS IN METROPOLITANS**

Mostafa Rabea Abdelbase Khalifa, University of Camerino, Italy  
Maria Federica Ottone, University of Camerino, Italy

*"Toward improving poor communities in major cities of 3rd world using self-changing methods"*

#### **Introduction**

The Gap inside Metropolitan cities

Developed and poor communities are no longer live separated. They meet on the border of poverty pockets inside the same city itself where the Gap is highly noticed in Metropolitan cities of 3rd world countries.

Poverty Pockets!!

- What/where are poverty pockets?
- Examples of poverty pockets in (Cairo, Mumbai, Nairobi, and San Paolo)
- What are problems ? (For governments/ inhabitants)

The blind methods (one-eyed approach)

As poverty pockets are located on a high value lands, urban developing sectors follow a traditional strategy of relocate the inhabitants to new low cost settlements outside the metropolitan urban context, hopefully, to clear the slum off by demolishing all buildings and replace them with new profitable projects. results of this actions were unexpected and surprised the governments.

- Why traditional strategies are one-eyed or blind approach for poor communities?
- Traditional and recent strategies (weakness or failures)
- Do we need to think "out of the box" for poor communities?
- Can we improve poverty pockets without people re-localization? How?

The Changing is "out of the box"

Western architecture culture had express, in the past years, several lines of urban phenomena interpretation, mainly based on a formal idea and on organization of roads and communication, (mono-centric city, multi-center, linear, etc.). Today, this approach is not appropriated any more for poor communities: we need to interrelate the themes on urban Sustainability produced by different disciplines to identify new standards, so to cover issues such as identity, land consumption, energy, thermodynamics, physics, economy, social development. The multidisciplinary approach seems now to be the only way that allows to obtain a new vision of sustainable urban development. The goal is to provide new tools for the interpretation of urban phenomena to all those ones involved in the territories of cities characterized by strong inhomogeneity.

Self-changing work Examples

A- Douala Experience: second prize award by IAHH International 2010

The idea of urban poor self-improvement was proposed by Association of Humane Habitat international competition, in which an interdisciplinary team of architects PhD, biologists, ecologists, members of the Graduate School of the University of Camerino-Italy, has proposed a strategy for regeneration of a suburb of the city of Douala in Cameroon. The group was awarded the second prize for a proposal which identified a method of gradual replacement of homes built with no sanitation and no infrastructure. An approach in which public participation in building infrastructure (sewers,

tanks, roads, etc.) is compensated with the participation of citizens in a program of guided self-construction

B- Self-blooming prototype technology

Self-blooming technology is a recent PhD study works on creating and automating slums self-improvement system, specially, for poverty pockets that located on high value lands inside Metropolitan cities without needs of re-localization of local inhabitants.

- What is self-blooming technology?
- Self-changing phases
- Sectors Flow/work co-operation
- Application Examples (Cairo and Mumbai)

### **CITIES FROM THE BOTTOM-UP: 22@PLANNING, SMALL-SCALE CULTURAL INTERVENTIONS AS CONNECTIVITY**

Philip Speranza, University of Oregon

The purpose of this research is to investigate urban design and bottom-up city planning in the information activities district of 22@ in Barcelona, Catalunya, demonstrating how a framework of connectivity between individual blocks may enhance existing participation by supporting the experience of cultural events and protected modernism built fabric to create an open-ended neighborhood system that integrates 22@ workers and residents within a single place identity.

In 2000 the city government of Barcelona conceived of an information activities district, similar to Silicon Valley, placing it in the post-industrial and residential neighborhood of Poblenou. Called 22@ its dual purpose is to diversify the city's business activities and to support a doubling of the local residential density in Poblenou. Both purposes will make current the identity of Poblenou from an earlier industrial based identity to one based on information. Unlike the tabula rasa top-down urban planning of the Olympic Village in 1992 that demolished large expanses of the city, the planning of 22@ protects the small and medium sized historic industrial fabric with bottom-up, block by block guidelines. Rather than adopting classical axial structure to connect blocks, the connectivity of the 22@ blocks will depend on material and cultural events already characteristic of the district to weave public spaces together at the scale of emergent pedestrian zones and neighborhoods. This generative process encodes small-scale differences of urban design interventions to link existing behavior patterns and frameworks for the evolution of Catalan culture in the district.

This fine-grained, bottom-up planning approach in the 22@ district demonstrates how small-scale and systematic urban design interventions may use a specific material affect to enhance the experience of identified existing and newly emerging identity of the neighborhood in ways that are consistent with Barcelona and Catalan values. The research documents urban design frameworks that support examples of annual music festivals, public food market networks, community gardens, and pedestrian oriented streets. Investigation of a public food market network seeks to provide a structure for observed adaptations of 22@ food culture from traditional Catalan lunch rituals. How can the local identity of information activities support an evolving food culture for both residents and workers? The paper will also include block modeling within the district previously limiting the research. The systems modeling will provide a structural framework for emergent patterns between the blocks that is not analog drawn from the top-down but emergences bottom-up from differences

## CITIES I (CONT.)

Jeffrey Johnson, Columbia University  
Yung Ho Chang, Massachusetts Institute of Technology

of the agent blocks and existing conditions in the district such as sea to mountain relationships, existing boulevards and patterns differences in emergent use across the abstract model of the district.

The value of the paper demonstrates how relatively modest, culturally based design interventions can create a framework for patterns of participation for an evolving district at the scale of individual spaces upward. This strategy of urban planning relies on network systems design using small interventions and guidelines rather than traditional top-down planning approaches as a way of ensuring the self determined reinforcement of identity of city inhabitants from the bottom up.

### **CONSTRUCTING UTOPIAS: CHINA'S EMERGING ECO-CITY MOVEMENT**

Zhongjie Lin, University of North Carolina at Charlotte

China's national agenda has set a goal of sixty percent urbanization by 2030, which means that each year about 16 millions of the country's rural residents – equivalent to the total population of the Netherlands – are moving into cities of different sizes. This trend has continued for more than a decade in this "largest mass migration ever seen in human history" (David Harvey). Amid this dramatic demographic shift and the resulting construction boom are ambitious plans throughout China to create new towns to house swelling population and to sustain economic growth. These projects are often conceived as exemplary piece of urbanism, showcasing the latest design and environmental technologies in town building. A series of prototype eco-new towns have been proposed and designed in this wave of mass urbanization, prominently among them Dongtan Eco-city in Shanghai, Binhai Eco-city in Tianjin, Caofeidian Eco-city in Tangshan, and Guiyang Eco-city.

These ambitious eco-city projects represent a new chapter in China's continuing attempt to pursue organized urbanization as a strategy to address complex economic and environmental issues. China has in many ways become the world's laboratory for new technologies and designs where global talents seek to realize their futuristic visions, and thus initiated many recent eco-city experiments with significant involvement by big-name international firms and organizations. A number of large-scale eco-city projects were planned and promoted, and several were carried out, with mixed outcomes, while some never got off the drawing board. Looking into these successes or bankruptcies will provide invaluable insight into the design, environmental, and socioeconomic aspects in the development of sustainable city.

This paper will examine the planning and development of these eco-new towns through the lens of urbanism and utopianism. These ambitious projects have national influence, and represent consistent effort in pursuing comprehensive environment to promote cities in the global economy. At the center of my investigation is the relationship between place making and social development. It raises a number of important questions about these urban visions. Has this growing awareness of sustainability become a driving force for innovative design of ecological cities, or does it remain political rhetoric for the marketing of an entrepreneurial governance? How does the increasing stratification of social structure, as a result of the market economy and changing demographic pattern, make an imprint on new urban forms and social spaces? In what aspects are these Chinese urban experiments different from their Western and Middle-eastern counterparts? Studying the emerging new town movement from both design and environmental perspectives, this paper

tries to present a general picture of ongoing urbanization in China through this eco-city phenomenon. This study will contribute to the understanding of new patterns of urban growth in our globalized era, and shed a new light on the pressing issues of sheltering the world's growing urban population and strategies of dealing with the current environmental crises.

### **HIGH-PERFORMANCE CITIES OR BUILDINGS**

Seung K. Ra, Oklahoma State University

#### Prelude

The International Energy Agency (IEA) in the World Energy Outlook, 2004 reported that the projected increase in worldwide electrification rates from 74% in 2002 to 83% in 2030 would provide a huge impact on social development, education and public health. The results would bring changes to basic human life, as well as environmental impact. For instance, reduction in the use of traditional fossil fuels for energy purposes, with attendant benefits of slower deforestation. As these changes take place, we must simultaneously look at infrastructure on a multi-level scale. The current trend is moving away from a monolithic infrastructural development, yet still the large scale projects create greater impact, economically, socially, and environmentally influencing the future urbanism. Because of the massive increase of urbanization and proliferation of cities, we must identify how the vital resources will flow and create new styles of urban infrastructure for global cities. Mega projects are not necessarily the answer for mega cities with mega problems. Common urban problems, such as energy intensity and population density, require thinking beyond physical size to issues of efficiency and sustainable generation. Smaller scale approaches combined with advanced technology will help to bring a larger impact on the global level, even if the physical scale is as small as changing a light bulb.

#### Motive

A recent article in the Economist (2010) suggests that Asian cities will determine the prospects for global CO2 emissions in coming years. As an emerging society, and perhaps the global stakeholder of urbanization, Asia is faced with great opportunity and great risk. The current rate and type of development are unsustainable. But unlimited possibilities lie in a sustainable exploration at the infrastructural scale. Expanding infrastructural urbanism is not only relevant to the Asian discourse, but globally. For example, the global demand for both quantity and quality of electrical power will need a global scale of investment in the near future: The Organization for Economic Co-operation and Development (OECD) predicted the total annual worldwide electricity investment needs through to 2030 average around \$350 billion and more than half of this investment will be spent on transmission and distribution.

The growing uncertainty of Architecture's mission in current urbanism, especially implementation of multi-scale infrastructural development as an urban intervention, will require its reposition and integration for building a High-Performance City. Based on the historical aspects of transformation of the city and the outlook of global investigation in terms of infrastructural investment, we continue to engage the future relationship between architecture and urban space and how the environment will be rapidly influenced by urban growth. The objective of the paper in building a High-Performance City is to not only encourage more efficient building for the future, but also to facilitate much more efficient networks within the current grid system. As the usage of energy becomes the driving force sculpting the future of our cities and reshaping existing cities, we must fully integrate Infrastructural development and architectural design within this new framework.

## SUSTAINABILITY I: TOWARD CARBON NEUTRAL CITIES

Andy Backer, IE University  
Belinda Tato, ETSA University

### **ACHIEVING THE '2020-2030 TARGETS' OF NET-ZERO-ENERGY-BUILDINGS WITH PARAMETRIC 3D/4D DESIGN TOOLS**

Thomas Spiegelhalter, Florida International University

The level of man-made CO<sub>2</sub> emissions worldwide climbed to a new negative record of 30 billion tons in 2010. For the building sector numerous energy efficiency market changes and benchmarking resolutions like the mandatory European Union 'nearly Net-Zero-Energy-Building 2018-2020 regulations' for all new public and private owned buildings, or the voluntary U.S. 'American Institute of Architects (AIA) '2030 carbon neutral building challenge' are now set up with various educational resource tools to help minimizing carbon emissions and try to reverse the negative impact. In overall the nearly zero or very low amount of energy required must be match to a very significant extent by reducing energy demand and producing renewable energy on-site, or from nearby sources in 2018.

But is this possible? How can Net-Zero-Energy-Buildings become curricular standard and practical routine in education and the profession, worldwide? To date, the basic curricular design process components with integrated project delivery metrics for a robust 3D/4D-net-zero-design regulatory framework are either incomplete or missing in most architectural schools! However, in some accredited schools, formally based curriculums have begun to change and weave numerous energy efficiency techniques and carbon-neutral design tool resources into their pedagogy. This research paper critically compares how these new criterions of accredited resources for digital 3D/4D-building information modeling (BIM), and 'Integrated Project Delivery' is mandating a better integration of collaborative carbon-neutral designs into the curriculum and practice of the profession.

Despite these promising tool resources, there is still a significant difference between how industrial designers and aerospace, aviation, shipping, and automobile engineering students use performance based parametric computing technology with integrated life-cycle-cost software engines to design zero-fossil-energy operated flying, swimming, diving, and driving infrastructures to architecture students. Since the 1980s, industrial designers have employed a different methodological use of 3D/4D-performative software in the aerospace, ship building, and automobile manufacturing than in traditional generative CAD and BIM architectural design. In architectural academia, generative computation has been primarily used for pure, aesthetic form-finding without applying zero-carbon-energy driven global performance metrics and CO<sub>2</sub>e reduction design strategies to reiterate derived designs. The advantage of parametric life-cycle design is that it links variables, dimensions, materials, and sensors to geometry in a way that when an input or simulation value changes, the 3D/4D-model automatically updates all systems and components simultaneously. These parametric 3D/4D models become manageable for designers to conduct various 'what if' life-cycle scenarios to design, optimize and change specific parameters, and benchmark indicators as needed.

The paper concludes that it is overdue that academia and the profession need to embrace a greater level of performative product- and industrial-design thinking in order to improve and to adapt to the needs of designing carbon-neutral Net-Zero-Energy Buildings as required by law until 2018! Radical changes to the core design education and the profession must be based on actual, annually-measured energy performance balance (kWh/m<sup>2</sup>/a) and carbon intensity (kgCO<sub>2</sub>e/m<sup>2</sup>/a) in buildings. Creative design

must continuously be reiterated and compared against systematic global 'best-building-performance' practices- rather than only looking at modeled assumptions of national peer groups of demonstration buildings.

### **AIRING RENOVATIONS: THE ATMOSPHERE OF PAUL RUDOLPH**

Kevin Moore, Auburn University  
Justin Miller, Auburn University

Increasingly, adaptive reuse has become an innovative practice, meeting new challenges with economically feasible and inherently sustainable solutions. Now, schools of design need to become leaders in this shift of attention, finally embracing our existing building stock as a valuable and renewable resource. Traditionally, renovations update and renew, adding amenities while uncovering a past. Renovations ground us in a tumultuous world of change. Looking to the future or anticipating change—proliferating new potentials—is still the privilege of new construction. New ideas need new structures. In fact, methods and motivations for adaptive reuse are largely absent from discussions of design innovation, especially in schools of architecture. For over thirty years, however, design in urban centers has privileged context through increasingly sophisticated techniques of analysis, assessment and intervention. The complexity of cities demands such a bold and prudent investment. Could renovations, likewise, be seen as interventions in a complex field of relations? Entirely new experiential potentials lie in maximizing effects with a minimum of resources: more change for less change. This new sensibility may assume less formal invention and more careful consideration of small but profound environmental effects.

This paper will present a 10-week undergraduate studio that repositions the renovation of a little known building by Paul Rudolph as an innovative solution to a new fraternity house. Rudolph completed the building precisely as he shifted attention from a climatically responsive ephemerality to an increasingly monumental spatial complexity. Air conditioning powers this change. As this generation of buildings, the first to abandon passive heating and cooling, requires renovation, new strategies are needed to reimagine their possibilities. Here, air is proposed as an aesthetic and performative medium. It is also introduced as a pedagogical tool to structure research, analysis, programmatic distribution, formal invention, material choice and visualization. Initial studies focused attention on the mutable pleasures of air as an inherently reactive but precise set of synesthetic phenomena. In addition to field surveys of other Rudolph buildings, the studio installed full-scale interventions in the existing building to test information in the air including internal pressure, velocity at openings, acoustic transmission and ambient light. The interventions also proved drastic changes in effect can result from decisions that show few traces in typical architectural drawings. Visualization tools including computational fluid dynamics (CFD) simulations were introduced during the design process to help visualize the possible atmospheric effects of each proposal. As a result, architectural solutions include carefully considered openings, curtains and ventilation to create meaningful thermal variety. In some cases, activities are proposed to occur in thermal zones rather than rooms. In many cases, materials including lighting are proposed to engage additional sensory potentials of air. The attempt to understand a building as a complex immersive vessel defies clear distinctions between visible and invisible realms and complicates what can be drawn with confidence. But this challenge may restore renovation as an innovative design practice in schools, one that promises to transform existing structures into sensitive containers—buildings to look with rather than look at.

## SUSTAINABILITY I: TOWARD CARBON NEUTRAL CITIES (CONT.)

Andy Backer, IE University  
Belinda Tato, ETSA University

### **ARCHITECTURE MUST FOLLOW THE STRATEGY OF MUSIC: SHARING**

Eduard Sancho Pou

The music industry has undergone a revolution that was on the verge of destroying it. In just over ten years, the public has stopped buying CDs and started downloading music. They have gone from possessing something physical that used to be collected and had a certain value to downloading intangible MP3 files that cost almost nothing. And the industry is beginning to adapt to this new situation, which has caused income to be generated from live concerts, subliminal advertising and digital royalties.

Architects are as baffled now as record companies were then. The bursting of the housing and subprime mortgage bubble has created a new scenario. What once had value and was secured by appraisers and banks has evaporated.

People are rethinking the need to own things, be it a home or a CD. The important thing is not to own something, but to enjoy it, and pay for it when you need it. Why store hundreds of CDs, if you can keep them on an iPod? Possession is a luxury only available to collectors and mythomaniacs. Enjoy the music you like and simply delete it when you are no longer interested in it. And this concept is moving into all areas, including architecture. Why do I need to buy a home if my job or my partner may take me to live in another city at any time? Why do I need a three-bedroom apartment if I live alone? If guests come, there are websites that will provide me with a spare room just a few metres from my house where I can put them up. Because the use of community resources is what the Internet offers. And that's more than saving. It's sharing and creating a society that does not waste.

Music is 10 years ahead of architecture; let's take advantage of its experience.

### **FROM THEORY TO PRACTICE IN DESIGNING, MEASURING AND BENCHMARKING CARBON-NEUTRAL-ARCHITECTURE: LOCAL EXAMPLES, GLOBAL PERSPECTIVE**

Thomas Spiegelhatler, Florida International University

Years of discussion among teachers, researchers, practitioners, and critics of architecture about climate change have prompted broad consensus about the potentially catastrophic consequences of our reliance on fossil fuel driven designs and the roles of architecture and urbanism in this cataclysmic condition. However, the slow pace of reform efforts and the inadequacy of most "sustainable" practices in achieving the United Nations Intergovernmental Panel on Climate Change's averaged annual Greenhouse Gas emissions target of 3.3 tons per capita by 2050 calls into question the efficacy of professional and academic initiatives in high-emitting countries. If committed advocates of sustainable construction cannot reach these goals, how will society adjust its relationship to the built environment in order to prevent apocalyptic climate change? The paper poses questions to the discipline and sustainable design practice of architecture: Using global benchmarking standards for analysis and evaluation, what models of sustainability rating and post-occupancy assessments have achieved the United Nation Environmental Program (UNEP) standards for reduced greenhouse gas emissions, and what new projects offer demonstrable evidence of the potential for reaching these goals? How do the professions – as individual practitioners, firms, and professional organizations – employ benchmarking to identify and publicize best practices? How do contemporary design practices challenge existing systems for evaluating sustainable development? To date, even the basic curricular design and training process components, with integrated project delivery metrics for a robust carbon-neutral-design regulatory framework, are either incomplete or missing in most architectural schools and professional organizations!

The paper will discuss and conclude how buildings should be designed, built and measured with resource foot printing on a common metric scale, which can only be realistically applied and globally benchmarked when interrelated life cycles of systems, materials, and land-use planning in this wider geophysical perspective are considered.

For example, the E.U. Directive on Energy Performance of Buildings (EPBD) has progressed to set mandatory goals to have all new 'public' buildings be 'nearly zero-energy-buildings' or nearly carbon-neutral by the end of 2018 and all 'private' buildings by the end of 2020. The nearly zero or very low amount of energy required should be covered to a very significant extent from renewable sources, including energy produced on-site or nearby. The United States American Institute of Architects (AIA) has proposed the voluntary '2030 Challenge', which aims to achieve fossil fuel reduction for all new buildings by 90% in 2025, and carbon-neutral by 2030.

The paper will outline that any legislative and curricular efforts must be based on actual, yearly, measured building energy performance balance (kWh/m<sup>2</sup>/a), carbon intensity (kgCO<sub>2</sub>e/m<sup>2</sup>/a) and a integrated building life cycle analysis, rather than on modeled assumptions from somewhat exceptional national 'demo buildings'. If this approach were to be used, it should be always compared against systematic global best practices, rather than only national peer groups of buildings. The paper concludes that the use of integrated performance metrics and life-cycle-analysis tools in the early stages of design will lead to a participatory and integrative practice planning to arrive at carbon neutral design.

## SUSTAINABILITY I: TOWARD CARBON NEUTRAL CITIES (CONT.)

Andy Backer, IE University  
Belinda Tato, ETSA University

### **TRADITIONAL MATERIALS OPTIMIZED FOR THE 21ST CENTURY**

Elizabeth Golden, University of Washington

The rapid pace of development and economic forces have resulted in the ever increasing complexity of construction, with most building components being manufactured out of materials and minerals coming from places located thousands of miles from the sites where they are installed. In his article, *Global in a Not-so-Global World*, Mark Jarzombek writes that "Buildings of even humble proportions are today a composite of materials from probably a dozen or more different countries. In that sense, buildings are far more foundational as a map of global realities...than even a shoe."<sup>1</sup>

Growth in countries such as China threatens to erase rich traditions of building with local materials. Traditional methods of construction in developing nations are being replaced by practices that are cheaper and faster, while the benefits of building with native, natural materials are being overlooked, or forgotten. Against this backdrop, a small but growing movement of architects around the world are critically re-examining context in terms of locally accessible building materials, available human resources, and construction methods native to the areas where they work. Contemporary methods of analysis and computer simulation, material testing, and collaborative on-site training are being strategically utilized to provide these architects with a greater understanding of materials that were previously so unpredictable. Reestablishment of cultural connections to local materials, collaboration and knowledge transfer, alternative construction methods, and even new building products are being realized by stimulating the evolution of traditional building techniques.

This paper will present global case studies featuring work from architects created by optimizing "traditional" building materials, such as earth, straw, stone, or wood. The construction methods employed are similar to those that have been used for centuries. Of particular interest are what historian Wolfgang Ullrich refers to as *Archaismen*, or *Archaisms*, which he defines as "The reference back to what has been forgotten and supposedly out-of-date...A culture that threatens to lose itself in sophistication sporadically requires calibration and to re-establish the roots of its origins and principles. *Archaisms* are forward looking, as they can open up new perspectives."<sup>2</sup> In these contemporary projects using traditional materials and methods, ties to the past are not made through formal or sentimental composition, but rather through the building process itself: through the interface between the architect, the material and the technique. Traditional construction methods are updated and optimized, and natural materials are being combined with industrial products, to create composite systems, which offer advantages over all steel and concrete systems. Local materials have lower embodied energy, create healthier environments, and the resulting buildings typically perform better than those made solely from industrially produced materials. These projects propose an innovative way forward at a time when people in the poorest countries are paying the highest price for global warming.

#### Notes

1. Jarzombek M., and Hwangbo A.B. 2011. "Global in a not-so-global world". *Journal of Architectural Education*. 64 (2): 59-65.

2. Ullrich, Wolfgang. 2008. "Vom Ursprung der Fulle und Vielfalt". *Werk, Bauen + Wohnen*. (3).

## CIVIC ENGAGEMENT I: DIRECT ACTIVISM

Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### **FROM FREEDOM OF EXPRESSION TO EXPRESSION OF FREEDOM: RESPONDING TO SOCIOPOLITICAL CHANGE IN THE CLASSROOM**

Magda Mostafa, American University in Cairo

On January 25th, 2011 the Egyptian reality changed. Civic society became a tangible being in the minds of a long too complacent world- filling the streets, shaking the ground and uttering demands that as recent as January 24th would have had you questioned, jailed or, at worst, killed. This change brought violence and even death, but it also introduced vocabulary into our everyday lives- words that had previously been absent- democracy, choice, rights and freedom of expression.

As educators, we quickly became aware of the gravity of challenges ahead and our responsibility to capitalize on the opportunities this presented us with. This paper sets out to outline the structure of the "Freedom Pavilion" project at the American University in Cairo, and its role in illustrating the power of design to convey meaning, mobilize society and effect change.

The American University, with a campus in Tahrir square, was both figuratively and literally a witness to the events of January 25th and its subsequent revolution, that took place at its doorstep. As part of its role to bear witness to these events, upon returning to classes on February 13th- a mere 36 hours after the overturned president succumbed to the uprising of the Egyptian people- AUC launched a project to collect artifacts from the revolution- namely the "University on the Square" initiative. The project outlined here is a design response to that initiative.

Beginning with the premise of exercising our freedom of expression through the expression of freedom, this project challenged students to present spaces and forms that could at once embody our newly born freedom, preserve its existence, promote the ongoing dialogue to maintain it and functionally house the artifacts that bore witness to it. Programmatically, this "Freedom Pavilion" project was required to house the "University on the Square" collection and at the same time create a space for free exchange of ideas, respectful debate and political discourse through elements like a speaker's corner, temporary exhibition space and public domain.

Projects developed in this studio ranged from abstractions of the revolution's narrative, to experiential spaces relaying the multi-sensory encounter of moving from oppression to freedom, to conceptual installations using the overlay of material, form and experience to relay meaning. Students challenged themselves to balance hope with realism, fact with romanticism and pragmatism with symbolic vision.

This paper will present the power of bringing civic engagement into the studio and integrating critical discourse, particularly with respect to its impact on motivating students, challenging their assumptions and fostering their creativity. In a visual essay this presentation will illustrate the various spatial experiences Egyptian students have chosen to represent this pivotal moment in history, their role in it and their chosen vehicle for the expression of freedom.

### **THE ARCHITECT CITIZEN: THE NATURE OF CIVIC ENGAGEMENT IN POSTWAR RECONSTRUCTION PROJECTS IN LEBANON**

Marwan Ghandour, Iowa State University

Based on studying postwar reconstruction urban projects in Lebanon, this presentation argues that user participation in the production of the design project is subject to highly contested political negotiation, which result in political (and material) gains, mostly to actors external to the user community. This presentation will propose that civic engagement should be considered a creative process, addressed through the architect-citizen model instead of the intensity of user participation in the design process. The architect-citizen, in that sense, is educated to constantly search for design tools and partnerships that allow her to integrate current and projected future user groups in the process of design.

SOLIDERE, Wa'd, and Nahr elBared Camp are three urban reconstruction projects in Lebanon that targeted neighborhoods destroyed through armed conflict in the 1970-80's, 2006 and 2007 respectively. Even though these urban areas were produced over decades of multiple social interactions and economic considerations, the reconstruction projects regenerated the whole area within contemporary political and social prerogatives, diminishing the diversity of actors and discourses in the process. SOLIDERE is the offspring of the neo-liberal government that took power in Lebanon in the early nineties, immediately after the end of the fifteen-year civil war. The project targeted historical downtown Beirut that included the historical markets of Beirut in which all economical and confessional sectors of the Lebanese communities were represented. In an effort to lure global capital, the project triggered radical demographic change by transforming all property and entitlements in downtown Beirut into shares that constituted SOLIDERE, a privately owned real-estate company. Wa'd, on the other hand, is about demographic stability. The main area of intervention of the Wa'd project is Haret Hreik, a dense residential neighborhood in the southern suburbs of Beirut. Making use of the political conditions of the civil war and its aftermath, which displaced the pre-war landowners, a handful of developers transformed Haret Hreik from a suburban neighborhood of Beirut in the seventies to a very dense urban neighborhood with stringent spatial conditions. Hizbollah, the main opposition group to the government at that time, spearheaded the project. The third site, Nahr elBared camp, is a neighborhood that originated as a semi-autonomous Palestinian refugee camp in 1949. At the time of initiation of the reconstruction project, the neighborhood community did not have a strong political representation, which allowed an informally developed group of professionals to initiate a highly participatory design process for the demolished camp. The project was later adopted by the United Nations organization UNRWA, the original caretaker of the camp.

Each of these projects includes a complex network of actors and user groups that may have a claim to the space of the project. In an effort to articulate the skill-set needed for the architect-citizen, this presentation will discuss the level of user participation in the design process in relationship to the resulting urban/social conditions that were/are being created in these three urban sites.

# WEDNESDAY, JUNE 20, 2012 - 4:30PM - 6:00PM

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## CIVIC ENGAGEMENT I: DIRECT ACTIVISM (CONT.)

Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### **TRANS-ACTIVISM IN DESIGN: A CASE STUDY**

Sally Harrison, Temple University

#### Trans-activism in Design: A Case Study

The call to activism in design has developed in myriad interesting ways since it was first articulated in the 1960s as a resistance to the juggernaut of top-down planning. (Hatch, 1984, Jones, et al. 2005) New design activisms are expanding the agency of the professions and engaging and empowering underserved communities in the process. Recasting the roles of client and professional, redefining the scope and subjects of design, and a broadening the sites and time-frames of discourse, design activisms have emerged around reactive, proactive and transactive models of practice.

Reactive practices are efficient and respond to need defined a priori: these include the modest pro bono professional services to community-based non-profits that form the core of the work of design centers, but also high profile disaster relief and other design efforts reacting to a humanitarian emergency. (Bell and Wakeford, 2008) In the proactive model of practice the designer takes the lead, framing critical social environmental issues through design research and speculation, temporary art-based spatial practices, or highly mediated events like charrettes and exhibitions. The third and most complex is the transactive practice: inefficient by intent, design evolves through a long-term commitment to a specific locale, building relationships of people to place to effect sustainable physical change. (Hamdi, 2004, Cruz, 2010) Often adopting elements of reactive and proactive practice, transactive process is always discursive and necessarily time based. Seeking emergent potential in creative use of space, connections are made between what is tangible and local and what is abstract and systemic.

The presentation reviews the three modes of design activism, focusing on a case study of a transactive practice undertaken over twenty five years in an impoverished urban neighborhood. A three block area is home to a unique arts organization led by artists and designers working with local youth to bring creative expression into a place seemingly without hope. Grown incrementally, it first appropriated a 19th century storefront as dance studio, then expanded its reach, rehabilitating abandoned row houses for classrooms and transforming the increasing number of vacant residential lots as public spaces with brilliant mosaic murals and sculpture. But the post-industrial economy has taken such a heavy toll on the fabric of the neighborhood that the organization is exploring ways to stimulate further growth. The emergence of interest in new modes of arts education, performance and urban gardening suggests other ways to occupy, intensify, heal and re-structure the space where the organization is situated. A nearby university's design faculty and students, local teens and their families, staff and artists have been engaged in imagining the future of the place. Seeking to frame a continuous dialogue between a compelling future and a lived present, the designers developed a transactive process where long term vision is balanced with strategic catalytic interventions that activate and map out the sites of potential growth. A plan is being presented to its funders and to other public stakeholders and first of these interventions is being developed.

## OPEN I

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **CECIL TUERA CELA**

Colin Rimpley, Ryerson University

In his 2009 *A Brief History of the Future*, Jacques Attali characterizes the history of progress as one of the conversion of service industries into consumer goods. In recent years we have seen this notion taken one step further, as consumer goods such as CDs and books – physical congealments of the service industries of musical performance and storytelling – have vanished before our eyes, converted this time into pure information. A previous generation of architects saw the same process happen in the building trades, as the craft-based trades gave way to mass-produced consumer goods (often chosen by the architect from a catalogue). What we are witnessing is a double change of state: relational to solidified to indexical; however, unlike the state changes of ordinary matter, these changes are not reversible.

The architectural profession – or at least that part of the profession devoted to the service of clients – is inherently vulnerable to such an historical development. We are surely on the brink of massive incursions into the life of the professional architect of technological solutions – indeed, we see them already, as performance-modeling tools take over the traditional role of human calculation. There are more to come: the analysis software that verifies (and certifies, for official purposes) compliance with local building codes; detailing software that produces technically competent, affordable and sustainable solutions for any tectonic situation (along with a discount on your liability insurance). Can design itself – or Design – be far behind? Patrik Schumacher (2011) has suggested that parametric design shifts the role of the designer to that of curator, coordinating inputs and subsequently choosing among potentially many automatically generated outcomes, while Cynthia Ottchen (2009) points to a future in which soft data sets render even the curatorial services of the architect/designer unnecessary.

What, if any, will the role of the architectural profession in such a scenario? Ottchen insists that the architect is still critical to the process; as “multidisciplinary strategist [the] new architect is still ultimately responsible for design intent.” While compelling, this is not the only conceivable or likely operational future for the profession. Equally plausible, are two other scenarios: the architect as expanded public intellectual, engaged in and embedded in the likely increasingly strident debates around the form of our urban and natural environments in coming decades; and the architect as craftsman, as haute couture designer-artist, engaged in a traditional understanding of the material and technological practices of architecture. By examining each of these scenarios from the point of view of architecture’s institutional DNA – the profession, the practice(s), and the discipline – this paper aims to open for discussion the ways in which we today, as educators, might anticipate the future needs of our students.

### **References**

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Ottchen, C. (2009). *The Future of Information Modelling and the End of Theory*. *Architectural Design*, 79, 2.  
Schumacher, P. (2011). *Parametricism and the Autopoiesis of Architecture*. Log 21.

### **FRAMING THE FACTS: MOVING BEYOND A MULTICULTURAL SURVEY OF ARCHITECTURAL HISTORY**

Charles L. Davis II, University of North Carolina at Charlotte

This paper analyzes the limits of multiculturalism for promoting diversity in architectural education to propose an alternative approach for teaching architectural history in professional schools. Multiculturalism has been an implicit paradigm in the National Architecture Accreditation Board’s requirements for professional architecture schools since the late 1980s. The latest policies require architecture schools to provide students with an “understanding” of global traditions of architecture including works completed by Eastern hemisphere, minority, and women run practices (NAAB 2009). Despite new textbook surveys that promote a global understanding of architectural history, canonical values associated with “civilizational development” and “monumentality” continues to promote the selection of “significant architectural precedents” (Jarzombek, Prakash, Ching 2010, xii). Recent scholarship demonstrates the implicit effect these values have on marginalizing the presence and agency of social minorities who do not exemplify these dominant social values (Kaplan 2010; Stevens 2002; Chamberlin 2010; Wilkins 2011). Diversifying architectural education requires more than creating a multicultural survey of monumental architectures; it requires exposing the continued social function of architectural canons, past and present.

Critiques of multiculturalism have emerged within the humanities since the mid-1980s. For progressive academics, the political goal of multiculturalism was the preservation of minority groups’ rights. In a democratic society that elevates the defense of individualism, this required recognizing the formative role of group identity in individual formation (Taylor 1994). This ontological account of social difference, however, has been used to promote a “politics of recognition” that merely recognizes cultural differences without interrogating the causes of structural inequality (Barry 2001). This recognition has paradoxically placed minority cultures in a vise that requires them to only define themselves in relation to canonical values. The tension between increasing the representation of cultural difference and preserving the protections afforded minority groups has played itself out in architectural education as well (Davis 1991; Bozdogan 1999). The NAABs strategic use of the term “understanding” over the more rigorous requirement to develop one’s “ability” to work within global traditions strongly suggests the dominance of a politics of recognition within professional education.

My paper situates the pedagogical aims and learning objectives of a course I have developed over the last four years, entitled ‘Race and Architecture’, within the shifting debates on multicultural education. The purpose of this course is to demonstrate the historical influence of racial discourses on architectural culture, a goal that aligns with postcolonial critiques of canonicity. However, this class expands its focus beyond the most obvious effects of racism in non-Western or Third-World contexts. It explicitly identifies the tendency of multicultural paradigms to mitigate the social responsibility of the architect. This means identifying the institutional function of racial discourses in promoting cultural norms that perpetuate racial inequality in architecture. This class proposes that racial and ethnic discourses be considered a consistent element of architectural culture, and insists that ‘race’ be understood as a cultural construct with political and formal implications. These consequences are explored through interdisciplinary reading and building case studies in nineteenth and twentieth century transnational contexts.

## PRACTICE I: AT THE CONFLUENCE OF RESEARCH AND DESIGN

Felipe Correa, Harvard University  
Louisa Hutton, Sauerbruch Hutton

### **DEVELOPING A DESIGN THEORY: THE ABEND SINGLETON STORY**

David Sachs, Kansas State University

This paper explores the design philosophy that guided the work of the celebrated late 20th Century Kansas City architectural firm Abend Singleton. The work spans almost 40 years and is remarkably diverse; it reflects the dramatic changes in architectural culture and taste of the time, yet exhibits common attitudes and characteristics that suggest the presence of a consistent underlying theoretical basis.

The ideas manifested in Abend Singleton's work were drawn from varying sources; they were a rich amalgam that grew out of the experiences and values of the principals, Steve Abend and Crichton Singleton, and the dynamics of their office. Abend and Singleton carried forward the lessons of their teachers, which included ardent exponents of heroic modernism as well as individuals who were beginning to question the limited focus of Post World War II International Style modernism, notably Aldo Van Eyck, Balkrishna Doshi, and Louis Kahn, but Abend and Singleton interpreted them quite differently based on their individual interests and sensibilities. Critical reflections in their internship experiences provided Abend and Singleton with an understanding of the difficulties in the practical application of these ideas. In their joint practice, which began in 1967, Abend and Singleton's design methodology evolved in response to the unique challenges they faced, and with the participation of the many talented young architects who passed through the firm. Their approach was at once flexible and responsive, and also deliberate and rigorous.

The paper illustrates a sampling of key projects as a way of showing both the processes and formal implications of Abend Singleton's working theory. These examples show the value of an enlightened modernism, which remains optimistic while embracing the vicissitudes of an uncertain world. Abend and Singleton found a way to challenge the expectations and raise the standards of both their clients and employees. They were able to produce uniquely appropriate buildings of various types and at diverse scales.

Abend Singleton's work is illustrative of the expanding interests and sensibilities of the modernist tradition through the latter part of the 20th Century. While the challenges facing today's architects continue to change, an understanding of the Abend Singleton story can provide a hopeful example of how such challenges have been addressed in the past, and might be tackled in the future.

### **LEARNING ARCHITECTURAL RESTORATION THROUGH COOPERATIVE WORKING STRATEGIES**

Mariona Genis, ETSAB (UPC)

Albert Casals, ETSAB (UPC)

José Luis González, ETSAB (UPC)

The theoretical, technical, and multidisciplinary specificity of the Architectural Restoration education often entails the knowledge fragmentation and makes the student lose the necessary global and complex view of the matter.

In this paper we present some of the conclusions of an educational research project which seek to improve the architect's ability to analyze, reflect and especially to synthesize during the intervention's process in patrimonial buildings.

The main education method applied is based on the objective-systemic method to restore patrimonial buildings. This method uses as a comprehension tool the systemic approach from Mario Bunge (Bunge, 2002), and as an axiological basis the Alois Riegl value theory (Riegl, 1902) adapted to 21st century.

The original hypothesis is that the use of a method in which the student manages the specialized information using cooperative learning, allows the work team to reach a wider consensus on the use of this information in the project and therefore it helps to involve it in the development of the design proposal.

The whole project consists on six case studies to be carried out in several university centers. At this moment, two out of these six cases has been carried out in the Máster de Tecnología, especialidad en Restauración y Rehabilitación ETSAB (UPC). In both of them, four student's teams have analyzed, evaluated and planned in an existing patrimonial building under a real restoration process from we had all the previous studies made. The selected buildings were World Heritage Monuments like como the Tempio Duomo di Pozzuoli (Napoli, Italia) or the Pabellón de San Manel en el Hospital de Sant Pau (Barcelona, España).

Along the whole analysis process several specialized roles has been assigned to the students: architect, historian, art restorer and archeologist. They had to form multidisciplinary teams with one specialized student from each area.

They all had their specific information and competences, and in several classrooms's meetings they had cooperative learning sessions using the jigsaw technique. In this kind of sessions they use to have a primary meeting between specialists to deep into the specific knowledge and then they returned to the basis multidisciplinary group to transfer this knowledge. In an addition to this cooperative work they have been using during the whole process a wiki site linked to each specialty.

First evidences collected about the cooperative learning utility to incorporate the specific knowledge into the design proposal are very positive, especially for workshop's classroom attendance (98%) and the degree of satisfaction achieved about the utility of the process (0.81).

But further than this global opinion, in a correlation analysis some of the questionnaires variables show an important correlation in this following key issues: the specialist's discussion improves the consensus achievement in the main project choices (0.83) and the taken choices are much more consistent with the previous analysis (0.86). These variables are considered crucial to the success of the following case studios and offers good perspective.

## CITIES II

Jeffrey Johnson, Columbia University  
Yung Ho Chang, Massachusetts Institute of Technology

### **APOCALYPTIC DESIRE AND OUR URBAN IMAGINATION**

Amy Murphy, University of Southern California

This paper seeks to explore the role of the apocalyptic trope in popular culture and its influence on our ideas of future urbanism. For nearly the last three millennia, some portion of the world's population has subscribed to the notion that the world as we know it is going to be destroyed by the wrath of nature, the will of God, or, more recently, by humankind itself. While many apocalyptic references relate back to conservative (often religious) traditions, a great number in circulation today are being promoted by alternative (non-religious) entities with equal veracity. As eco-theorist Greg Garrard has written, not only has the apocalypse as an idea been present since the beginning of Judeo-Christian time, but more recently the apocalypse trope has "provided the green movement with some of its most striking successes," with publications such as Rachel Carson's *Silent Spring*, Paul Ehrlich's *The Population Bomb* and Al Gore's *Earth in Balance*.

Whether within Alan Weisman's bestseller *The World Without Us* (2007), Pixar's blockbuster *Wall-e* (2008) or any number of the many post-apocalyptic Asian anime films produced over the past twenty or so years, there are no shortages of references to life after the fall of industrial-capitalism in today's media. While some post-apocalyptic representations such as the anime work *Akira* (1988) or the History Channel's *Life After People* (2008) might remain fairly nihilistic in their future projections of urban life, the majority of these post-apocalyptic narratives provide some glimmer of hope that, with some exact changes to certain western traditions, a new type of sustainable balance is possible. In terms of architecture, this desire has begun to register itself in contemporary urban planning projects such as *The High Line in NYC* (2011), which provides a certain poetic vision for a future with a greater sense of nature's presence and nostalgic remembrance of the industrial age now passed.

This paper builds on my own past research on how the now-ubiquitous metaphor of the apocalypse might inform our current discourse about future cities, sustainable technologies and the role of nature in urban planning today. Relating a number of post-apocalyptic anime films to a number of recent urban/natural disasters, the paper extends itself to engage Ulrich Beck's theory of reflexive modernism, and attempts to connect his theories on social agency to the theme of this conference regarding 'change' and our role as architects in imagining the future. While many of the threats that fuel today's apocalyptic imagination are real, I argue in the end that the real crisis of the future is first and foremost that of time— or more precisely our current out-of-date concept of historical time.

### **THE UNPLANNED CITY: PRESERVING PLACE THROUGH URBAN MAKING**

James Fowler Eckler Jr., Marywood University

The American City is changing. For a long time it has been "shrinking" as populations evacuate the center<sup>1</sup> in favor of the ex-urban periphery.<sup>2</sup> However, recent evidence suggests that the trend may be slowing, or even reversing.<sup>3</sup> This reality presents opportunities to transform our cities, as long as we avoid pitfalls of planning.

Roles architecture plays in urban transformation are varied. Architecture that doesn't consider characteristics of local culture will disrupt a city's evolution.<sup>4</sup> This architecture is a component of a planned city that supplants local traditions with a contrived image of urbanity; the city becomes "theme park."<sup>5</sup> However, an architecture that builds from existing conditions is one that has the potential to foster social interaction and cultivate a sense of community.<sup>6</sup> It contributes to an unplanned city, one that evolves according to the changing needs of a populace.

How can architecture facilitate unplanned change? Can the city be transformed at the scale of individual buildings, or are these practices forever relegated to urban planners working at the scale of districts? Is there a way to reestablish the role of the architect as urbanist through design education? These questions frame a proposal for design pedagogy that explores the potential of architectural intervention to act as a catalyst for the growth of the American City.<sup>7</sup>

This pedagogy promotes an understanding of the city as a complex set of inter-related systems, both cultural and physical.<sup>8</sup> Studios implementing it depend as much on technique as knowledge. Generative mapping is used to document and analyze urban form and cultural traditions. Synthesizing different facets of the urban context enables the student to understand social drivers of urban form. The act of mapping guides the design of an architectural intervention that responds to multiple site forces. Can architecture be at once generated by the constraints of its surroundings and a force for directing their transformation?

This paper proposes strategies for addressing issues of the city in architectural education. Of special interest is the technique for generative mapping, the architecture that results from it, and the potential of this design process to affect the transformation of the city while preserving its unique character.

1 See David Rusk. *Cities without Suburbs: A Census 2000 Update* (Washington D.C.: Woodrow Wilson Center Press, 2003)

2 See Mario Gandelsonas. *X-Urbanism: Architecture and the American City* (New York: Princeton Architectural Press, 1999)

3 The Brookings Institute Metropolitan Policy Program. *State of Metropolitan America: on the Front Lines of Demographic Transformation*. (Washington D.C.: The Brookings Institute, 2010)

4 See Colin Rowe and Fred Koetter. *Collage City*. (Cambridge: MIT Press, 1978)

5 See Michael Sorkin. *Variations on a Theme Park, See You in Disneyland*. (New York: Hill and Wang, 1992)

6 See Lebbeus Woods. *War and Architecture: Pamphlet Architecture 15*. (New York: Princeton Architectural Press, 1993)

7 See Stan Allen. *Points + Lines: Diagrams and Projects for the City*. (New York: Princeton Architectural Press, 1999)

8 See Christopher Alexander. "A City is Not a Tree" *Architectural Forum* (122, no. 1, April 1965: 58-62)

## CITIES II (CONT.)

Jeffrey Johnson, Columbia University  
Yung Ho Chang, Massachusetts Institute of Technology

### **URBAN MAPPINGS AS A VISUAL RHETORICAL TOOL FOR DESIGN TEACHING CHANGE**

Paulo Providência, Universidad de Coimbra

The urban context is considered as a typical problem of master's courses on Design Studio's assignments in architectural education. Conversely, bachelor students mainly learn basic design tools such as drawing and model making, geometry, structural conception, and basic tectonic issues. Bachelor courses, overlooking urban context and avoiding cultural and social meanings for architecture, subsume design, to design skills learning. The question that comes about is, thus, how to incorporate specific urban topics on design studio assignments in a bachelor level? Moreover, what change in practice is necessary in order that those incorporations may lead to a more world aware strategy for design studios?

This paper addresses cognitive mappings of urban topics as a visual rhetorical tool for design teaching on design studio. Mapping is an activity that implies collecting, choosing and inscribing information, bringing tacit into explicit knowledge. Only throughout the urban experience – walking, drawing and describing urban space - students may get empirical information in order to map it. Besides, collected information must correspond to three topics and respective types of urban mappings: Cultural mappings draw social use and functions of urban spaces for programmatic aims. Affective mappings draw unexplored or hidden urban spaces for architectural articulations, and Critical mappings draw iconic or conceptual urban infrastructures as a support for architectural design.

From a teaching / learning approach, cultural, affective and critical mappings and correlated cartographies allow a reflection-in-action practice, and have a generative character over design proposals. Mapping the urban experience is an iterative design process related to the argument of proposals, and results in the production of empirical urban cartographies. Moreover, mapping for the design proposal is a heuristic-creative process, as mappings do support the design idea, drawing a solid ground for architectural projects delivered by the students.

Rhetoric is a process of meaning production, and as an art of persuasion it may be understood as a tool for refinement of design proposals. The uses of rhetoric communication strategies allow to structure oral as well as visual communication. The way visual rhetoric translates specific architectural aims and objectives throughout urban cartographies is a very rewarding process, because it leads to the clarification of the purpose of each data mapping and its pertinence for the general argument of the design proposal. Researching specific visual rhetoric arguments is also a way of learning communication skills, and turns design proposals more comprehensive.

This paper is supported by investigation collected from selected works developed by design studio students and it is centred on the rhetorical role that cultural, affective and critical mappings and correlated cartographies have on teaching exploratory Design Studio at bachelor education level. The paper also explores visual rhetoric as a mean for architectural design communication.

### **URBAN NOMADS**

Nicoline Loeper, Saxion University  
Matthias Ott, Saxion University

Urban Nomads

Since the 80s it is argued that architecture and urban design are changing, due to multiple factors. The profession reacts with interesting approaches to this fact. Nevertheless education in architecture and urban design seems to be captured in inflexible and static curricula.

Urban design in The Netherlands has a high level and a rich tradition. That allows us to experiment with new education methods. Four years ago Saxion University of Applied Sciences therefore has started an urban design school. This school works with a new flexible educational approach: "Urban Nomads".

Urban Nomads is exploring the potentials of the dynamics of change, in order to create flexible design solutions: strategies for dealing with changing circumstances. Just in time, together with the field of activity.

Strategy

It is essential that the education form can be easily adapted to the given circumstances. Therefore the study consist, after the first regular year, of short and intense workshops, with clear results. These workshops travel like nomads, according to partners, participants and assignments, through the field of activity. Spontaneously, independent and aware.

Case: "Public Places in Hybrid Territories" (2010/2011)

Assignment: try to find design potentials in the transformation of harbour areas and the urban network that is related to it.

Participants: urban design students of the Saxion University of Applied Sciences (The Netherlands) and architecture students of the Fernando Pessoa University in Porto (Portugal).

Designweek 1 (Amsterdam/ Rotterdam):

Students analyzed ongoing transformation processes in the harbour areas of Amsterdam (like Borneo Sporenburg by West 8 and IJ-Oevers by Ton Schaap) and Rotterdam (like Muellerpier by Kees Christiaanse and Kop van Zuid by Renzo Piano/ Koolhaas) .

Several days excursions to these areas, lectures by the urban designers, municipalities and users of the areas. Urban dialogue and discussion.

After that: workshops, on a specific location in the harbour area (Quarantine Island, Rotterdam), coached by local professionals.

Results: the students developed a toolbox for a design strategy.

Designweek 2 (Viana do Castelo):

Students visited the abandoned harbour area of Viana do Castelo, to compare it to the Dutch situation, and to test the applicability of their strategies. Excursions, lectures of professors of the university.

After that workshops, at the university of Porto, coached by professors of different disciplines and universities.

Results: the students applied their toolbox, and developed a design.

## CIVIC ENGAGEMENT II: ALTERNATIVE DESIGN PRACTICES

Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### **“FROM THE ICONIC TO THE EVERYDAY: INSTITUTIONAL SHIFTS FOR STUDENTS AS CITIZEN DESIGNERS”**

Arunava Dasgupta, School of Planning and Architecture

This paper discusses the role of architectural institutions within the prevailing scenario of rapid change across all levels of human settlements in emerging economies like India with specific focus on the need for paradigm shifts in design studio pedagogy from simulated problem-solving exercises to civic engagement processes.

The obsession of practicing architects in India towards the iconic continues to be the driving force behind individual thrusts of creativity in more ways than one. Sadly, this prejudice connecting the “special” or “different” as architecture against the everyday to that which is not, stems from a pervading malaise rooted in the world of architectural education within design faculty and students across this sub-continent. Such a trajectory of design exploration within studios in majority of architecture schools has typically confined itself to the development and training of design minds in the pursuit of ‘extra-ordinary’ projects revolving around large-scale, albeit contemporary urban artifacts as the focal catalyst for design exploration. More importantly but quite understandably, this prevailing fixation towards the iconic has visibly resulted in inhuman, anonymous, degraded physical environments of everyday living across the total urban spectrum. Moreover, architectural practice so far, has overwhelmingly concentrated on metropolitan city turfs that have in turn gleefully swallowed the creative cream of the profession while some residual talent has desperately tried to answer the needs of remaining urban domains. It is imperative to bring into focus right away though, that this heavily lop-sided orientation of the profession towards urban arenas of engagement constitutes but only 30% of the more than 1.2 billion people of this country served by the profession today!

Over the last two decades, the pace with which this country has been transforming in response to its increasing connectedness with the global economy is seen to effect widespread and unprecedented aspiration-driven demands on the professional expertise of architecture and related disciplines. Much of this demand now is palpable from non-metropolitan urban domains and quite significantly from the vast majority of the rural counterpart. Such demands of change are also not confined to the “special” or the “extra-ordinary” but far more to the day to day, even mundane, needs of growing societies. Issues of equity, sustainability, identity and continuity have all come to the fore in this unforeseen rush for change.

Is there a role of architects beyond cities? Is there a way to cultivate a learner centric, personal engagement with city space as the foundation for a citizen-designer exploration of our environments? Could there be an agenda of creative collaboration through civic engagement and participation with social realities for design studio pedagogy to evolve into? In a break away from the erstwhile academic tradition, using the experience of the first public art festival in the city of Delhi and multi-dimensional institutional initiatives within remote Himalayan tribal villages, this paper explores the dynamics of students as citizen designers engaging these questions as a possible first step towards an alternative, immersive and nuanced approach informing change and connected imaginations in our part of the world.

### **HUMANISM, UNIVERSALISM AND THE “NATIVE GENIUS”. CIVIC ENGAGEMENT IN HOUSING DESIGN FROM ALBERTI TO CIAM AND BEYOND**

Nelson Mota, University of Coimbra  
Goncalo Canto Moniz, University of Coimbra  
Mário Krüger, University of Coimbra

Alberti’s famous analogy “a house is like a small city and the city is like a big house” has been repeated as a mantra to promote a more humanist approach to architecture and urban design. This dictum was used by the post war generation of architects and urban planners engaged in the revision of modern movement’s interwar principles to foster a re-conceptualization of the role of the individual in the built environment. This issue was especially relevant to mass housing design in the aftermath of World War II and urban renewal processes from the 1970s onwards. Nowadays, we are again facing times of change. There seems to be a trend to polarize the participation of the individual on architectural and urban design practices related with mass housing. On the one hand, spontaneous engagement of the individual is praised as expression of one’s identity. On the other hand, commodification of architectural practices detached from a particular circumstance is also gaining momentum. In this context, to what extent both participatory processes and the attention to local culture can contribute to deliver a more humanist approach to housing design? How can universalist approaches be mingled with the “native genius”? Has the affirmation of the particular to be made against the universal?

In his *De re aedificatoria*, Alberti contends that the elements relevant for understanding a building are *regio* (the surroundings of the building), *area* (the building site), *partitio* (partition), *parie* (wall), *tectum* (roof), and *apertio* (opening). Together with highlighting the importance of taking into account in the design of a building universal concerns on issues such as climate, hygiene and salubrity, Alberti stresses also the central role of adapting the building to its context. This dialectic would be also central in post war architectural education in Portugal, especially in the Oporto School led by the figure of Carlos Ramos, who fostered the transition between a Beaux-Arts system and a modern approach. In the 1956 CIAM congress in Dubrovnik, a group mainly composed of former Ramos’ students presented a proposal for the design of a rural community, which showcased an outcome deeply influenced by both Alberti’s humanist discourse and the Team 10’s “other” modernism. Moreover, this group’s proposal was seminal in supporting an architectural approach that could foster civic engagement in the design process, foreseeing the 1970s and 1980s trend towards the promotion of users participation in the design process.

Drawing on research currently being conducted about Alberti’s influence on architectural theory and practice in Portugal, this paper will contribute to discuss in contemporary architectural education and practice the need for a re-assessment of the immanent values shared by both the Renaissance humanist and the post-war revision of modernist principles. The role of the individual and its community as part and parcel of a process where assumed dogmas were changing will be especially highlighted. This paper will thus deliver a contribution on how change in the built environment can be fuelled by civic engagement in the design process.

## CIVIC ENGAGEMENT II: ALTERNATIVE DESIGN PRACTICES (CONT.)

Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### **PARTICIPATORY ANALYSIS OF THE LIVING ENVIRONMENT: THE PLUS ULTRA**

Leandro Madrazo, Ramon Llull University  
Angel Martin Cojo, Ramon Llull University  
Omayra Rivera, Ramon Llull University

With the context of a joint European academic program, during the second semester of the academic year 2010-2011 we have carried out a participatory pedagogic program in the Plus Ultra neighborhood in Barcelona with the participation of students and citizens. This program was part of a network of learning activities carried out in collaboration with five European schools of architecture and urban planning.

The neighbourhood consists of a group of low-rise houses constructed by the first settlers in the 1930s. From that time on, the neighbourhood has undergone a considerable transformation: in the surrounding fields housing blocks have been built, leaving the old Plus Ultra neighbourhood like an island in the middle of a newly built environment; a leftover from another time. The city urban planning office has elaborated a special plan to replace the existing buildings, while maintaining some of the spatial and formal features which characterize the settlement. However, neighbours have reacted against this plan since considering that part of their lives would go away with these buildings. Emotional, but also financial interests – discussion on the value of their properties, having to move somewhere else during the time of construction– are behind the neighbours' claims.

We thought that the on-going debate provided an opportunity for citizens and academics to engage themselves in a common study on the value and significance of dwelling in our contemporary societies. Students –guided by their tutors– helped the neighbours to externalize and communicate their views, perceptions, and experiences about their dwellings and their live in the neighbourhood. Somehow, students played the role of mediators between the neighbours and the city administrators by creating the conditions that favoured dialogue.

A series of learning activities were designed specifically with the following purposes:

- To collect first hand information from the inhabitants regarding the perceptions and experiences of their living environment
- To provide citizens with the appropriate methods and tools to express and communicate their perceptions of their living environment
- To promote citizens' participation in the urban planning process

To achieve these goals, we used different kinds of techniques: meetings with citizens in the neighborhood, recorded video interviews, narrations, schematic representations of the urban spaces and dwellings, and photo elicitation. The information obtained was discussed and analyzed in the classroom, and then communicated to the community through a blog specially created to support this pedagogical experience.

At the end of the semester, the knowledge collectively acquired was presented to the neighbourhood in a public presentation structured in the following themes: dwelling, memory, community, being rooted to a place, offering resistance, public space, accessibility, limits, and density. This pedagogical experience involving students and citizens caught the interest of the local press which dedicated an article to report on the work done.

### **DESIGN LITERACY AND CIVIC LITERACY: AN AMERICAN EXAMPLE IN MEDIA RES**

Sabir Khan, Georgia Institute of Technology

For a second-tier city Atlanta figures prominently in both the national and the disciplinary imaginary: from its Civil War “burning” to its moment in the global spotlight during the Centennial Olympic Games (the first “third world city” to host the games); and from the lurid and fulsome accounts of James Kunstler and Tom Wolfe to the conceptual tease of Rem Koolhaas: “Get away from Paris and Amsterdam and go see Atlanta. Go straightaway and without any preconceived ideas”.

Against this backdrop, an urban project of transformative potential is underway, with significant implications for how cities and citizenry mutually inform and produce one another. The Atlanta Beltline Project has commissioned 22 miles of underused or abandoned freight railroad lines to provide the organizing framework for a braid of trails, parks, transit, and higher-density intown development and, in the process, has galvanized the city and its citizens in a collective bottom-up and top-down effort to reshape their physical, social, and civic, landscape.

The Beltline is an American “grand project” in media res, and as such, provides a rare opportunity to see how “design” literacy and “civic” literacy may reinforce each other and, in the process, deepen our understanding of the way a city may be conceived, perceived, and lived.

This paper focuses on the interplay of designers, architects, artists, professionals, academics, politicians, community activists, and everyday citizens to parse the multiple discourses – formal, aesthetic, professional, political, civic – that inform the Beltline. It identifies the issues that such a project raises – for the design, planning, and governance of cities; for the professionals usually associated with these tasks, and for the current and future inhabitants of the City of Atlanta and its metropolitan region.

The ambitions and operations of the Beltline mirror and refract many of the same tensions that have marked the transformation of post-Franco and post-Fordist Barcelona: the tension between grand plans and everyday life, between regional, local, and infrastructural scales, between territorial strategies and site-specific projects, between democratic desire and technocratic impulse, and between political vision and the collective imagination.

## TECHNOLOGY I: SCALES OF ENGAGEMENT

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### BIOMIMETIC INFRASTRUCTURE

Mariam Mojdehi, Georgia Institute of Technology

Infrastructure is the ideal lens with which to study architecture's relationships with culture, development, and technology. Contemporary urban life can be defined as a series of unexamined daily interactions with various systems designed to meet our demands for comfort and safety. That we are able to carry such high collective expectations of access to clean water, inexpensive food, and reliable energy is a triumph of modernity. As populations grow and migrate into cities and as global warming shifts from a trend to an irreversible pattern it is time to reevaluate the cost and effect of our infrastructure systems. Instead of measuring against the short metrics of delivery at lowest consumer cost, can we reconsider infrastructures as more holistic, integrated networks?

Architectural education, shifting away from its preoccupation with the design of singular buildings and sole authorship, is ideally positioned to address global problems such as population growth, transportation, and unprecedented water demand. Within this expanded terrain of networks and systems is a biologically inspired approach to design. Employing nature's 3.8 billion years of 'research and development', a biomimetic design approach lies at the intersection biology, design, and technology. It privileges a systems based approach to materials and fabrication. Additionally, it seeks opportunities for synergies and optimizing symbiotic relationships. This is radically different from the expectations and parameters from which we presently design. For example, there are 5 natural polymers for mankind's petroleum derived 350. Yet even with this expanded palette, we have yet to manufacture anything that has the strength of spider's silk, or the passive ventilation capability of a termite mound. In nature, there is no such thing as waste, rather systems are closed energy loops where the waste of process is fuel of another.

When biological systems meet emergent techniques of assembly, fabrication, and software modeling and scripting new synergies occur. In this realm, designers are enabled to investigate materials beyond a finite object based approach and invest in performance as a measure of a systems ability to adapt, evolve, and maintain homeostasis. Biomimetic Design's goals are to seek optimal material efficiency and produce a closed energy cycle (waste reduction/ elimination). Performance is tied to form, just as skin is tied to skeleton. It has the potential to re-frame attitudes towards materials and to blur the boundary between inorganic and organic. These goals are neatly aligned with the expanding demands of our evolving urban infrastructures. The emergent range of renewable energy possibilities (tidal power, solar energy, and wind power) as well as emergent typologies (desalination plants, seawater greenhouses, and vertical urban farming) collectively serve to illustrate both the need to reconsider or infrastructural systems and the potential relevance of a biomimetic approach.

### EXTREME ENVIRONMENTS: LIVE INPUTS - VARIABLE OUTPUTS

Nataly Gattegno, CCA + UC Berkeley

Contemporary design practice demands the reinterpretation and recasting of the territory of architecture. This territory has become expansive and routinely employs a promiscuous mixture of design tactics from the fields of fluid dynamic modeling, robotics, advanced fabrication, biology, environmental and material sciences. In doing so it actively generates and designs its own unique formal and environmental conditions. This expanded territorial practice takes in information from its surrounding environment and through a reformulation of these live inputs yields formal logics and variable outputs that are simultaneously representational frameworks and spatial armatures for architecture and design. There is a fundamental shift taking place in how we expect these frameworks to perform as analytical machines, and how in turn these machines become dynamic, and perhaps intelligent, performative frameworks for architecture and design. This paper explores the opportunities of an architecture that relies on changing, mutable and dynamic inputs and interrogates the variable and evolving outputs that such a design framework may yield. The results are possible due to the expanded territory of practice, academia, and technology. They propose a more interconnected, networked – dare we say ecosystemic or eco-logic design process.

In general terms, ecosystems are defined by networks of agents that self-organize into complex hierarchies, patterns, and processes. The 'system' in 'ecosystem' implies the importance of interaction and interdependency among the parts. The 'eco-' in 'ecology' connotes the structure and function of a collection of agents—whether microbes, particles, plants, animals, or emerging species of artificially intelligent beings—in relation to their environment. Distinctly different from the evaluative term 'environmental', ecosystem ecology describes the behavioral logics of the system; the inputs and triggers versus the outputs and effects. Ecosystems are constantly confronted with a range of environmental fluctuations and inputs that vary transiently in magnitude and force. Under these terms, conventional notions of scale are of negligible importance and are subservient to the interaction among constituent parts.

This paper will explore these issues and investigate this expanded definition of 'energy' by exploring territories of excessive and moderate energies; extreme environments that are becoming normative environments for practice. This paper will present the author's work, and student work completed as part of a graduate architectural research seminar and studio that operated in extreme environments. What are the implications of designing at the extreme – far beyond the normative? What are the implications for design at the minimum or maximum? How do we work with live inputs and design for variable outputs as practitioners, educators and researchers? What other territories of design are revealed in the folds of these conditions? How do we leverage them to question the normative, the conventional, the average and the mean? How do we design with and at the extreme?

## TECHNOLOGY I: SCALES OF ENGAGEMENT

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **INTEGRATING THERMO-FLUID COMPUTATIONAL MODELS INTO UNDERSTANDING SUSTAINABLE BUILDING DESIGN**

Ulrike Passe, Iowa State University

Shan He, Iowa State University

Zhi J. Wang, Iowa State University

Sustainable buildings demand a holistic approach towards the design of space, envelope, and environmental control systems; the construction materials and occupational behavior. The goal of our research is to push whole building performance evaluation and simulation to higher levels. This paper will report on an interdisciplinary research endeavor coupling engineering expertise in computational fluid dynamics (CFD) with architectural design to build simulation expertise for designing natural ventilation strategies in buildings. We utilize an operating solar powered home as a laboratory for modeling and testing. The building explores an efficient balance of passive design and active energy harvesting strategies. Energy measurements are available to verify simulations.

Our research goal is to enhance the utilization of naturally occurring energy flows around buildings and through their interior spaces, within or around building materials to achieve thermal comfort, individual control and air quality, while eliminating fossil fuel consumption and negative environmental health impacts. We aim to achieve this goal by integrating CFD simulation and visualization tools into the design process. In particular we investigate the relationship between spatial composition and natural air movement as free heating and cooling ventilation strategies by tightly coupling computational fluid dynamics modeling and architectural design. A successful implementation of this research will significantly reduce the need for active mechanical systems in buildings and provide a holistic performance assessment model, which will greatly enhance the acceptance of green technology. An in depth literature review was conducted to understand the current state of the art of natural ventilation simulation and design identifying new research questions on the interaction of space, air movement and material properties. The project started by modeling whole building ventilation scenarios of wind and buoyancy driven natural flows with ANSYSFLUENT based on representative studies. We then applied the knowledge to the case study house and conducted a variety of scenario simulations and can now verify the simulations with measurements on site.

Firstly the importance of spatial composition for air movement is discussed, then are the boundary conditions established for buoyancy and wind driven air movement, before solar radiation and energy transfer in air can be modeled. In the result section a first sample simulation for a sun space on a winter various seasonal days with direct irradiation and diffusion irradiation will be discussed. Outside temperature and wind speed will be set and a variety of windows to the outside are opened and closed to understand the interaction between solar radiation and outside wind patterns. Thus these parameters and connections enable the convective passive solar air loop to start bringing solar thermal energy into the main living space. The paper will discuss these first results and their implications for natural ventilation design.

### **POST PARAMETRIC DESIGN INTELLIGENCE**

Santiago R. Perez, University of Arkansas

A critical shift must occur within the generative culture of computational design and digital fabrication, as revolutionary now as Le Corbusier's *Vers Un Architecture* was when originally published in 1921. Parametric Virtuosity, in itself, is no longer sufficient to carry forward the innovations enabled by the confluence of new computational methodologies and digital fabrication. The early promise of pioneering projects such as SHoP's *Camera Obscura* has given way to a culture of parametric, robotic exhibitionism, largely devoid of practical applications beyond the demonstration of the technologies themselves.

Michael Speaks has written on the "Post-Vanguard" generation that replaced theory-laden "truth" or functionalist innovation, with global "Design Intelligence" fostering a new wave of innovation. This culture continues to thrive and inform contemporary practices, in large part thanks to the emerging technologies offered by computational methods, and advanced prototyping. The era of computational virtuosity and fabrication has been largely mainstreamed, with the adoption of fully articulated robotics now seen as the newly emerging "market" for academic research, leveraging both parametric design and fabrication.

Rather than simply scaling up the complexity of projects produced under this new wave of (robotic, parametric) technologies, a new, perhaps "Post-Parametric" Design Intelligence must emerge, transcending the short-term vision of computational exhibitionism, towards a new design rationality, informed, rather than determined by computational methods and robotic fabrication.

What will guide this new phase of research? A return to the conceptual, theoretical positions that Speaks termed the Theoretical Vanguard is unlikely. Similarly, the continuation of computational virtuosity as an end in itself will not produce further innovation. One possibility is a new look at the material-based practices of twentieth century modernism, which ran counter to, or alongside of prevailing modernist ideologies. These practices, such as the work of Jean Prouve, or the Eames office, pre-figured both emerging technologies and the methods of production enabled by global capitalism. They were early adopters of "Design Innovation."

The author's interest is in REFRAMING FABRICATION within what Aalto called an Extended Techno-Humanist Rationality, repositioning emerging work within the larger sphere of global praxis, leveraging computational and robotic technologies beyond mere formal play. This paper is both a manifesto and diagnostic tool for examining the impact of computational and fabrication culture on the larger sphere of Design Innovation. It is hoped that through this critical, reflective lens, a new series of projects may emerge, leveraging both computational and robotic technologies, nevertheless informed by a Post-Parametric Design Intelligence.

## TECHNOLOGY I: SCALES OF ENGAGEMENT

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **URBAN USER INTERFACE**

Ginette Wessel, University of California Berkeley  
Eric Sauda, University of North Carolina at Charlotte

The January 2011 Egyptian uprising in Tahrir Square was called a “Facebook revolution,” but its importance is not that it was digital, but rather that information and space were bound in an arena for social change. Historical, symbolic, and cultural attributes embedded within and ascribed to this space combined with the mobilizing power of social media were central to its revolutionary success. A new city is emerging based on this virtual and spatial intersection: the Urban User Interface.

The walled city is obsolete. The city as a movement system is absorbed. The city as walled fortress made space the main form of meaning: the wall marked the boundary between urban and rural, the public square marked the important center of social exchange, and cathedral and palace marked the literal apogees of ecclesiastical and secular power. The city as movement was an outgrowth of transportation technologies from rail to automobiles. Any clear boundary between the urban and rural was obliterated, and cities spread along the arteries of movement; a system of flows without fixed boundaries. By contrast, contemporary cities are suffused with information, transmitted by an increasingly dispersed network of laptops, tablets, and smart phones. Our ComputingInPlace research group has been studying the contemporary coexistence of information technology and the city through the lens of HCI.

Interactivity is a perception that a user sometimes senses while using a computer; this implies that the idea of a single map of the city is naive. Digital flaneurs expect instant and continuous data about shopping, navigation, history, weather, politics. We have developed representations of the city that are user-centered, based both on location and on the interests at hand. We have distinguished between spatial and semantic descriptions of the city, and have demonstrated how to translate knowledge between the two.

Direct manipulation refers to the move from command line interfaces to graphical user interfaces and then to fully physically embedded systems. We have developed a framework for displays and computing in public that analyzes physical space as a critical part of the interface, incorporating both the virtual and the physical vectors for a wide range of input and output devices. We have developed techniques to map and understand the relationship between mobilized services and location-based information via social media. The overlay of real-time information onto space reveals reconfigured social patterns of exchange and of movement.

Affordance is a term from psychology that studies cognition not as an internal state but as an interaction with a particular environment. Using anthropological ideas of place and perceptual concepts from computer vision, we have shown how to extract meaning from a complex public setting and use it as part of a public interface.

Information technology is not only redefining how we receive, generate, and communicate information, but it also is directly linked to the reconfiguration of social, political, and economic processes within our urban environments. We are discovering alternative methods of representing the city to replace tired ideas of formal repetition and hermetic systems.

## ACADEMIA II: COGNITIVE ARTIFACTS IN DESIGN EDUCATION

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **AN ALTERNATIVE MODEL FOR UNDERGRADUATE THESIS INSTRUCTION: USING COLLABORATIVE FULL-SCALE DESIGN EXERCISES TO SUPPLEMENT INDIVIDUAL RESEARCH PROJECTS**

Eric Thomas Nulman, University of Southern California

This presentation will examine a pilot undergraduate thesis studio that synthetically combined three course typologies – studio, workshop, and seminar – into a rich and investigatory environment. Design explorations, material prototyping, and theoretical frameworks were pursued simultaneously towards the completion of a comprehensive thesis design project. Desired learning outcomes for the studio included: working and thinking in a contemporary manner (collectively, projective, atmospheric, diagrammatic), establishing an architectural agenda (an interest, topic, position, approach), ability to test design performance using full-scale models and to make necessary design adjustments (prototyping, installations, information feedback loops, digital fabrication), to design with consideration of an event (implicit or explicit activity, programmatic relationships, movement or flows), and the ability to produce affective environments (atmosphere, affects, materials of sensation, spatial experience).

The studio promoted a contemporary approach to architectural design – design research – with special emphasis on the creation of affective environments. Design research is an approach to design based on a series of calculated design experiments that are begun with a clear definition of project goal(s). In academia, many courses that conduct material research take the form of a seminar or workshop, in which the research (research through making) is linked to a particular tool or technique from the outset. However, a design as research pedagogy is more effective in promoting the use of full-scale constructs to influence the development of a design concept if it is employed in the context of a design studio and linked with a particular project. In this new context, material investigations instead operate in a supporting role and are tied to the goals of a specific project. The tool, technique, and method are selected in support of a concept; this approach avoids developing a product whose qualities are limited or predetermined by a preselected tool and technique. By incorporating full-scale investigations (prototyping) of material and atmospheric effects into the studio design process, the production techniques and strategies become more varied between projects inasmuch as their selection of a tool, technique, or method is concept based towards achieving a desired affect. Students pursued a collective design agenda concerned with the creation of charged and active spaces in which the occupants are not passive recipients of information but are actively contributing to the production of affects. Spaces best described as affective environments. In this pursuit the studio shifted its interest away from the standard production of objects and towards the production of atmospheres and effects. The production of atmospheres and architectural effects required students to work with real or intended materials and environmental conditions at or near full-scale in order to properly understand and experience a material's qualities and sensory affects. Students learned how to design and employ architectural effects through a series of exercises including: studio installations, small group material effects prototypes, and individual material effects prototypes. These full-scale exercises cultivated an awareness and ability to construct a spatial experience that emphasizes materiality, perception, and atmosphere.

### **OPERATIVE TRANSLATIONS - DIAGRAMS BETWEEN THE ANALOG AND THE DIGITAL IN EARLY DESIGN EDUCATION**

Antje K. Steinmuller, California College of the Arts

As new spatial information technologies expand the data available for design, coherent navigation and knowledge-building via diagrammatic systems will be increasingly necessary in order to manage and access content.<sup>1</sup> Further, the form of that navigation will be the critical issue. This paper argues for the diagram to be the structure for that query, and specifically, for the critical role of diagrammatic work in beginning studios through examining the catalytic function of diagrams within the design process. This issue is foregrounded by developments in digital media in recent years that facilitate working iteratively and transformationally: As parametric modeling enables serial, carefully calibrated transformations of specific relationships, and as 3D modeling software becomes the default method for development of ideas in early design education, questions arise about the changing role of the diagram in early design education.

In addition to arguments for the diagram as navigation, it has also been argued that the diagram becomes merged with, or supplants architecture as the built outcome of the design process - built work seen as only one manifestation of the wealth of virtual possibilities spread open by the diagram.<sup>2</sup> Yet in design education, diagrams are not typically thought of as the object of design, and there is need for a theory on understanding and teaching diagrams. The challenges ahead lie not only in managing the flow of information, but more fundamentally, in the designer's relationship to knowledge and in the diagram as the tool to make this knowledge operative. Diagrams - Deleuze's "abstract machine"<sup>3</sup> - distill the wealth and complexity of information to its essential systems and relationships in order to make it available for transformation, transposition and extension in an open-ended process. As an "instrumentalizing technique"<sup>4</sup>, they set in motion a generative process that escapes the 'sign', and avoids 'type' and cliché. Positioning the importance of a balance between digital and analog skills in early design education, this paper critically reflects on the generative content of diagrams that are situated at the intersection of the digital and the material.

As diagrams become the vehicle for translating information from one medium into another, systems and relationships are extracted as generative 'DNA' - a code embedded with variable parameters. This paper examines the contribution of 'abstraction' (extracting information) and 'translation' (between 2D and 3D, between digital and material) to the production of knowledge through diagramming. Diagrams, here, operate as iterative research into possibilities embedded in material and organizational systems. The paper uses as case studies three ways of embedding diagrammatic explorations in introductory studio courses: 2D translations between serial studies in physical modeling (3D material to 2D digital to 3D material); iterative translations of 2D precedent work into constructs of varying material systems (2D surface to 2D line to 3D material); lastly, diagrams produced in site and precedent analysis (translations within 2D, extended via Grasshopper). The analysis of these case studies reflects on the emerging dialog of formal with performative criteria as critical components of operative translations: diagrams with generative potential in the contemporary design process.

## ACADEMIA I: PEDAGOGICAL AFFORDANCES OF THE DESIGN STUDIO

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **STANDING ON PRECEDENT: AN ARGUMENT FOR INSTRUMENTALIZING ARCHITECTURAL HISTORY**

Amanda Reeser Lawrence, Northeastern University

One of the most fundamental and still pressing questions within the pedagogy of architectural schools is how to frame the relationship between the design and history/theory curricula. Should the teaching of history remain a discreet and autonomous field in which students study images and memorize dates? Or should historical knowledge be framed as “useful” to the designer, “a vitamin to invest his designs with new vigour” as Henry Millon memorably phrased it in 1960? Conversely, how should design instructors incorporate the analysis and study of precedents into their studios, if at all?

The relationship between these two aspects of the architectural curriculum has morphed and changed over the years, responding to trends within the profession and the academy. We have seen everything from Bruno Zevi’s call that architectural history subsume all aspects of the curriculum, to Walter Gropius’s famous near-total banishment of history altogether. More recently, in the wake of postmodernism’s seemingly facile historicist appropriations, history curricula have become more or less detached from design studios, and design instructors have shied away from any apparent appropriation of the past. Although none has yet approached a Gropius-style fervor of historical excitement, there has nevertheless been a questioning of history’s ultimate relevance within the confines of professional architectural schools.

This paper proposes a model for re-instrumentalizing architectural history for designers. It does so by reconsidering the question of influence, the role of appropriation on the part of designers and historians, and how both understand history as relevant to the “new.” How does the architecture of the past affect contemporary architectural production? What does it mean for an architect to reference, copy, incorporate, or acknowledge precedent? What are the strategies for doing so? These are longstanding questions in architecture, questions that lie at the very heart of our disciplinary definitions, but there are opportunities today to answer them in new ways.

My focus will be on specific strategies by which architects reuse the past—strategies that we can locate and analyze throughout various examples within architectural history. The emphasis, in other words, will be on understanding the operation performed, the way in which the past is brought forward. Importantly, these operations aren’t tied to any one time period. This transhistorical analysis offers a way to see commonalities and differences throughout history.

Ultimately, this paper aims to provoke discussion as to how we might develop a more sophisticated approach for engaging the past within architectural schools and to offer a richer and more productive language through which to talk about influence. To do so, I consider various theorists—from Bloom to Jonathan Lethem—as well as recent models for understanding the uses of the past, both within and outside of the academy. As architects tentatively dip their feet in these ideologically charged waters of the past, we must ask what it means to “stand” on precedent, once again.

### **TOPOLOGICAL AND PARAMETRIC TEMPERATURES IN ARCHITECTURAL ACADEMIA**

Alfredo Andia, Florida International University

Thomas Spiegelhalter, Florida International University

It seems that we can no longer think the future of digital technologies in architecture without rethinking the future of the profession. This paper argues that professional practice and architectural academia have developed two diverging stories about the present and future of the computerization in design. Architectural practice is using computer technology to “modernize” the profession more than truly “revolutionize” it.

While in academia many support this “modernizing” view, an increasing number of universities are becoming test beds for new visions of design imagination. This ground-breaking fraction in academia is presenting a broader critique in which architectural materiality can be rethought in relation to generative form-finding, population thinking, and automated topological structures.

In this paper we will argue that a plausible merging of the ideas from mainstream practice and pioneering academia can yield one of the most novel themes for the future of architecture: Generative and parametric modelers that contain specific topological intelligence could be fused to a worldwide network of procurement of products and services in the construction industry.

We differentiate in this paper two attempts to use topology and parametric in Academia. One the one hand there is a large group of architectural studios using these techniques for form finding. We argue that this exclusively form based academic endeavor is quickly leading us to an apparent aesthetic exhaustion. We argue that a second approach in which topology and parametric is used to evaluate factors such as land cost, density, codes, regulations, structural parameters, acoustics, automated parking layouts, sunlight, heat evaluations are much more fundamental to reshape the heuristic teaching of architecture.

We present and evaluate in this paper the functioning prototypes of more advanced topological and parametric models used in studios in academia. Architectural students use CAD/CAM to design different parameters creating performance centric vernacular proposals. The 3D design model turns into a responsive mock-up model that becomes an intelligent that can test multiple scenarios. The generative 3D model calculates for example the internal layout of each apartment as different performance parameters are feed such as day light, minimum courtyard dimensions, design preferences for parking lot, minimum requirements for cross ventilation. The associative model allows the designer to consider many domains which are impossible to consider in a manual drawing process or a traditional CAD system. Each interior space, wall, interior space, and public spaces is treated differently based on the performance criteria set in the parametric system. Since the architectural students code the parametric components the resulting design are not traditional buildings but designs that responds to local conditions and material selection.

The work produced is formally close to the design produced by offices such Office DA or Sou Fujimoto in which usually one material and detail is repeated to solve a significant part of the design. We finally discuss the implication of this type of design thinking into architectural academia and how the recycling and improvement of this prototypes could develop a completely new approach to architectural thinking in academia.

## OPEN II

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **ARCHITECTURAL EDUCATION & PRACTICE: QUO VADIS**

Valerian Miranda, Texas A&M University

In the early 1970s, in response to the growing number of professionals involved in the process of successful architectural design, AIA gold medalist Bill Caudill, FAIA, wrote ".....I contend, however, that if other professionals contribute to creating the phenomenon of ARCHITECTURE then they should be called architect." Though his statement sounded outrageous at the time, with more states introducing and passing legislation that weakens the role of the architect, the veracity of his contention appears to be borne out, forty years later. From his writings, it is obvious that he foresaw rapid change and tried to position his firm, some educational institutions and the profession to ride the crest of change which is now upon us.

That recent graduates, in the United States, with degrees in architecture have the highest unemployment rate of all college graduates is not just hearsay, it is a quantified fact that adds to the list of woes of architectural practice and consequently architectural education. While the present economic climate can, and is being blamed for this condition, closer examination shows that the reasons for the woes of architectural academia and practice may be more systemic.

A study of longer term trends shows that change in the academy and the profession has been reactive rather than proactive, lethargic and occasionally inappropriate to the rapidly changing economic, social, environmental and technological circumstances. The study described here examines evidence that leads to the above conclusion and then examines the academic-professional relationship of two other disciplines, law and medicine, both of which appear to have healthier academic-professional relationships than architecture. Though both disciplines are highly valued and compensated by society, their approach in transitioning students to the profession is distinctly different.

A very high percentage of medical school graduates go on to practice as registered medical practitioners, a considerably lower percentage of law school graduates practice in the courtroom. This difference is reflected in their pedagogic approach, a medical school without a teaching hospital is as inconceivable as a law school with its own courtroom. Yet the transition from student to licensed professional is clear, stable and predictable.

Do these obviously successful models hold lessons for the architectural academic-professional relationship? Should there be more conformity in educational standards and nomenclature? Should the profession of architecture be de-regulated? With the advent of sophisticated building performance simulation, performance based codes and digital code checking is a segment of architectural practice destined to follow the fate of travel agencies?

The investigation concludes that in an era when the currency of the realm is innovation and creativity, there is opportunity for academia and practice to ride the crest of change by discarding a few questionable values, sacrificing a few sacred cows and embracing a few uncomfortable realities.

### **DESIGN ABROAD: CONSTRUCTING RELATIONSHIPS**

Magda Bernaus, CIEE Barcelona Study Center  
Suzanne Strum, CIEE Barcelona Study Center

In an era of expansion of study abroad for American students and increasing globalization of architecture practice, this presentation addresses current models for international architecture study. We also wish to reflect upon and share our experiences in developing an immersive mixed program in Barcelona that values cultural understanding and local knowledge as essential learning outcomes.

According to the Institute of International Education, 270,604 U.S. students studied abroad for academic credit in 2009/2010. Study abroad has more than tripled in the past two decades. Spain is the third destination for US students, following the UK and Italy and receiving more than 25,000 American students in 2009/2010, although it is difficult to determine the exact number of architecture students which may represent a relatively small percentage overall.

Architecture students are naturally engaged with the deep structures of place, but differences are still pronounced. In Europe, architectural culture is urban. Students encounter dense historic fabrics; non suburban peripheries, traditionally marginal and of mixed morphologies; and typologies that reveal different modes of living and cultural values. In the Barcelona case there is also a great deal of experimental architecture: hybrid community projects, public housing and public space. For many American students, coming abroad may be their first truly urban experience, often a cause of greater cultural shock than foreign values.

Study abroad has been highly theorized in general, but not much has been written about frameworks for architecture education abroad. Most schools follow variants of two models: nomadic faculty led summer programs that concentrate on field study and directed travel or iterations of island programs, which the Forum on Education Abroad defines as a program whose pedagogy formally includes little cultural immersion, such as one in which home-campus students live together and home-campus faculty instruct them in facilities owned by the home campus. In the best cases, students have exposure to local professionals and debates.

This insularity, as opposed to European exchange models, might be accounted for by language education and the diversification of American education itself. Marked differences exist between undergraduate professional programs and study within liberal arts curriculum, making it difficult to immerse students in host institutions. Such difference in formation and practice make American students less mobile than their European peers. We do not wish to criticize these models but explore beyond them.

We have been engaged in the challenges of creating a Hybrid Program that allows for diversity, choice and contemplates deeper immersion. This model places an emphasis on language study, reinforced by students living with host families. We have also concentrated on partnering with host institutions where students with appropriate language levels take normal courses and become part of the student body. Our model makes use of local faculty, guest critics, speakers, as well as architecture firms for internship. We engage native students of architecture and design to act as guardian angels and friends, introducing students to local culture and accompanying them to events. These guided insertions provide a stronger connection to the place of study.

## OPEN II

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **PARTNERSHIP AS A PEDAGOGICAL STRATEGY IN ARCHITECTURAL DESIGN III - UBI**

María Candela Suárez, Universidade da Beira Interior  
Joana Carvalho, Universidade da Beira Interior

Architectural Design presents a particularity in relation to the other disciplines that make any study plan of Architecture. Better known as “atelier”, Architectural Design is a potential laboratory in which professors and students investigate, reflect and produce architectural solutions for specific problems. Usually, those solutions are the answer to programs for a theoretical subject, unreal, that ends up being taken as the reflection of each student, with subjectivity and desires of their own. In general, these eventually determine the final result, after a monologue in which the constraints are limited, in many cases, to the advices and guidance of teachers and to the interpretation (more or less rigorous, depending on the convenience) of the regulations. In any case, the dynamic ends up not having, in general, more than two actors: teacher and student. Decades of application of this pedagogical system, and extended lists of schools as proof of this, demonstrate its reliability as strategy in teaching Project. But is this system the only possible? Is it enough? Does it provide to students the dimension of reality, characteristic of architecture?

As a lab, immersed in a changing world and society, Architectural Design should assume now other challenges: 1) search of new pedagogical strategies, capable of increasing the motivation of the architecture students, intensifying the dynamic “research-reflection-production” mentioned above; 2) approximate those students to the community, allowing them to interact with it not only as users, but as producers of solutions/answers.

This abstract fits in the theme “Academia” and introduces two variables in the debate: 1) innovation in the pedagogical strategies; 2) interaction of the architecture students with the community. It starts from the assumption that it is possible to introduce the “partnership” (with public and private institutions, through a system of academic ideas contest) as “pedagogical strategy” in Architectural Design, being this strategy a “detonator” of academic responses with practical application for clients/partners of the real world.

As an example, will be presented the course of Architectural Design III-UBI (Covilhã, Portugal), which structure born from the desire to constantly motivate the students, proposing them challenges that transcend the mere fact of meeting some academic obligations that end up being archived. It will reflect on some proposals unwrapped (by initiative of public/private partners; or proposed to these by the aforementioned course’s teachers). It is not intended to talk about the proposals themselves, but reflect on: the used work strategies teacher/student/partner, the achieved pedagogical results, the impact on the community, without leaving aside the legal void that underlies even in this type of work, which should be resolved in order to formalize the partnership as a pedagogical strategy in Architectural Design.

### **TEAMBUILD UK: NEW FORMATS FOR DELIVERY OF LEARNING IN CONSTRUCTION**

Alex Maclaren, University of Edinburgh

‘Teambuild UK’ has been running annual training competitions for multi-disciplinary teams of young construction professionals for 20 years. I began by involvement in 2005 and am now a Trustee of the charity.

I present this competition is a test case for new forms of delivery of learning in construction. The annual brief for Teambuild is built around a real ‘live project’ with real data and real problems, and the resulting competition judged by active construction professionals and the real clients of the site. This is a cross- industry venture requiring diverse groups of young graduates to work together outside of their comfort zone. This structure is increasingly relevant as the delivery of real-world projects move further towards cross-functional teams. Feedback on the competition from participants and industry sponsors is overwhelmingly positive.

We run a loose-fit structure, and pride ourselves in the transformative nature of our product, working with a rolling exec team of recent past-participants, developing the practical delivery, ensuring we maintain relevance to the participant core every year. The competition is recognised CPD and receives funding from construction Institutions and national bodies.

The practice of architecture is changing, and so must our methods of teaching architecture become less insular, more engaging, more ambiguous. The funding framework is changing, as is student investment and expectation. I believe an inclusive horizontal approach to teaching, learning and research, increased professional integration, which engages and benefits industry, government and academia, will develop to meet these changing needs.

I will present the current competition format as a case study, and refer to recognised critical and creative pedagogic methods in analysing the potential benefits of this approach. I will propose the benefits of this format to industry, academia and the student, and relate the delivery of the competition to architectural education criteria and Europe and the US (eg RIBA and NAAB)

Key Issues arising in presentation: cross-disciplinary working, industry engagement, funding, BIM (Building Information Modelling) integration, links between industry and academia

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## SUSTAINABILITY II: NEW TOOLS FOR ANALYSIS, EVALUATION AND VISUALIZATION

Andy Backer, IE University  
Belinda Tato, ETSA Alicante

### **BIOMIMETIC CONSTRUCTION**

Mark West, University of Manitoba  
Lancelot Coar, University of Manitoba

In recent years architecture has seen the gradual rise of biomimicry as a paradigm for architectural design - witness the increasing appearance of architectural forms defined by parametric design software, and the attendant interest in “emergent” self-organizing systems and forms. This development represents a significant shift in design thinking and methodology – a consequence of the convergence of ecological thinking, cybernetics, and the computerization of architectural production. The aesthetic charge given by such form-generating programs is considerable, pointing toward new kinds of “organic” architectural form, not simply “inspired” by nature but somehow like Nature in their very generation.

The factory-based architecture of machine modernism, to which we are heir, is almost entirely based on the productions of single axis mills: saw mills, rolling mills, extrusions, etc. The single axis mill, by its nature, produces uniform section, prismatic, forms, perfectly aligned not only with the construction tools and methods of industrialized building culture, but with our drawing tools as well. So, for example, the T-square and the computer cursor are direct geometric/productive kin to the table saw’s blade, fence, and set square. By contrast, emergent/biomimetic designs are producing complexly curved forms that while mathematically described in Cartesian 3-space, are of another geometric order, and hence difficult and expensive to build. These are almost always extravagant things to construct. As architecture is beginning to fundamentally rethink its relation to Nature through the adoption of emergent and biomimetic paradigms, their constructed outcomes remain thoroughly enmeshed in a culture of excess rather than in simplicity and reduction.

One case in point is the development of evolutionary and topological structural optimization programs. These parametric software(s) produce extraordinary designs for minimum-material, optimized, structural shapes for a given “load space”. The results tend to have a stunning formal kinship with natural structural forms (complex curvatures, branching structures, constantly varying sections, etc.), and offer the promise a new approach to sustainable construction via reductions in the volume of construction materials required. However, the construction of such shapes, at the scale of architecture, is exceedingly difficult. When construction is attempted at all, it tends to use cast reinforced concrete poured into sacrificial polystyrene moulds, carved by multi-axis CNC routers; elegant, minimal, optimized structural form is built using the “brute force” of a high-capital tooling and excessive construction waste.

The deep, longstanding, disconnect between the cultures of design and construction, and architecture’s current focus on virtual biomimetic form, has generally excluded a search for biomimetic methods of construction. Truly biomimetic architecture needs to imagine and develop coherent and congruent methods of construction. The dream of building a work by pressing “print”, eyes closed to the very nature of the constructions that follows, surely will not suffice.

This paper will examine these questions, and offer specific examples of sustainable biomimetic construction methods directly tied to parametric and computer-optimized designs. These examples focus on new construction and design methods currently being developed in the areas of flexible fabric form-works for cast-in-place and precast concrete structures, and parametrically designed, funicular, masonry thin-shell, “Catalan” vaults.

### **CASE STUDIES IN SUSTAINABLE DESIGN AND THE MOTIVATION FOR ENHANCED METHODS AND TOOLS TO MEASURE ENVIRONMENTAL IMPACT**

Aimee P.C. Buccellato, University of Notre Dame

Inspired by rapid innovation in building technology and correlated advances in energy performance, architects are turning to emerging technologies with unparalleled enthusiasm to achieve buildings aimed at greater ecological sustainability. But what are the costs – the consequences, perhaps – of these novel and often experimental building materials and methods of assembly? And how effectively are they currently being measured and considered alongside calculated energy use? Are the prevailing systems of measurement adequate, the industry-leading tools comprehensive enough and readily accessible to students and practitioners of architecture to enable truly informed decision-making, inspire knowledgeable adoption of nascent technologies, and ultimately influence the design and execution of genuinely sustainable buildings?

The authors have begun to examine this question through the development of a more accessible, efficient method of quantitative analysis of construction methods, materials, and principles of design; research that is simultaneously supported by and motivating the development of a novel digital design and analysis tool which will enable students and design professionals to empirically evaluate and compare the broader impacts of their design decisions at every step of the building design process. This paper will present a focused series of case studies involving both proposed and built projects and empirical materials and methods analyses carried out using the novel methodology and Tool:

How Green Is Gold?

Comparative analysis of a new, LEED (gold; 2008) certified institutional building;

The Placebo Effect and LEED

Loyola University of Chicago’s Information Commons (LEED Silver; 2007).

What current research – and the tools available to both research and practice – lacks is the ability to holistically measure and evaluate building practices, from the commencement of the design process, to the selection of materials, the methods of their assembly, and the long term implications of one’s design alongside building energy use. As the paper will describe, data collected from case studies generated as part of this research reveal that there exist quantifiable differences between newness – in terms of advanced building technologies and design – and effectiveness, underscoring the need for more accessible and effective methods and tools for measuring, evaluating, and promoting the execution of truly sustainable building design; and inspiring much-needed critical examination of contemporary “green” building practices, many of which may be, in fact, completely at odds with long term sustainability.

The methodology and prototype tool being developed by the authors is uniquely focused on generating specific, objective, quantifiable data capable of describing and comparing the broader implications of decisions made at the very earliest stages of the design process – and throughout the design process – in order to positively influence the range of impact that those decisions may have on the environment. By reaching beyond polemics and positions still grounded on largely aesthetic or stylistic premises, the research intends to expand existing modes of inquiry and analysis, and aims, ultimately, to influence our ability to make truly informed design decisions leading to the design and execution of truly sustainable buildings.

## SUSTAINABILITY II: NEW TOOLS FOR ANALYSIS, EVALUATION AND VISUALIZATION (CONT.)

Andy Backer, IE University  
Belinda Tato, ETSA Alicante

### **CHANGING THE RELATIONSHIP OF FORM AND PERFORMANCE: THE CONCEPTUAL INTEGRATION OF QUANTITATIVE PERFORMANCE EVALUATIONS INTO DESIGN PEDAGOGY**

Ulrike Passe, Iowa State University

Architecture plays a significant role in building a sustainable world, but its pedagogy has to change. Due to diminishing resources and a rapidly changing climate sustainable design requires a thorough understanding of energy performance as a design parameter. Urgent demand for carbon and energy neutral buildings challenges conventional design and programming and the way we teach it. Purely conceptual or formal approaches to the design of spatial composition and building envelope no longer provide adequate solutions for buildings and neighborhoods, which need to be energy, water and material self-sustained. Additionally it is no longer sufficient to build for one local climate. Instead with the building lifespan, design concepts also need to integrate the ability for buildings to adapt to future climate scenarios.

A thorough understanding of thermodynamics, the physics of air movement and of technologies to utilize natural forces and solar energy has to be integrated into design concepts and parameters. Architectural skills have to change from the ability to develop static forms to the ability to develop dynamically changing spatial scenarios. The question is how to educate students to creatively address those challenges, when especially natural ventilation and day-lighting are extremely complex and ever changing dynamic phenomena and already the movement of the sun across the day is hard to grasp. Architects need to be equipped during the early and later design phase with knowledge and design tools to integrate and predict dynamic performances of natural light, solar energy and air movement to achieve these sustainable high performance buildings.

This paper will examine the approach to two design studios, which integrated sustainable design principles and environmental performance modeling tools. The first studio was an experimental summer program in Berlin, jointly developed between a US and a German architecture program with the goal to integrate dynamic performance evaluation software tools into conceptual design. The projects used a building footprint given by a master plan for an urban brown-field rehabilitation site and developed strategies for adaptable mixed-use typologies and concentrated on the envelope as an interface for light, solar radiation and air. The second approach was tested in a semester long graduate studio, where students developed medium scale mixed use net zero infill project alongside a classic US automobile strip and addressed all stages from programming to energy balance and details.

In both cases, students gained an elevated understanding of energy performance in the urban context and visualized the specific energy flow patterns for wind, light and solar radiation as they are dynamically shaped and manipulated in the dense urban context. These new performance oriented design studios lead to projects that not only reevaluated the relationship between architecture, cultural landscapes and environmental issues, but also reshaped the iterative process of design as it integrated quantitative with the qualitative parameters. The paper will compare the pedagogical approaches which used parametric performance evaluation tools as well as thermal calculation spreadsheets in support of aesthetic speculation and enhanced experiential quality in order to understand their influence on sustainable design concepts and spatial strategies.

### **ENGAGING STUDENTS IN THE CRITICAL EVALUATION OF GREEN BUILDINGS: A USER INTERFACE PROBLEM**

Kyle Konis, Portland State University

How are the aspirations of a society to create healthier workplaces and reduce resource consumption made manifest in the built environment? And how do we differentiate successful built outcomes from failures? Largely absent from this discussion are the end-users of buildings. Nearly all buildings promoted as successful examples of "sustainable," "green," or "high performance" design are embraced prior to occupancy without critical evaluation of the environmental conditions experienced by occupants. This paper establishes an approach for integrating critical evaluation of buildings in use into architectural education through the exploration of the user interface as a design problem. The paper argues that the lack of interfaces available to register feedback in buildings leads to a form of environmental design that is largely detached from the preferences or needs of building occupants, with cascading implications for energy use, occupant health and well-being. The objective of this approach is to engage students in examining how the environmental conditions enabled by environmentally responsive design strategies are assessed, modified (both formally and informally), and adapted to by building occupants over time. The paper reviews existing methods for the collection of occupant feedback and monitoring of occupant behavior in response to transient environmental conditions and discusses the role of designers in defining, collecting, visualizing and responding to sources of occupant data in buildings. The paper concludes by speculating on design outcomes informed and responsive to occupant data.

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## SUSTAINABILITY II: NEW TOOLS FOR ANALYSIS, EVALUATION AND VISUALIZATION (CONT.)

Andy Backer, IE University  
Belinda Tato, ETSA Alicante

### **THE ABACUS AND THE EARTHWORM: ENVIRONMENTAL LIFECYCLE ASSESSMENT FOR ARCHITECTURAL DESIGN**

Erin Moore, University of Oregon

Students of contemporary architecture must account for aspects of building design that go far beyond the established curricular topics of space, form, scale and construction. To begin to make fundamentally more sustainable buildings, architecture students must learn to anticipate a building's lifetime of environmental impacts for each design decision that they make. In their too-brief architectural education, students must to some degree become chemists, environmental scientists, ethical philosophers, physicists, statisticians and accountants to begin to understand, to quantify, and to make good judgments about the ecological context of the materials they specify, about the long-term energy performance of a building, and about the full lifespan of the building in terms of its construction, use, re-use, and eventual entry into the waste stream.

Life cycle assessment (LCA) is the systematic quantification of the life cycle environmental impacts of a product or service using aggregated data from industry. What tools or principles does the field of environmental lifecycle assessment offer architecture students that might help them navigate the complex territory of accounting for long-term environmental impacts of design decisions? How can these principles or tools be incorporated into existing architectural design school curriculum? How can students be taught to use LCA data while understanding the pitfalls of superficial analyses? In this presentation, the author describes ways that some of the principles and practices of lifecycle assessment have begun to be incorporated into design and construction curricula in the Department of Architecture at the University of Oregon. This includes examples from core building construction curriculum and from advanced technology seminars for graduate and undergraduates, and examples of ways the principles might fit into core design studio topics.

At the University of Oregon, architecture students already have an extremely solid education sustainable design. The addition of LCA tools, or at least of a lifecycle design paradigm, is a natural extension of existing curricular strengths. At the same time, key questions remain about life cycle assessment, curriculum and the design process. What are the design implications of accounting for the lifecycle environmental impacts of the materials of architectural design from raw material extraction, to manufacture, use and then disposal?

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## ACADEMIA III: YOUR STUDIO ASSIGNMENT IS TO CHANGE THE WORLD

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **BRINGING IT ALL BACK HOME: PROVIDING DESIGN AID IN OUR OWN BACKYARD**

Edward M. Orlowski, Lawrence Technological University

Awareness of international crises and the opening of global marketplaces have captured the attention of contemporary practitioners. Large firms invest increasing amounts of resources and effort to managing global opportunities, but given the state of the economy, some are finding that such labors are not paying off. Furthermore, the common model of architectural practice is predicated upon a very limited client base. Architects create new opportunities by diversifying their definition of who can be a client, and how a different skill set can both increase their professional prosperity and bring design services to overlooked local stakeholders.

Similarly, international crises - be they tsunamis, earthquakes, or floods - capture the attention of socially-aware design professionals. These instances often bring out the best in design practitioners, but just as frequently result in design interventions which, while well-intended, range from misguided to patronizing. Designers who practice humanitarian architecture on a global scale must negotiate obstacles such as language barriers, inadequate understanding of local practices, and an overly-heroic sense of hubris. Meanwhile, many of our local communities - some in our own backyards - suffer from less dramatic yet equally dire conditions of decay, poverty, and neglect.

Are traditional models of architectural practice still viable in cities mired in physical, psychological, and economic crisis? What are the reasonable limits of architectural involvement in such contexts? Are students being educated in a manner that allows them to maximize the public benefits of their talents? To accept these challenges is to accept the need for a new model that allows for the possibility of new interpretations of professional practice, outcomes and deliverables.

This paper outlines the philosophical underpinnings and activities of practitioners who are breaking from previously-accepted models of global, professional, and humanitarian practices. Examples include 'storefront architects', who aim to bring professional design services to clients who previously believed this a luxury reserved for only wealthy individuals and corporations, and Seattle architect John Morefield, who changed his practice by offering "architecture for five cents". Discussion includes the work of Public Architecture, which was launched when John Peterson decided to 'create his own design competition' by presenting an unsolicited proposal to improve public green space in San Francisco's Tenderloin district. The transition of Atlanta-based Mad Housers from 'guerilla activists' to 'legitimate' service providers underscores the opportunities for architects to fulfill their fiduciary responsibility within a matrix of social and professional sanction.

The paper concludes with an introduction to a graduate level design studio offered at a Midwestern university. By exploring alternative practice principles such as clientless and unsolicited architectural interventions the course requirements shift student skill development from 'problem solving' to 'problem seeking', attempting to engage students in a dialogue regarding the social, political, and cultural obligations of the design professional. Special focus is placed upon cultivating student abilities in critically reading their environment from both the physical and social perspective, as well as upon expanding their definitions of 'architectural' interventions, seeking to impact sustainable change at the individual and neighborhood scale.

### **INVESTIGATING DESIGN-BUILD AS AN ALTERNATIVE MODEL FOR ARCHITECTURAL EDUCATION**

Hermie Elizabeth Voulgarelis, Cape Peninsula University of Technology

The architect has always very nobly (although not always very humbly) believed in his ability to change the built environment and by extension the lives of people for the better. In South Africa today architects have an important role to play in re-shaping the built environment in response to pressing social needs.

The traditional architectural studio is an interactive project-based learning environment that is almost universal in its approach to the training of architectural students. Although the projects might imitate real-life scenarios or even be set in response to actual problems or opportunities, students very seldom (if ever) get to see the final product. Solutions to the problem set is usually shown through graphic presentation, since it is obviously impractical, if not impossible, to build all the actual designed buildings. However, Hill and Beaverford (2010:1) assert that the "very specific, and at times discipline-centric studio experience, often fails to promote interest and understanding of new perspectives (and) social realities".

The Rural Studio has sparked an interest in design-build studios and following this example, numerous international institutions are now offering some sort of design-build program. What they all have in common in how they operate is a strong link to the vision that the late Samuel Mockbee had "of architecture that embraced not only practical architectural education and social welfare but also the use of salvaged, recycled, and curious materials and an aesthetics of place" (Dean: 2010:15) However, architecture schools in South Africa have not yet embraced this pedagogy and specifically not the use of design-build as an exclusive methodology for training architects and architectural technologists.

"Recently, architectural education has begun to recognize the potential of a more intensive relationship between the tasks of designing and building". (Erdman et al., 2006:174) Design-build in this context "denote(s) more than simply an expansion of professional services and opportunities, describing instead integrative approaches to architecture whereby the act of building becomes an essential critical and pedagogical tool" (ibid). "Some thirty years ago Victor Papanek said that 'design has become the most powerful tool with which man shapes his tools and environments and by extension, society and himself'. (Papanek in Pollack, 2007:42)

This paper is an initial literature survey to investigate the pedagogy of the design-build studio in the context of a design-build project by students at the Cape Peninsula University of Technology. The importance and relevance of using design-build methodology as an exclusive in the training of architectural technology forms the underpinning of the investigation.

Students in their second year of study at the Cape Peninsula University of Technology recently completed an outdoor classroom at an under privileged multi-grade school. The experiences and learning opportunities of the students, staff and school community could potentially lead to the development of an alternative model for socially responsible architectural education.

# THURSDAY, JUNE 21, 2012 - 3:00PM - 4:30PM

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## ACADEMIA III: YOUR STUDIO ASSIGNMENT IS TO CHANGE THE WORLD (CONT.)

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **LIMINAL CARTOGRAPHIES: RE-THINKING URBANISM IN CONTESTED TERRITORIES FROM AN ACADEMIC PERSPECTIVE**

Rene Andree Peralta, Woodbury University

If modernity is a constant state of liminality (Zukin), then the urban realm of the San Diego- Tijuana region has come to be a suspended form of modernity, an environment whose existence and survival depends on the consequential tumult of globalization. Trapped between economies of surplus, militarization on one extreme and rampant urbanization, expedient forms of habitation common to the “developing world” on another are part of the paradoxical state of one of the most volatile urban regions in North America.

This paper proposes a distinct method of envisioning academia & praxis through the detailed liminal condition found between ecologies of difference. How do urban and social conditions change as the production of global-security strategies and inclusionary process of urbanization continue extending themselves beyond physical border conditions? Acts of resiliency drive a novel type of settlements overcoming the challenges produced by slow deployment of material infrastructure across informal urban territories. This new urban paradigm plays itself out in contested territories and geographies that are not bound by immaterial political limits but transformed into hybrid (Canclini) landscapes of natural, social and (in) formal networks.

These informal networks have woven themselves into multiple spaces, each with its distinct form of identity, which as of today has produced the most heterogeneous places within our urban milieu. Yet, conflicts arise when these informal and rhizomatic systems of development are confronted with “modern” alternatives of city planning producing homogenous archipelagos, where the pursuit of diversity is an illicit endeavor. Cities are now part of a drag and drop method of urbanism that after a few years have been successful in breaking away from the mold of top down urban planning and inflexible land use policy. The spatial differences between both informal and formal developments vary in that one is capable of absorbing and constructing out individual perceptions of what constitutes a partial yet autonomous right to the city.

The work to be presented in this conference are the reflections of the unique spatial juxtapositions inherent to the US/Mexico border international cultural and territorial collisions. Research within it provides a focus in catalytic design for geographies challenged by pressures of difference and flux. While the discipline of architecture re-assesses its critical stance towards these new standards in urban environments, the work presented emphasizes the global challenges emerging in developing and developed countries as they consolidate towards a critical mass. The goal of this research, then, is to produce a body of architects capable of addressing, through both field and form, the characteristic dilemmas of contemporary society's extreme habitat scenarios of excess and scarcity. The emphasis in this presentation will be given to work produced in an academic setting and how relationships between social and bureaucratic actors engage in “real” urban situations. The state of our cities and regions require a shift in academia and a reevaluation of the efficacy of our approach to practice worldwide.

### **PUBLIC INTEREST DESIGN: A VEHICLE FOR CHANGE IN ARCHITECTURAL EDUCATION AND PRACTICE**

Nadia M. Anderson, Iowa State University

Since architecture became professionalized and distinguished from the building trades during the Renaissance, its practice has been largely reactive with the architect responding to the wants and needs of a paying client. The object of the architect's work thus becomes the articulation in terms of form and function of a product that has been pre-conceived by the client. The architect does not question the product proposed by the client but rather offers alternatives ways in which it can be realized, thus operating as a passive producer of consumer goods as well as a producer of space according to the predominant economic structure (see Harvey 1985, Bell 2010). Professional expertise thus becomes associated with form-making and technical organization rather than the synthesis of multiple types of information that is the true hallmark of design.

Professional design education has traditionally followed a similar structure to that of practice, focusing on the design studio as the locus of production in which students learn the methods of a “master” professor who acts as a substitute client. While professional accreditation requires that students “prepare a comprehensive program for an architectural project,” this focuses on physical and technical requirements rather than broader socio-political concerns and assumes that design students will go on to practices in which project agendas are determined by others (see NAAB 2009). Current trends toward the integration of “support” coursework with design studios, the expansion of interdisciplinary offerings, and the growth of research-based studios and practice indicate that the traditional model is no longer enough. Sustainable design, integrated practice, and BIM demand a more integrated, holistic approach to design education that is just the beginning of what will be needed to confront global climate change, increasing urbanization, and population migrations, all of which will have substantial impact on the built environment.

This paper presents examples of university-based activist practices that offer alternatives to conventional models of education and practice and describes the ways in which they operate with respect to university and practice systems. Whether structured as design centers, design/build studios, outreach studios, or research courses these practices engage a wider scope of work that includes what Bryan Bell describes as “help(ing) to define problems and locat(ing) opportunities where design has the potential to change the lives of individual people and communities” (Bell 2010). Typically interdisciplinary and operating at multiple scales, the most effective of these programs engage design in a proactive, systemic way that focuses on civic issues rather than products and uses the built environment as an instrumental force to include those who have been at the political-economic periphery. They not only give students opportunities to truly integrate a broad range of knowledge and skills but also create opportunities for interaction with design professionals and offer new opportunities for professional work. The paper concludes by proposing ways in which activist practice can be more effectively integrated into design education with respect to both accreditation and professional internship and the opportunities that this can create for design practice.

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## CIVIC ENGAGEMENT III: SUSTAINABLE NEIGHBORHOODS

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Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### **COMMUNITY AS CLASSROOM: PROCESS OVER OUTCOMES**

Richard Klopp, Vanier College

Community-based projects can engage participants in meaningful, collaborative, and constructive learning activities. They can also activate and empower citizens to positively transform their physical environment.

This case study offers a detailed account of four interrelated community projects, each creating the context for the next project to unfold. The projects involve the revitalisation of two dilapidated urban schoolyards in Montreal, Canada.

Nearly 100 architecture students, 50 primary school children, and a mix of building professionals, teachers, school administrators, industry representatives, tradespersons and volunteer parents participated in the design and construction processes. It was a community-building exercise in both the social and physical sense of the term. It was also an educational experiment that invited participants to step outside the silos that typically isolate academia, industry, professions, culture and community.

The case study takes the form of a play with a running commentary of reflection and insights provided in the margins.

ACT I describes a parent-initiated schoolyard revitalisation project and the fundraising activities that generated the initial social cohesion and motivation among volunteers. It highlights the value of process as an end in itself, especially in volunteer initiatives where funding sources and commitments are uncertain.

ACT II recounts a design-build competition for urban furniture involving teams of architecture students. It offers valuable insights into the setting up of successful learning-centred partnerships and the balancing of stakeholder interests and commitments that this entails.

ACT III gives an account of the co-design and production of a large mosaic involving the participation of school children. It reveals the importance of leadership and drawing on local expertise to generate unique live project opportunities.

Finally, an EPILOGUE describes a sequel project at another school involving many of the original project partners. It demonstrates the transferability of the project and its learning objectives to a new context.

### **INNOVATIVE CHANGE IN THE ARCHITECTURAL, ECONOMIC + CULTURAL LANDSCAPE OF METRO-MANILA**

Peter Zweig, University of Houston

The mid 20th century vision of architectural solutions for the urban environment involved creating a tabula rasa. In the United States Frank Lloyd Wright envisioned Broadacres as an ever expanding landscape that was the underpinnings for what was to become suburbia: Le Corbusier wanted to raise Paris to create an open highway system with dense vertical housing: while the Metabolists saw the city as organic with expansive large scale projects that created the framework for rebuilding the cities in post world war II Japan.

Each of these solutions involved architectural insertions into the urban environment without any social, economic, or cultural (SEC) context. Through an innovative architectural project I did at the request of the President of the Philippines, I will demonstrate a sponsored government project that is currently being introduced to invigorate the new, affordable social housing program that is being built on a massive level throughout the Philippines.

The housing and community project for this case study is located in Metro-Manila with Phase I consisting of 4,000 houses with schools, playgrounds, markets, etc. The relocation government project (Comprehensive Shelter Program) will target approximately 517,175 families that currently live by railroad tracks, the waterways and informal housing settlements throughout the city. The government intends to move this population to affordable housing. The unique program that we have developed consists of offering 10 free chicks with each house. This concept (SEC) provides a way for each household to have nutrition in their food, a means to earn money, and a method to initiate a sense of place in the community. The architecture uses a patented monocoque concrete, sprayed system that can be built very quickly, is economical and culturally compatible with the existing poured in place concrete buildings. The green architecture program utilizes the topography, retention ponds, solar passive systems and technology to create a new form for an affordable housing community. The thriving, new template questions the broad architectural gestures of previous architectural urban planning of the 20th century and engages the civic realm in a new way that encompasses the architectural, economic and cultural landscape.

This case study will outline the proposed architectural innovations of the housing project, the successful SEC initial program that was offered, and the potential future of the long range planning of the program.

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## CIVIC ENGAGEMENT III: SUSTAINABLE NEIGHBORHOODS

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Kathrin Golda-Pongratz, Clemson University / Universitat Pompeu Fabra  
Murray Fraser, University College London

### THE PARADISE CREEK ECO PARK: A COLLABORATIVE MODEL OF ACADEMIC CIVIC ENGAGEMENT

Phoebe Crisman, University of Virginia

Forces for change currently impacting the academy and the profession necessitate innovative pedagogical models and new modes of practice. This paper examines a model of civically engaged practice developed in a series of academic design research studios. Rather than the normative method of awaiting a commission conceptualized by the client, these interdisciplinary studios worked with community partners to identify opportunities, design a sustainable project to inspire environmental stewardship, and seek funding for realization. Civic engagement is an essential aspect of this approach to academic learning and research.

University faculty and students from architecture, urbanism, art and medicine investigated the complex relationship between human inhabitation, environmental restoration, and sustainability education through the design of a 40-acre public wetland park. They collaborated with the City of Portsmouth, Portsmouth Public Schools, and several non-profit environmental groups and community partners. The Paradise Creek Eco Park contains the river's last stand of mature forest and co-exists with contaminated industrial Superfund sites and an economically challenged, racially diverse urban neighborhood. The studio designed a park plan and several small park structures that engage urban kids in hands-on exploration and learning, including two classroom pavilions, children's playground, tree house and kayak launch. There were several research goals: create a place that increases the sense of well-being, economic vitality and opportunity for outdoor exploration for all ages; design green pavilions, children's playground and other structures that educate visitors about sustainability; make a place where citizens may rediscover the healing respite of a healthy, living river; and create strategies for industry and natural ecosystem to co-exist in harmony.

Both individually and in teams, students considered complex social, economic, ecological and architectural issues across scales—from the Chesapeake Bay to local watershed, city, neighborhood, site, building and architectural detail. They studied how architecture can be used and perform. For instance, an outdoor classroom is a generator of energy, collector of water, assemblage of didactic surfaces and spaces, place to experience the River and engage the senses, event space, constructed wetland for water filtration, and habitat for migratory butterflies and birds. The relationship between natural and constructed systems is revealed in a design that works with sun, wind, water, earth and biology. Photovoltaic panels provide power and rainwater and wastewater is collected and filtered. Students investigated old and new materials, technologies and constructional systems in service of the didactic agenda. The Park and its architecture physically manifests an inventive educational agenda that teaches about sustainable dwelling, as well as the inextricable links between water and land, the tidal river ecology and wetland restoration. This design research project establishes a model for university and community collaboration, while fostering a commitment to environmental ethics and sustainable practices by connecting academic learning with the students' desire to make a positive difference in the world.

### THE RACE IS REALLY THE PRIZE: DESIGNING COMMUNITY CAPACITY IN ECODISTRICTS

Christine Mondor, Carnegie Mellon University

The Race is Really the Prize: Designing Community Capacity in Ecodistricts  
Cities are interwoven diagrams of economic, social and ecological patterns. As our society developed technology to build power lines, dams and levees, food supply networks, and other modern infrastructure we overcame many ecological limitations. As a result, city planning shifted away from ecological concerns to focus primarily on economic and social issues. We wanted to know what economic and social opportunities would arise if a neighborhood renewed itself by deep planning around environmental systems?

Sustainability frameworks such as the ILBI's Living Cities Challenge (Institute 2011) are changing the practices of urban and architectural design by advocating for urban scale systems that are environmentally performative; the emerging term ecodistrict has been used to describe this planning. This planning is often focused on the technical and engineering implications of performative place-making, especially with infrastructure related to distributed power generation, net zero water, and net zero energy. Consequently, technology has been seen as the biggest challenge. In our work in urban communities we have observed that while infrastructure—the “hardware” of a community will continue to be a focus for problem solving, the “software” of community capacity is the variable that most affects the success of a project. We believe that community capacity will be the locus for transformation and the next threshold for design opportunity.

High performing systems require innovative design and engineering, yet the most effective systems require community capacity to imagine, implement and steward the systems. Innovative urban scale systems depend on the community's strength in decision-making, knowledge development, legal structure and financial resources. In this emerging context, our profession will have opportunities to orchestrate community capacity simultaneous to the design of the physical environment and we need design methods that acknowledge the interrelatedness of social engagement and the built environment. This dual focus aligns sustainability as a wicked problem where technological issues are interwoven with social issues and puts the very definition of community as an issue of design.

This case study examines sustainability through physical place making, as well as the social and cultural infrastructure. Through work with community groups, nonprofits and local government, the concept of an ecodistrict has evolved beyond environmental performance to be both a physical and a social strategy which offer opportunities for design. This study suggests that community resiliency can be created when built environment improvements are coupled with civic engagement; where making place is a community-building act.

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## PRACTICE II: AT THE CONFLUENCE OF AUTHORSHIP AND COLLABORATION

Felipe Correa, Harvard University  
Louisa Hutton, Sauerbruch Hutton

### **COLLAPSE TO EXPAND: ALESSI'S TEA AND COFFEE PIAZZA**

Shannon Starkey, University of California, Los Angeles

Merging threads of the expanded field, audience/public and aesthetic practice, this paper examines two strains of postmodern architecture – aesthetic autonomy and capitalist commodification – proposing an interdependent and complicit relationship, through study of a movement in the early 80's that has been largely overshadowed by exploration of late modern experiments. In 1979, Alessi initiated a design program, Tea and Coffee Piazza, with eleven architects from around the world, marking the genesis of a number of mass-produced products and programs specifically targeting architects, and signifying the production of small-scale industrial design objects by architects including Michael Graves and Aldo Rossi that ran concurrent with the design of large-scale commercial projects.

Tafuri's autonomous 'retreat,' as evidenced in the Alessi program, is a new aesthetic labor moving seamlessly from the back room of the studio to the global stage of financial capital and mass culture. Tea and Coffee Piazza forms a critical hinge in the move from the post-modern to the industrial, from art object to mass-produced consumer product. Increased production paralleled a geographic expansion of a more generalized design approach in northern Italy to the world at large, utilizing apparatuses including the Max Protetch gallery, for distribution, and MOMA, to spread ideas and influence through the all-encompassing design department.

Through the program, and concurrent with Philip Johnson on the cover of Time holding AT&T like a toy, branding entered architecture. The expanded field is a politics of consumer culture in addition to practice, a mechanism by which architecture reaches a public audience and is witnessed in the global commercialization of derivations of the limited-production tea sets.

Beyond branding, the program illustrates changes in practice including a resurgence of typological thinking and the collapse of scale into a more manageable and easily distributed product illustrating design ideas and approach. The tea set is "scaleless and without reference to a physical site; it reads as an ahistorical representation of an authored idea." Alessi facilitated design investigation free of political engagement. Within the teapot there is a collapse of monument and domestic object, an urbanization of the house and the domestication of the city that begins with the title and carries through product form.

Looking specifically at Aldo Rossi, the program allowed a more accurate conveyance and investigation of the ideas with which he grappled and extended a line of work that started with projects like the Teatrino Scientifico and Teatro del Mondo. The tea set collapses ideas of form, event, type, theater, memory, scale and function, into a toy. The teapot, with tenuous function, operates as an image that travels across time, culture and locale for the purposes of evoking memory. The tea set merged model tool with art object.

The Alessi program falls within the last chapter of the relationship between architects and industrial design toward global distribution and mass production, from the closing of the Bauhaus and opening of the MoMA design department (1933-34) to Michael Graves for Target (1998). The story begins with architects like James Watt in the Industrial Revolution.

### **OBJECTS OF OUR AFFECTION**

Danielle Etzler, Harvard University

In architecture, the production of knowledge has been isolated from its application.

The 20th century model of architects extracting both theoretical and physical products from an industrialized mass production economy has inverted in the early part of the 21st; access to software and fabrication facilities has generated speculative production methods by architects in an effort to engage in the physical act of making, and to inject design innovation to today's architectural endeavors; Architects often bring fabrication ideas to the construction industry, whether they are received with open arms or not. In its most prevalent form, this speculation and the authorship that comes with it takes on the scale of a single surface of a building, a small pavilion or enclosure, or a temporary installation. In the former, as professionals we can exert control over a single part of a building at a time. In the latter examples, we operate in a curated and self-contained culture of architecture in which we are both producers and consumers. In each, architects are looking for venues for "our work".

Buildings are the objects of our affection; associated with the imagination of architects, they operate largely without our influence. Though there are variations across the globe, the built environment is increasingly controlled by the construction industry; clients, consultants, contractors, and fabricators extend influence to shape a building long before an architect is involved. Frequently the architect or firm credited with a project is one of many who have been part of the building over a number of years; from planning to pre-design, design, project management, permitting, and construction, in any large project there are an increasing number of architectural firms playing an important role in getting any single building built.

The curated, authored environment of speculative work associated with architectural innovation could not be more at odds with the contemporary project of building. As a profession we have generated new models of practice, authored processes if not objects, and rallied around the idea that the profession itself must be protected. What we have not done as a discipline is accept what every professional actively involved in the built environment accepts every day; that no one person controls the making of buildings, and the collaborative environment in which buildings are made is rich in both resources and ideals. The sooner we stop talking about whether we should lead or follow, the sooner we can be better collaborators.

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## PRACTICE II: AT THE CONFLUENCE OF AUTHORSHIP AND COLLABORATION (CONT.)

Felipe Correa, Harvard University  
Louisa Hutton, Sauerbruch Hutton

### **RETHINKING POST-VANGUARD CONCEPTUAL PRACTICES**

Santiago R. Perez, University of Arkansas

We are witnessing a gradual shift in the perception of what constitutes architecture, from object-specific practices, celebrating the autonomy of form over landscape, to architecture as a field-driven, adaptive enterprise, with the agility to negotiate multiple agencies, technologies, and paradigms.

Parallel to this, the rise of the Expanded, Provisional Practice defined primarily by small offices, combining advanced technologies with what Michael Speaks termed Post-Vanguard Design Intelligence, constitutes a model for combining a newly emerging pragmatism with a conceptually driven attitude towards architecture as a performative, adaptive framework for innovation.

Offices which leverage both the Conceptual, Strategic and Technological, recall both the mid twentieth century practices of Jean Prouve, the Eames Office, and others, and invoke the radical-conceptual attitudes of the sixties, within a much more subdued shroud- an anti revolutionary, perhaps evolutionary position that re-negotiates the Performative, Ecological and perhaps Parametric tendencies toward a broad Conceptual enterprise.

Newly "refurbished" models of efficiency proposed by techno-parametric culture (Kieran & Timberlake: Refabricating Architecture), fail to capture the possibilities inherent in a re-thinking of conceptually driven architecture. Similarly, the strategic recasting of labor in architecture (Deamer: Building in the Future), focuses on a neo-pragmatist approach to architecture, lacking a conceptually driven foundation. In the same vein, the invocation of Ecological Practice (Tilder: Design Ecologies) perhaps comes closest to re-instituting a critical-conceptual framework for architecture.

Is it possible to entertain both a renewed sense of pragmatism in architecture, while at the same time advocating for a profound return to the conceptualist practices that informed late twentieth century work, without a return to the "Theoretical Vanguard" but rather through Thinking in Action and through Material Practice?

The author is invested in a reconsideration of material practice combining a pragmatic leveraging of (parametric, computational) technologies, within the broader framework of conceptual practice. This discussion is largely absent in contemporary (Digital Fabrication) culture, thus the interest in posing these questions within the broader umbrella of practice, towards a reconsideration of emerging modes of production.

## GLOBALIZATION I: ENERGETIC STRATEGIES & ANALYTIC MODELS

Hitoshe Abe, University of California, Los Angeles

Pascal Berger, University of Hong Kong Shanghai Study Center

Marc Schmidt, École Polytechnique Fédérale de Lausanne

### **ENERGY-(R)EVOLUTION**

Wendy W. Fok, University of Houston

As more than half of the world's population is expected to continue to live in cities, exponential urban development and population growth along with infrastructural increase are considered as parallel concerns and topics of discussion. The purpose of these design speculations is to offer potential design applications for architects and urban planners into dynamic investigations, integrating a layered approach of amalgamating architecture / landscape / infrastructure within future scenarios of "edge-based" urban environments (Hong Kong, Bangladesh, Shanghai, Houston, Texas, and Orlando, Florida). The topic of discussion, which has been in the past fifty years, and will continue to be under relentless scrutiny given the challenges of ecological changes, sustainable anxiety, and those aspects of urban development deal with design processes that consider the urban fabric and taking into account to the scalability of agricultural and ecological research, which has been and will continue to be a necessary requirement for future city planning.

To better understand the repercussions within the current state of the world, case-studies developed in past studios were developed using several international major 'hit' zones: Orlando, Florida and Houston, Texas (two US cities that are predicted to be 60 meters under water within the next 100 years), and Bangladesh, Shanghai, China, and Hong Kong (three Asian edge cities that are historically influenced through Western persuasion, and are consistently suffering from overpopulation). These case-studies of locations were used to develop topological research proposals of inquiry of alternative energy solutions that anchor itself within the system of developmental research using non-solar and non-wind driven sustainable energy solutions.

The case-studies took into specific environmental conditions into consideration to explore the various levels and aspects that pertained to design approaches that have certain ecological effects and techniques of self-sustainable systems. Whereby each researched location had specific contextual approaches that were based on a manifold of environmental conditions defining the ecological designs. Topics of design used both analogue and digital tools to further Urban Strategies as related to each individual city. Much of the research originated through finding innovative forms of connections and quest for paradigms within digital designs applied to sustainable urban cities.

The dominant theme within the speculative and developmental proposals questioned the edge condition of urban coastal developments, and actively ponders the role of architects, designers, and urban planners, edge intervention and construction along coastlines and waterfronts. Within the socio-developmental aspects, these projects are in search of a new set of relationships between democracy, individualism, sustainability, and capitalism for 'edge' conditions and their typological repercussions. Whether the ecological, economical and equity are balanced within a triangular relationship between urban development and our sustainable future cities, many of the proposals systematically questioned the authenticity of current cities, and whether the regard of sprawl and dynamic urban growth has affected the developmental behavior of the human understanding of places and non-places.

### **GEOGRAPHIES OF ENERGY**

Rania Ghosn, University of Michigan

In his best-selling book *The World is Flat* (2005), the New York Times columnist Tomas Friedman argues that the world is being tied into a single global market place where spatial barriers are being overcome. Friedman, along with other advocates of the "space of flows," rightly acknowledges the intensified flows of information, capital, labor, resources, and commodities in larger quantities and at greater speed. Yet, such accounts of intensified flows often interchange globalization with "shrinking world," "death of distance," or the "end of geography" altogether, constructing a world unhindered by the dimensions of space, materiality, or politics—beyond territory. They internalize benefits and accrue them to the city while externalizing costs, sliding them out of sight, to the periphery, underground, or deserts.

This paper asserts the significance of the territorial dimension in the operation of transnational flows. Through the case study of the Trans-Arabian Pipeline (Tapline), a cross-border oil pipeline in the Middle East, the paper explores how the global flow of oil depends on a physical and political inscription of the energy regime in the landscape. Throughout the course of the twentieth century, the growth of oil into a global commodity has brought the Middle East and its oil infrastructure on the agendas of foreign policy and international trade marking the space of the region from extraction fields, through transportation routes and into refineries-ports. Operating between 1950 and 1975, the 1,000 mi cross-border Tapline, a subsidiary of four American oil companies, carried part of its sister company's crude from the Aramco wells in Saudi Arabia across Jordan and Syria to a Lebanese port on the Mediterranean. Designed as an overland shortcut, the pipeline was represented in company publications as a free-floating pipe that merely overlays the land to vanish into the horizon. However, the cross-border flow required material interventions that inscribed the infrastructure's territory into the landscape. It comprised an extensive system to map, build, service, inhabit, and secure the line. In Saudi Arabia in particular, Tapline played a developmental role in the Northern Province, which contributed to stabilizing the northern frontiers of the Kingdom and supported the settlement within its political boundaries of tribes that had seasonally migrated in search of water across the arid region and into Iraq. The pipeline company drilled groundwater wells, provided free medical services in its clinics along the right-of-way, and built public facilities in the pumping stations towns.

The energy infrastructure required thus a set of discursive and material technologies to inscribe the flow of oil into the landscape. In the process, it materialized a territory through which the multinational oil corporation, the state, labor power, as well as local emirs negotiated their stakes and interests. From this perspective, territory is understood as a constitutive dimension of globalization. At time when the triad of energy, economy, and environment is at the forefront of design concerns, such territorial understanding of global infrastructures yields crucial insights into the spatial planning for subsequent energy transitions.

## GLOBALIZATION I: ENERGETIC STRATEGIES & ANALYTIC MODELS (CONT.)

Hitoshe Abe, University of California, Los Angeles  
Pascal Berger, University of Hong Kong Shanghai Study Center  
Marc Schmidt, École Polytechnique Fédérale de Lausanne

### **MAPPING URBANISM**

Kelly J. Hutzell, Carnegie Mellon University

Mapping Urbanism, an interdisciplinary course, comprises urban design, information design, history, and theory. Cities from across the globe that exemplify various typologies – the global city (New York and Paris), the shrinking city (Detroit and Manchester, England), the growing city (Las Vegas, Doha) and the megalopolis (the U.S.A.'s Northeast Corridor and the Pearl River Delta, China) – are examined through an interdisciplinary framework. The aim of the course is two-fold: first, to develop an appreciation for diverse histories, cultures and the built environment and second, to educate students to become engaged citizens of the world, reflective and informed about the complex issues of urbanism. The course strives to achieve this by cultivating critical thinking through an analytical, problem solving, and interdisciplinary approach.

For the past five years, this upper level elective course has been offered at Carnegie Mellon's Pittsburgh, Pennsylvania and Doha, Qatar campuses. On both campuses, students of many disciplines and backgrounds have exchanged intercultural communication and knowledge of the social, economic and political influences on the built environment. Urbanism is examined through readings and written responses from books such as *Learning from Las Vegas* and *Al Manakh*; information design is studied through the lens of Edward Tufte and Richard Saul Wurman; and graphic and interactive websites are introduced from the likes of Brian McGrath and Ben Fry. Each specific city is then examined as a case study, through documentation and analysis of data, asking relevant questions and drawing comparative conclusions, while communicating the results graphically, in a dynamic and accessible manner.

The complex issues of urbanism provide a rich backdrop to teach skills in critical thinking and representation. Issues examined include ethnic and economic diversification, the merits and pitfalls of increasingly globalized cities and the relationships between urbanization and ecology. However, the focus tends to change based on the locale and student groups. For example, in Pittsburgh, students are keen to examine issues of urban development and environmental sustainability, while in Doha, students expand the notion to include cultural sustainability as well.

Analog and digital mapping skills go hand in hand, and build upon each other over the course of the semester, through workshops that provide software instruction with the Adobe Suite and GIS, and introduce the fundamentals of processing. Conceptual mappings, focused on the "home" city, assist in the initial exploration of urbanism through the documentation of perceptual and sensory personal observations. Traditional mapping techniques such as Nollie maps and Lynchian diagrams provide tools for understanding the fundamentals of a city's structure. The correlation of GIS with census data yields comparative demographic information. Mobile computing, paired with Google Maps, as well as diverse web-applications, increasingly yields innovative and informative visualizations.

Mapping Urbanism advances students' knowledge of urgent global challenges and cultivates a wide array of critical written, verbal and graphic skills. These multiple means of approach reinforce and complement an architectural education. Whether in Pittsburgh or in Doha, students acquire new ways of seeing and portraying the city.

### **MODEL BEHAVIOR: ARCHITECTURE AND THE CITY IN THE AGE OF POST-MECHANIZATION**

Frances Hsu, Georgia Institute of Technology

model noun

. A three-dimensional representation of a person or thing or of a proposed structure, typically on a smaller scale than the original: a model of St Paul's Cathedral [as modifier]: a model aeroplane

. A thing used as an example to follow or imitate: the project became a model for other schemes

model verb

. To devise a representation, especially a mathematical one, of a phenomenon or system: a computer program that can model the behaviour of smoke

Over the last two decades, computation has permeated culture and society. Architecture's concerns in the present time are rooted in computational paradigms, just as the values of modernism were rooted in the machines of mechanical reproduction and mechanization arising with industrialization. Beatriz Colomina examined the extent to which Le Corbusier and Adolf Loos recognized and utilized the new modern media of their time, such as advertising and photography. Correspondingly, Patrick Schumacher addresses a new globalized style—called parametricism—produced by architects, such as Zaha Hadid, that succeeds modernism through systems thinking techniques such as animation, simulation, and scripting.

This paper examines the change, fostered by computational techniques, in the status, meaning, and role of the "model" for the mutually dependent levels of the design process—for seeing, thinking, and making; for description, analysis, and synthesis—in case studies.

Models are a specialized mode of reflection on architecture, a kind of mediated state between design intentions/visions and built artifacts. The three-dimensional physical model is a form of expression (along with drawings, books, exhibitions, lectures), used in the realization of a building at several stages: To explore and convey concepts, analytical thinking, and alternatives during the design process; and to describe and communicate the physical construction of the "finished" building to the client.

Digital tools have become (increasingly) dominant in the design process. With parametricism, used for both design and fabrication efficiency, making models becomes "modelling." Modelling amplifies systematic relationships, "problems of continuity across scales, the integration of parts and wholes, and variation and variability." Alternatives produced with computer imaging have a particular relationship to the conceptualization of formal and spatial configurations, and programmatic and aesthetic decision-making.

In addition to affecting the creation of artifacts, changes in the meaning of the "model" occur in the representation/analysis of the city. One is today always cognizant that the immediate, physical environment is augmented through the virtual and electronic: Digital advertising and news via internet, radio, and television, as well as mobile connectivity, e-commerce, and social networking media such as tumblr and foursquare. The changing urban metabolism of the informational city is measured and analyzed, or tracked, via traffic optimization, geographical imaging (gis), and financial trading sites. The generic city is a "smart" city run on the efficient use of capital and the rewards of the free market, whose forces are often accepted by architects who extrapolate and expand upon information modelling as design tools.

## OPEN III

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **A CERTAIN BRAND OF HUMANISM: THE PEDAGOGY OF MATTHEW NOWICKI**

Eric D. Bellin, University of Pennsylvania

The life of the Polish architect, Matthew Nowicki, was cut tragically short in a 1950 plane crash returning from Chandigarh, India to the United States. He had been asked to design the plan for the new capital there, a task that would subsequently fall to Le Corbusier. In Nowicki's untimely death at the age of forty, not only was a very promising young architect lost, but also a visionary educator. At the end of 1940's Nowicki was appointed as the Head of the Department of Architecture at North Carolina State University, and curricular changes were quickly instituted to inscribe "humanistic values" within the education of the architect.

For Nowicki, an education in design was to begin with the "study of man in terms of his psychology, intellect and emotion" and the relationship between these things and the physical environment in which he is enveloped. This humanist position was imbedded within NC State's architecture curriculum in the form of required courses including Contemporary Civilization, Contemporary Science and Society, Human Behavior, and Urban Sociology. In this, Nowicki attempted to fuse concerns of anthropology and sociology with architectural education, and while this was not uncommon in the 1960's and 70's, the program at NC State University is one of the earliest American examples of such an attempt.

This paper explores the details and particulars of the curricular changes that Matthew Nowicki implemented at North Carolina State University in his effort to build the program around the notion of a humanist architecture. Also investigated is the role of Lewis Mumford, a mentor and collaborator of Nowicki's, who was both instrumental in curricular development and served as a visiting professor at the School of Architecture. As much of contemporary architectural education gravitates towards questions of technique and digital production, a fresh look at Nowicki's humanist curriculum serves to remind us that, above all else, an architect builds for people, and questions of humanity must not be left behind.

### **FOLD-OUT DRAWING: A NOTATIONAL DRAWING FOR FABRIC FORMING**

Kentaro Tsubaki, Tulane University

*"Real time now prevails above both real space and geosphere.  
The primacy of real time, of immediacy, over and above space  
and surface is a fait accompli and has inaugural value."*

In his essay, Speed and Information: Cyberspace Alarm! Virillio attributes the fundamental change in our perception of the world to the realtime information exchange, the effect of digital media in the cultural context.

Digital culture demands instantaneous visual gratification. Virtual models accurately represent three-dimensional forms. Their pictorial depictions have long replaced the slow notational drawings in the design process, or so it seems. Digital fabrication tools, a staple in many architectural institutions instantaneously replicate three dimensional forms. Theoretically, these tools are to bestow the long lost control over fabrication back in the hands of architects. However, it is rather short-sighted if the goal is simply to replicate by by-passing the hands of the fabricator and subverting the material tendencies and limitations all together. Design decisions based on the feedback from the material properties and fabrication processes are integral to the notion of craft and making. Without a conscious effort to reflect upon the material resistance, the newly found control will turn into an overindulgent formal exercises.

The poetics of architecture resides within a phenomenal performance of a physical construct beyond the predictable, evoking an emotional and intellectual response. Without the embodied understanding of materiality and sensibility to fabrication, it is impossible to make potent design decisions. Thus, the question is, what kind of tools do we use? How do we document the physical measurements and sequence of fabrication, pay attention to the phenomenal qualities of the materials and reflect on the design intention all at the same time? Is a drawing too slow and obsolete in the digital-centric age?

This paper argues for the agency of drawing as a mediation between the materials and the act of making, a quality not present in the pictorial depiction of virtual models. It demonstrates that notational drawing is an essential tool for both design and fabrication that is impossible to substitute with pictorial depiction. The fabric formed plaster experimentation conducted by the author will be referenced for this purpose.

## OPEN III (CONT.)

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **SILVER RESIDENCE HALL AT NYU UPTOWN: A BRIDGE TO CO-ED HOUSING**

Carla Yanni, Rutgers University

Perched on a cliff above the Harlem River, New York University's uptown campus in the Bronx captures a pivotal moment in architectural design, and student life. Designed by Hungarian-born Marcel Breuer in 1956 and opened in 1961, the 600-bed structure was the first co-ed dormitory at NYU. Its architecture reveals reluctant co-educationalization and faith in the power of architecture to shape student behavior.

Julius Silver Residence Center was a seven-story high-rise, shaped to curve along the river. A community hall sat on relatively high ground, but the dormitory was in a deep well, with one of its levels below grade, and three dorm levels below the floor of the community hall. The community hall was designated as the space for men and women to socialize. From there, the plan directed men and women into their own separate pedestrian bridges, which in turn led to the male and female ends of the slab. Inside the men's section, the services (stairs, elevators, and bathrooms) were in the center, bounded on both sides by parallel corridors. The women's side was a more typical double-loaded corridor plan. It offered more privacy, because every two bedrooms shared one bathroom, and the bathrooms were tucked inside the rooms. It was at that time taken for granted that women needed more space and privacy than men. [Bowling Green State Colleges, History of Student Affairs Archives, Association of College and University Housing Officers, MS 487, Box 1, Conference Proceedings: ACUHO, First Annual Conference, 1949, p. 17.] The New York Herald blared the headline: "NYU on Heights to go Co-Ed: Men and Women will be housed in New Dormitory." In contrast, an internal NYU publication soothed nerves: "Rigid division and control will of course be maintained." [Clippings file, Archives of American Art, Breuer Collection frame 1212.]

To some viewers, Breuer's buildings may seem to make no attempt to fit their surroundings, especially the aggressively sculptural concrete lecture hall that sits just beyond the community center. But "context" is an elusive concept. Breuer wrote: "We 'modern' architects don't hate tradition – the opposite is true." [Jones, Cranston. Marcel Breuer: Buildings and Projects, 1921-1961 (New York: Praeger, 1962) 257.] The use of Roman yellow-orange brick (the same material as the Beaux-Arts buildings) was enough to create a dialogue among the structures.

This paper relies on original research conducted at the Archives of American Art, New York University, and the History of Student Affairs Archive in Bowling Green, Ohio in order to explore Breuer's co-ed dormitory as a microcosm of modernist campus design. It is one case study from a book-in-progress titled: Live and Learn: The Architectural and Social History of Dormitories and Residence Hall. The central research questions are: why have American educators believed for so long, and with such fervor, that one needs to house students in order to educate them? And, more specifically, what is the role played by architecture in legitimizing that idea?

## TECHNOLOGY II: TECHNOLOGICAL PEDAGOGIES

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **HOW CAN STUDENTS LEARN TO INTEGRATE FORM AND CONSTRUCTION?**

Karel Vandenhende, ASRO KULeuven

Most design assignments in architecture schools are copies of typical assignments in an architecture practice. They start with the first sketches, which are further developed in a preliminary design, and end with working drawings and design details. This sequence works for someone who masters all the aspects of architecture, and therefore can foresee the consequences for the realisation of a preliminary design sketch. But this is not the case for beginning architecture students; for whom the construction often turns out at the end of the design process as a choice of the less disturbing structure to realize their designed form.

This lack of integration makes good architecture impossible, because earlier research proves that in good architecture, more satisfactory solutions encompass more topics of the stated problem at the same time. So these good solutions integrate many topics, including form and construction.

A literature review on didactics brings up 3 interesting strategies to counter this problem.

First, thematic assignments simplify the complexity of architectural problems and make it possible to focus on certain aspects, for example the integration of construction and form.

Secondly, by working on scale 1/1, the difficulty of rescaling and problems of representation are both omitted out of the design process and reinforce the possibility to focus on form and construction.

And thirdly, the order in which steps are applied in practice does not have to be the order in which they should be taught. There are very good reasons to teach "backwards", so there is always something before you is that you already know.

All three strategies were applied in a thematic studio assignment last year that started where the design process in practice often ends: the details. The assignment started with the exploration of the formal and constructive aspects of possible connections between 2 parts of the same or different materials by building and exploring the connections in reality. And it ended with the exploration of the form and the constructive properties of vertical or horizontal structures, created by frequently repeating that connection. During the whole design process, the formal aspects of what the students were constructing, were visible and at the same time, the constructive qualities were tangible with their hands on a full size scale. While neither paying attention to context nor to function, they were able to concentrate on the integration of form and construction.

### **IMPERATIVES OF CRAFT: PEDAGOGY FOR EMERGENT TECHNOLOGIES**

James Fowler Eckler, Jr., Marywood University  
Karl Wallick, University of Wisconsin-Milwaukee

Expectations of craft, both digital and manual, situate drawing as the primary agent of synthetic investigation for architecture. However, with constantly evolving software, scripting, databases, and various other analytical programs added to the architect's media of brain and pencil, both students and curricula face choices about how to position design and skills curricula between broad exposure to many tools or narrow specialization in the media of the moment. Attempting to locate a school's position along such a gradient means that one is forever playing catch-up to the latest software updates. But in comparison to technology, fundamental design principles mostly remain constant. The pedagogical outline must be robust in principle but malleable in structure so that digital and manual tools can evolve with the industry while architectural principles stay intact.

In this paper we show such an approach within the context of an undergraduate foundation studio. Our approach to digital processes as generative tools involved defining spatial qualities through the lens of edge, zone, and assembly tectonics in a carefully sequenced series of cumulative design exercises. Through these exercises, students are expected to develop a design process while engaging in experimentation that demands a hybridization of manual and digital crafting techniques. This paper explores opportunities for combining the conventional hand drawing and modeling with digital fabrication, rendering, and making within the virtual environment. A priority for this studio is to overcome students' expectations that digital craft represents a final outcome. For this group of undergraduates, manipulation occurs exclusively within the virtual environment and any output is considered immutable. This presents a clear barrier to integrating inquiry as public discourse, iterative design process, and digital craft into the design process.

In this pedagogical model we use Semperian tectonic principles as a way of providing linkage between the different steps in the studio sequence. Examples of student work will show that as a pedagogical tool, keeping spatial fundamentals stable, we are better able to keep up with the dynamic pace of technological evolution.

Positioned at the very beginning of a curriculum this studio constitutes the student's first exposure to digital media in design, much less digital fabrication. This reality presents a pedagogical problem. How do we structure a project that offers necessary skills based training, coupled with design instruction with an emphasis on integrating manual and digital methodologies? Can this structure be used to reinforce and develop a process of design in which discovery is a result of craft? How can there be tectonic language or even an attitude towards assembly when one is plotting models? How do we formulate a studio structure to deliver content that anticipates construction logics for materials, structure, environment, and organization rather than formal gymnastics divorced from actual limitations? And, within the larger architecture curriculum, how does this project help prepare students to enter an ever changing, technologically diverse, discipline?

# FRIDAY, JUNE 22, 2012 - 9:30AM - 11:00AM

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## TECHNOLOGY II: TECHNOLOGICAL PEDAGOGIES (CONT.)

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **MANUEL OPERATIONS IN THE AGE OF DIGITAL DESIGN: A CASE OF A BEGINNING DESIGN STUDIO**

Myung Seok Hyun, Georgia Institute of Technology

Walter Benjamin, in his renowned essay, "The Work of Art in the Age of Mechanical Reproduction (1936)," introduced the compelling metaphor of the painter/magician and the cameraman/surgeon. The painter works like a magician, who only "slightly" reduces the distance between the hand and the body; whereas the cameraman works like a surgeon, who "considerably" the distance, by dissecting with the surgical knife the body. The painter sees the appearance of the subject and mimics its wholeness through depiction, maintaining the distance that ensures the aura. The cameraman penetrates within the subject, cutting the subject into fragments and re-contextualizing them through re-assembly. Benjamin's metaphor signifies the transition in media technology and the mode of artwork. As this Benjaminian framework brought insight into the tendencies of fragmentation and collage-like structure of the historical avant-garde, the recent change in digital technology demands a new agenda for critical assessment of the current mode of art and architecture.

The manual operations introduced in this paper followed the pedagogical structure of three phases. 1) In the first phase, the students were asked to identify and observe the performance of both the tools they use and the matters they sense. Through these operations, the students acknowledged that the modes of production and reception are constantly in tension; that the process of design is the constant feedback between being the author and the audience. 2) In the second phase, the students began with a physical module. Through material understanding and manual operations, the students then developed ways of repetitive iterations that accumulate the modules into a performative artifact. 3) In the third phase, the students investigated the parameters of the site, its spatial and temporal phenomena. The modular repetitions from the second phase were then transformed by responding to the parametric intensities of the site.

The operations raise awareness toward the three key aspects that constitute the new design agenda of digital technology. The interactive nature of today's artwork ensures the participant's self-awareness as both the author and the audience. The design is profoundly genetic rather than mimetic, as it is involved in formulating the kernel that performs as the source of self-generation. The newly defined authorship and the strategy of genetic engineering are both directly related to site-specificity. The spatial and temporal phenomena of the site and its collective mass are the significant parameters of the studio operations.

The Benjaminian framework is profoundly dialectic. Benjamin, by attending to the modes of production and reception, poses the artwork as not merely responsive to the technology, but as its dialectic counterpart. The beginning design studio work introduced in this paper, in this regard, is suggestive of digital technology, but produced through manual operations. The key goal here is to verify and re-imagine the potential modes of digital production and reception, without adherence to digital technology itself.

## OPEN IV

Elie Haddad, Lebanese American University  
Jorge de la Cámara, Barcelona Institute of Architecture

### **ANISTOTROPIA - MORPHO-GENERATIVE SOUND ANALYSIS**

Christoph Klemmt, Orproject

As different as music and architecture are, the two forms of art also share a close relationship, and many composition and design concepts can become applicable to both. This essay explains some of the historical relations between the two disciplines, and how research by architects Orproject explores digital formations and algorithmic aggregations using sound and music. By transforming time-based attributes into spatial dimensions, the harmonic behaviours of a sound over time can be turned into complex geometries, which, due to the sound's inherent logics, can become suitable morphologies for architectural applications.

### **CULTURAL COGNITION AND SMART SPACE DESIGN CULTURE**

Alfredo Andia, Florida International University  
Branko Kolarevic, University of Calgary

Spatial design in the 20th century implied a profound concern with form. The aesthetics of the analog artifact became the exclusive milieu in which artists and designers could present identity, order, and provoke visual emotions. Design occurred typically only before fabrication and usage. Once the analog piece was built its design would remain frozen in time and could no longer be modified.

In this paper we will argue that the act of design in the 21st century will inevitably develop a parallel creative process. Human space is changing from a collection of "dumb" analog artifacts into networks of "smart spaces" in which human, products, and places can interact in real time. The paper introduces the historical foundations of "augmented reality" that began to be introduced with terms such as "ubiquitous computing," "calm technology," "third paradigm" by authors such as Mark Weiser, Alan Kay and research centers such as Xerox PARC more than 30 years ago. But it also argues that despite the accelerated lowering of price per bit and atoms per bit and the evident miniaturization of computers the design of "augmented reality" has maintained a very narrow design vision of space production.

The paper is based on an extensive review of more than 400 prototypes of "augmented reality" projects. We argue that this "hybrid" world is emerging as a gradual accumulation of technologies. This signifies not only a clash between two types of human environments and technologies but a collision of detached design cultures, traditions, and understanding of human factors. Relationship, timing, and bonding experiences between human actions, consciousness, and spaces are more important than technological solutions. The whole subject matter of this new computing age is transforming data into cognition.

But what does it mean to transform data into cognition? Computing thought until the 1990s has been based mostly on "a-corporeal" vision of the world. Most of the traditions of digital computation have been based on a symbolic representation of cognition. Its future will be based on defining the experience and the emotional value of physical interaction.

We are critical with most "smart space" or "augmented reality" projects. We believe these are mostly object and function centric. We show how a significant number of prototypes we have analyzed develop a deep engagement or create wonder users but just minutes. The novelty usually wears quickly. A few more mature pieces, the ones that are able to engage the body, usually have a series of combinatory tricks that move the user into a cognitive narrative. The more engaging projects blur the user into a story. The most engaging projects have a universal language and an intricate story that can also be found in large art pieces such as the weather project by Olafur Eliasson or the cloud gate sculpture by Anish Kapoor. We finalize the paper by presenting how a more centered body-experience vision of computation calls for a more clear understanding of the field of "cultural cognition" that are related to our self-defining values.

### **FORCES OF CHANGE: PAST AND PRESENT**

Marci S. Uihlein, University of Illinois, Urbana-Champaign

Richard M. Bennett begins his article entitled, "The Direction of Architecture," by outlining the forces of change in architecture in 1946:

*"Although concern with its [architecture's] future direction must begin with the social and economic forces that activate our time, the final considerations that seem most provocative today are: (1) change in the architect's scope and methods; (2) greater concern on the part of architects with city and regional planning; (3) a more organic relation to nature; (4) new materials and technologies...."*

His observations were based on the time he lived and practiced, but one could easily assume that they were made about the current state of practice. Many of the issues that he has raised are relevant to architectural education and practice today. Economic factors, unemployment among architects, sustainability, digital tools, and transformation in building technologies have led us to a point where architecture and the role of the architect are on uncertain grounds. In January 2011, Architectural Record asked, "What Now?" In his introduction to the topic, editor Clifford A. Pearson provided an insight into the mood of the profession, "...the start of 2011 seems like a particularly confusing moment with architects facing a crossroads in terms of social and professional priorities, economic concerns, and design approaches." One has to ask, what does change mean in architecture? Are the current themes of change new? Or are the questions the same? Do architects have the ability to develop answers to the current challenges any better than in the past? What can be learned from the profession's previous endeavors?

This paper will examine change in architecture by reviewing and analyzing scholarly journals such as Journal of Architectural Education and trade magazines such as Architectural Record from the twentieth and twenty-first centuries. These sources will be used to identify the issues and look for patterns within the profession. The goals are to give our current discussion of change context, identify previous stumbling blocks, and highlight the unique challenges/opportunities of our time.

## PRACTICE III: AT THE CONFLUENCE OF REPRESENTATION AND POLITICS

Felipe Correa, Harvard University  
Louisa Hutton, Sauerbruch Hutton

### **A CASE OF MISTAKEN IDENTITY: CHANGES IN THE PERCEPTION OF FEMALE ARCHITECTS IN PUERTO RICO**

Norma Isa Figueroa, University of Texas at Austin

This paper relates to the practice of architecture by female architects in Puerto Rico and their efforts to make themselves visible as professional women. As more women are presently becoming practitioners, this work attempts to show changes in society's attitude towards female architects by evincing the efforts of past generations in establishing themselves in the practice. From a Cultural History standpoint, it makes a critical analysis of the newspaper articles that featured female architects published in the Island between 1945 and 2011, and argues that society was both fascinated and intimidated by these professionals. By analyzing their photos, this paper brings to light the way visual images were manipulated to construct, in line with prevalent gender notions, the identity of the professional woman in the field of architecture. The images found in the newspaper articles show how the press pigeonholed the female architect into different archetypes, in an effort to normalize the identity of the professional woman. The opening article, published in 1945, deals with the first female architect in Puerto Rico and presents three pictures where gender performance is literally staged as a way to deal with the 'crisis' brought on by the Liberated Woman. Subsequent articles present female architects trying to establish themselves in the profession as active participants, as students and as construction supervisors, while the press represented them foremost as women and then professionals.

From the newspaper articles analyzed, this paper contends that the traditional role assigned to women as caretaker was woven into the practice, and shows how female architects accepted or struggled with society's expectations. While female architects were trying to make their mark in society, the articles published by the press evidence the systematic disregard they were subjected to by the same institutions they were subjects of: the School, the Profession and the Family.

### **LOST IN TRANSLATION: SEARCHING FOR THE DETAILS IN CONTEMPORARY ARCHITECTURAL PRACTICE**

Patrick Doan, Virginia Tech

*'In a poetic universe, every fragment is a luminous detail. It resonates with the super-sensuous. It is in perpetual transport from the everydayness of its material appearance to the sphere of the transcendental where it is really located, and its impact upon consciousness constitutes a moment of vision or the sense of embracing the totality of all that is.'*

Gerald I. Bruns, 'Toward a Random Theory of Prose', Introduction to Theory of Prose

When the question of 'the detail' is posed in architecture it is often taken as a technical issue to be solved. The Architectural Graphic Standards and material manufacturer's literature are often the first places considered when in search of building details. Within offices a library of commonly used details are kept for reference, use, and modification when developing and 'detailing' a building. Generally, the questions being asked of the detail are centered on its physical and performative requirements: where and how is it being used, and what are the responsibilities and demands being placed on

it such as transition, expansion, weather resistance, joining, etc. What can be lost in the 'solving of the detail' is its potential. Seen as solely a technical problem, the detail can become disembodied from the work; treated as a singular moment to be solved around a specific condition. Its potency and potential as a necessary and contributing part to the larger whole and realization of the architectural work can become lost.

In current architectural practice and theory there are varying positions taken on the detail from architects such as Rem Koolhaas who question the idea and relevance of the detail to architectural theorist Marco Frascari who asserts that the detail in architecture is the source for 'the possibilities of innovation and invention.' Author Edward Ford writes in his most recent book *The Architectural Detail*, 'The good detail is not consistent, but non-conforming; not typical, but exceptional; not doctrinaire, but heretical; not the continuation of an idea, but its termination, and beginning of another.' What becomes apparent is that the detail is not so neatly defined and with these varying degrees of interpretation can quickly lose its importance and potency within the practice of architecture.

This paper is an inquiry into the nature of the detail and its relevance in contemporary architectural practice.

### **THE ARCHITECT'S VISUAL PRACTICES AS A SOURCE OF POWER**

Richard Klopp, Vanier College

Visual representations play an essential mediating and structuring role in the negotiation of design decisions among practitioners engaged in the multidisciplinary context of commercial building design. Architects, by nature of their specific role and training, usually have the greatest command over the production and interpretation of visual materials, which places them in a position of power with regards to their use – and misuse. Drawing on a wide range of published sources, this paper examines how architects acquire and deploy power through their visual practices, focusing on the potential negative effects on team collaboration. A concluding discussion reframes this as an ethical challenge for all professions to be more proactive at assessing and disclosing the sources of power that stem from their privileged knowledge and abilities.

## SUSTAINABILITY III: NEW STUDIO DESIGN METHODOLOGIES

Andy Backer, IE University  
Belinda Tato, ETSA Alicante

### **ARCHITECTURE BEYOND BORDERS: PROVISIONAL LESSONS LEARNED FROM THE DEVELOPING WORLD**

Joseph Dahmen, University of British Columbia

Architects Without Borders, Architecture for Humanity, and similar groups attest to the growing desires of professional architects and their academic counterparts to produce positive change in the developing world. These well-intentioned efforts often employ environmental and economic sustainable design methodologies to provide more humane conditions in the regions of application. The most effective projects engage community participation in decision-making (Arnstein 1969; Choguill 1996), and display an intimate knowledge of site and context to generate successful outcomes (Mang and Reed, 2012; Van der Ryn and Cowan, 1996). However, encouraging participation and developing a nuanced understanding of site and context is difficult during an era of global practice, when intense project schedules, remote locations, and limited budgets make it difficult to fully comprehend the complex social and environmental relationships that characterize a particular site and culture, or to predict the unintended repercussions of actions on sites located across cultures.

As more of our working and communications processes migrate to digital and networked channels, the barriers to long distance service are diminished. How might a new generation of well-intentioned professionals and students engage remote places and cultures in issues of design and sustainability? The paper proposes a provisional methodology to utilize synchronous communication tools with design methods to produce understanding of social and material site conditions and context over the course of projects set in the developing world. The paper responds to challenges encountered in a recent developing world design studio offered at the University of British Columbia School of Architecture and Landscape Architecture. The methodology developed here could be embraced by western universities and design firms undertaking projects in the developing world and addresses the following areas:

- Approaches for operating from a distant design studio with incomplete knowledge of site conditions and local context
- The role of adaptable design approaches and responsive decision-making capable of responding to the different uses of the project
- The role of frameworks for others to complete versus finished designs

This method has the potential to enable Western Universities and architecture firms to develop effective sustainable designs calibrated to local social and environmental conditions.

### **CHANGE / NO CHANGE**

Ingrid Strong, Wentworth Institute of Technology  
Jennifer Lee Michaliszyn, Wentworth Institute of Technology

#### **CHANGE**

Academia has grappled for some time with how to incorporate sustainable design as an integrated part of the foundation design curriculum. Often an approach that has tacked-on or arbitrary requirements for sustainability results in, at best, a disjointed approach, and at worst an impoverishment

of design. This paper describes an experiment designed to address these questions in the foundation sequence in architecture at the Wentworth Institute of Technology. The experiment was held during the second semester sophomore year when students are introduced to projects concerning building massing and envelope, siting, orientation and daylight.

Buildings materials and assemblies, high technology and the need for implementation of performative strategies in response to our changing climate and diminishing resources led us to consider contemporary buildings as the forefront of implementation of 'change'.

#### **NO CHANGE**

By relating 'back' to "timeless" or "unchanging" issues of orientation, sun path and solar geometries, natural light, we were in fact tapping in to the concept that change itself is a constant. In past years, we began Environmental Systems with an applied take on climate and environmental forces over time. "Weather Follies", structures designed and observed by the students, were sculptural pieces set outside to record wind, sun angles, precipitation, humidity, surface and diurnal temperature differentials over the course of one semester. Beginning in 2010, we applied the same logic: record change, understand it in the context of universal precepts regarding building envelope – to a new kind of hands-on assignment.

#### **ASSIGNMENT**

The assignment bridged two courses: Sophomore Studio and Materials and Methods II, a required lecture course focused on the building envelope. Working from a selection of well-known contemporary built works, students broke into groups of three, first to analyze the envelope, then to build large-scale façade models of their chosen building.

By bridging the two courses, we were able to take advantage of the smaller studio sections to provide the students with more individual attention, while providing the active learning that enriched and helped students comprehend material from the lecture course.

#### **CONCLUSION**

Working with students who are beginning to grasp architecture and its attendant tectonics, we enriched digital exercises with a number of possible 3-D modeling options such as bas-relief diagramming and physical model building.

The built façade model was the capstone of this experiment. The act of making allowed for a deeper examination of the transformation of an abstract idea to the construction of a surface: idea to form, form to material, material to structure. Specifically, model making acted as a powerful tool toward a deeper understanding of tectonic languages as they inform decision-making in design processes.

The success of this project has been recognized throughout the program as a validation of built work and applied knowledge. The façade models represent the department's commitment to the art of making.

# FRIDAY, JUNE 22, 2012 - 11:30AM - 1:00PM

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## SUSTAINABILITY III: NEW STUDIO DESIGN METHODOLOGIES (CONT.)

Andy Backer, IE University  
Belinda Tato, ETSA Alicante

### **HEALTHY BUILDINGS FOR THE FUTURE: HOW CAN WE ENSURE THAT DESIGNS OR ADAPTATIONS DELIVER SUSTAINABILITY PRINCIPLES AND CAN BE INTEGRATED INTO STUDIO BASED TEACHING?**

Faidon Nikiforiadis

A successful sustainable architecture studio based course will have to be a well balanced blend of established scientific theories and design principles in relation to the healthy buildings and environments; It should aiming to raise the awareness and mold the practicing ethos of future design professionals.

The integrated studio teaching should allow students to consider the sustainable architecture design theories and principles and at the same time raise their awareness of potential issues of human health in buildings. Students should be given the opportunity to critically analyse current sustainable architecture and low energy design principles and technologies used in practice.

Studio based teaching should encourage students, to build knowledge, skills, understand, building occupant needs, and consider the environmental impact of their design decisions. It should also teach them, how to undertake holistic sustainable design and construction analysis integrated within the building design process using Building Information Modelling and Building Simulation Tools.

Studio class students practice skills and techniques and learn new concepts while working in an environment that encourages: learning by doing, working together and seeking advice or assistance from mentors and tutors. The studio is often an environment similar to that which students will experience in the workplace. The traditional lecture theatre, tutorial room and laboratory environment is replaced by a model based around the development of collaborative learning, integrated curriculum and problem-based learning.

A studio classroom is where students work in groups and are responsible for their own learning. Studio Tutors serve as guides or mentors. The interactive classroom promotes holistic skills, including thinking, inquiry, creativity and reflection by students, frequently involving peer review and critiquing.

In addition to two basic arenas of learning: teaching the art and science of architecture and teaching about the architectural world beyond the classroom there are eight other important kinds of general cognitive and attitudinal dispositions can be developed in an studio based sustainable architecture class (Develop Craft, Engage & Persist, Envision, Express, Observe, Reflect, Stretch & Explore and Understand Architectural World).

Studio Tutors should design informal and sometimes more formal ways that students interact with them and one another to create a social climate that nurtures learning. As students progress with their projects, Studio Tutors observe and intervene. Such observation and responsive teaching is critical to student learning. Studio Tutors are also aware and thoughtful of students' needs for privacy at times to develop a relationship with materials, tools, and their own work.

Studio Tutors also need to ensure that students feel safe and respected by each other. They need to create a climate where students are engaged with each other, collaborating and learning to participate in a community of design & building professionals. Studio Tutors should organise space, time, and interactions in their classes by using variations on just three studio structures: Demonstration-Lectures, Students-at-Work structure emphasises, Critiques

These structures foster an apprentice-master-craftsman relationship between student and teacher creating an atmosphere in which students work as design professionals together with other design professionals (Studio Tutors and peers).

## ACADEMIA IV: FINDING THE WORLD IN OUR CURRICULA

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **NETWORKING LEARNING PROCESSES: A VIRTUAL CAMPUS TO SUPPORT HOUSING STUDIES**

Leandro Madrazo, Ramon Llull University  
Paul Riddy, University of Southampton  
Marta Masdéu, Ramon Llull University

A Virtual Campus has been carried out with the support of the European Lifelong Learning Programme (LLL) in 2007-2009 and 2010-2011. We have developed, implemented, tested and evaluated a blended pedagogical model which combines on-line learning activities carried out in web-based environments with seminars and design studios physically situated at the participating universities. A digital platform was created specifically to support the pedagogical methodology of the Virtual Campus, which consists of two environments: Workspaces and a Case Repository. The former supports project-based learning, such as the development of a project – architectural and/or urban – in a collaborative manner. The latter is a digital repository housing case studies which is constructed collaboratively by learners and tutors.

Learning activities have been implemented with the participation of the partner institutions which help to develop and test the pedagogical model and the supporting ICT environment. The activities included four joint workshops in Ghent, Grenoble, Bratislava and Istanbul each one addressing a specific theme regarding contemporary housing: life-long dwelling, housing for diversity, effective housing and proximity. Urban and housing projects were carried out in local design studios and joint workshops, as well as in the learning environment provided by the digital platform. Community representatives, local authorities and housing experts participated in these activities, contributing to the identification of design projects, formulating program needs, and assessing project results.

The goal of the virtual campus is to use ICT to create a learning space which fosters the collaboration of learners –students and teachers– beyond the limits established by institutions, disciplines and academic programs. Therefore, this virtual campus is not meant to be a surrogate of the “actual” university. It is a network of learners and activities, as opposed to an organization of schools with a shared curriculum, a space where learning activities are designed collaboratively and carried in conjunction with other pedagogic activities taking place at the participating institutions. The uniqueness of the blended-learning model we have applied is that it broadens the interweaving of on-line and off-line learning activities within a single institution to multiple institutions in different countries.

The integration of on-line and off-line activities across partner institutions is a distinctive trait of this pedagogic model. Typically, after having defined a theme to be developed collaboratively by different partners, the learning activities are first carried out at each institution as a preparation for the work to be done in a joint workshop. In this preparatory period, the collaboration between students and teachers from the different schools takes place on the project's digital platform. After the completion of the workshop, students and teachers bring the knowledge acquired to the courses and seminars at their schools. Then the collaboration continues through the learning environment, in different ways: assessing peers' work; using the outcomes of one course as input for another; making distant presentations and critics of design studio work. This continuous flow of activities –from the physical to the virtual environments.

### **DESIGN AS A FORM OF RESEARCH: THE ROLE OF EXPLANATION AND ARGUMENTATION IN THE PREPARATION OF DESIGN PROJECTS THAT REPRESENT KNOWLEDGE CONTRIBUTIONS**

John Gordon Hunt, University of Auckland

The paper focuses on the pedagogical challenges associated with architecture design studios in which design work is also expected to meet the standards associated with postgraduate level research. The recent shift from undergraduate to postgraduate status for professionally accredited architecture programs in a number of countries, following the recommendations of the Bologna Accord, has seen universities require that these programs also satisfy the standards associated with Masters level research, and in some cases to require a major “design thesis” as the primary or sole component of the final year.

Specifically, the paper examines the role of evidence-based reasoning in presenting both design processes and outcomes in the case of design that is also expected to be a form of research, with the consequent focus on demonstrating knowledge contributions. From this perspective, processes of explanation and argumentation are advanced as having particular significance, and these are examined in some detail. The paper addresses the question “what are the distinctive features of explanations that potentially contribute to knowledge development in architecture?” In this context the significance of the distinctions between interpretative, descriptive and reason-giving explanations are examined.

The paper also draws on findings from studies in the interdisciplinary field of Learning Sciences and the empirical studies of Deanna Kuhn, in relation to the role of evidence in the construction of arguments, and the distinction between genuine evidence and pseudo-evidence in this regard. Based on informal observations by the author and teaching colleagues, it is suggested that deficits in thinking and reasoning processes found amongst college students in Kuhn's studies can also be observed in the explanations and arguments frequently offered by architecture students in support of their design work.

The paper then outlines a course of study developed by the author in order to address these deficits, as an essential step in preparing students for design as research. Students are required to develop explanations of a self-selected example of built architecture and to use these as a basis for arguing for a knowledge contribution for the chosen work. It is suggested that when carefully framed, the requirement for students to analyze an existing work of architecture work in this way fosters the development of intellectual skills that have direct relevance in their future design as research projects. The paper then reviews examples of student coursework and develops an optimistic conclusion that the interrogation of an architectural work in terms of thinking processes that are at the heart of successful research is not inconsistent with a focus on the intrinsic creativity and innovation of the work, and may offer a fuller account of such attributes.

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## ACADEMIA IV: FINDING THE WORLD IN OUR CURRICULA (CONT.)

Luis Francisco Rico-Gutierrez, Iowa State University  
Sharon Haar, University of Illinois at Chicago

### **STUDY ON TRANSITION OF ACCREDITATION SYSTEM FOR ARCHITECTURAL EDUCATION IN JAPAN**

Tomoaki Tanaka, Meiji University  
Koichiro Aitani, Kyushu University

Characteristics of the architectural education system in Japan were revealed. It is found important to develop 4+2 program based upon the contextual background of Japanese education and to improve it effectively in order to make it compatible to the common system in other countries.

In recent years, architectural education in Asian countries went through rapid progress in its internationalization. Accreditation system for architectural education programs became further important in order to provide validity and equivalency. It will also ensure fluidity for students who try to pursue one's professional study in other countries in the region.

The purpose of this study is to provide an overall perspective for the architectural education in Asia. It is also aimed to provide useful insights for improvements of the accreditation system in Japan.

First, an overview of architectural education and accreditation system in Asian countries is provided. Secondly, the basic structure of Japanese accreditation system and its recent modifications are reported. Thirdly, efforts of Meiji University toward JABEE accreditation including modification of its curriculum are described. Lastly, notable points to accommodate the mutually recognizable system in architectural education in Asia are considered.

The UNESCO-UIA charter for architectural education has set a basic framework for architectural education programs. Countries, such as Singapore and Hong Kong, used to adopt the RIBA system and are currently modifying their system in order to assure more compatibility. Korea that used to have 4-year undergraduate programs, changed the system to provide 5-year B.Arch. programs to accommodate the requirements. Then, more than thirty B.Arch. programs have been accredited by KAAB. In 2008, the Canberra Accord is signed by seven accreditation/validation agencies in pan-pacific countries. It intends to facilitate the portability of educational credentials between the countries that have equivalent accreditation systems. Aforementioned trend seems to be moving toward a common platform to assure equivalency of architectural education in the region.

In Japan, series of actions were already taken to accommodate the requirements. Joint accreditation system for 4-year undergraduate programs and 2-year graduate programs has been developed by JABEE that is an accreditation agency in Japan. Since this agency was established in 1999 to examine programs in engineering education, its system was originally prepared only for 4-year undergraduate programs. An accreditation system for 2-year graduate programs in architectural design was added later in order to accommodate the recommendation from UIA. In 2008, first three graduate programs were evaluated and the JABEE's reviewing procedure was examined by UIA. JABEE's accreditation system obtained conditional recognition from UIA and has started the step toward the truly compatible system in the world. JABEE has revised its criteria effective in 2012 and tries to increase accredited programs.

Meiji University where one of the authors is teaching develops a new graduate program called "International Program in Architecture and Urban Design (IAUD)" that will start in 2013. Its curriculum is prepared to accommodate the JABEE's criteria when it is reviewed together with the existing 4-year undergraduate program. During the preparation process, the unique char-

## GLOBALIZATION II: COGNITIVE SHIFTS

Hitoshe Abe, University of California, Los Angeles

Pascal Berger, University of Hong Kong Shanghai Study Center

Marc Schmidt, École Polytechnique Fédérale de Lausanne

### **ARCHITECTURE OF THE THIRD WAY**

Srdjan Jovanovic Weiss, Temple University

In 2006 Dutch architect Rem Koolhaas visited Energoprojekt, the former Yugoslav engineering giant, in Belgrade, Serbia. He interviewed Energoprojekt's chief engineer and manager who worked from the 1970s to the 1990s in Lagos, Nigeria, and in other countries of the so called Non-Aligned Movement. The content of this interview has not been made public and at this time there are no plans for its publication. The presentation will use the transcript of this interview (courtesy of Mr.Koolhaas) to chart the history of Energoprojekt and its architectural and urban implications during the transition from state-supported modern architecture of late socialism to today's crisis of emerging capitalist democracy.

The Non-Aligned Movement (NAM) was founded in 1961 in Belgrade in order to collectivize the third world countries that were not part of either the West capitalist or the East communist block. NAM was often called an international "third way" in geo-politics. Yugoslavia was one of the three founders of NAM. Architecture and engineering as well military trade played major roles in this geo-political development of the third way. By the mid-1980s the architecture department of the major Belgrade-based state corporation Energoprojekt was expanded to receive talented young designers to help meet the immediate need for design services commissioned from the various NAM governments. This urgent jump in demand made Energoprojekt as one of the most important commercial entities within any Socialist system. Thanks to NAM, Energoprojekt received massive infrastructural and military projects in the Middle East and Africa which included architectural commissions. These were mostly state projects in such places as Libya and Iraq, but also included semi-commercial commissions for hotels in Zimbabwe, and Fairs and Stadiums in Nigeria.

During the 1990s post-modernism exploded on the scene impacting nearly all architectural aspects inside the crumbling state of Yugoslavia. Even with the development of the local post-Yugoslav brand "Turbo Architecture," the international engineering contracts that Energoprojekt held maintained modern and straightforward solutions. The separation between glitzy domestic postmodern architecture and modern engineering abroad led to a nearly schizophrenic situation within the Socialist idea of globalization. On the one hand would become the main architectural tool for Slobodan Milošević's nationalist agenda while. On the other hand the company projected its international image as a successful global engineering corporation to the Middle and Far East as well as Africa, and increasingly in the countries of the former Soviet Union.

This paper will focus on the survival of the socialist corporate architecture giant Energoprojekt thanks to its engineering corps rather than its architecture. The knowledge about this has been missing at-large; this paper uses the Mr.Koolhaas' unpublished interview to retell this story, assess its implications for international practice of architecture and urbanism today and reflect on the relevance of former Socialist practice vis-a-vis the ongoing global economical struggle.

### **GLOBALIZATION: THE NEW MOOD-CONSCIOUSNESS OF ARCHITECTURE**

Afsaneh Ardehali, University of Cincinnati

Change is the transformative vehicle of architecture by way of which architecture is destined to transform and globalize itself. Rather than the traditional misconceptions that view architecture as a mere object of use or aesthetic beauty, each city as a bound unit for social cultural interaction, or each country as an independent unit of political domain, change is the necessary transformative mode that expands our understanding of the world and architecture. Change is what unifies and globalizes the world of architecture in its very core based on which new understandings of architecture unfold. Change is the undertone of our architectural discussions that take architecture beyond the customary utilitarian approaches, beyond the "too-open" modes of deconstructive agenda, finally to the very depth of all meaning in architecture. Based upon which, architecture opens up possibilities of the contextualizing character of our experiences. This understanding of change and architecture brings to light the full contextual dimension of our experience that is always infused with spatial aspects before we can recognize the depth of their significance. Change is the very mode of the emotional understanding of space that gives each of us our unique understanding of ourselves as well as the global phenomena of our life by way of architecture.

Having let go of the fear of the other, thrownness in today's world of global interaction, lost the traditional definitions of time and space, this paper finds the new definitions of architecture in the existential mode of that which Martin Heidegger characterizes as the mood of a state where your attunement and understanding merge in completeness of being a whole. Peter Zumthor's Therme Vals 'works' as an exemplary work of architecture: that clears the way of our preconceptions and opens the way for what we can now understand as such Mood-Consciousness of architecture. Rather than blocking the way, closing, and separating, this new Mood-Consciousness of architecture serves to globalize our mood by unifying diverse architectural attitudes, yet fully empowering each discussion on their own.

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## GLOBALIZATION II: COGNITIVE SHIFTS (CONT.)

Hitoshe Abe, University of California, Los Angeles

Pascal Berger, University of Hong Kong Shanghai Study Center

Marc Schmidt, École Polytechnique Fédérale de Lausanne

### **SOFT STRATEGIES, SEEKING INTANGIBLE CONCEPTS (CASE STUDY APPLE)**

Eduard Sancho Pou

Money is not interested in architects' names, but rather the profitability of their works.

Building projects are no longer based on aesthetic criteria, but on meeting users' or the market's needs. This maxim, evident in the case of the mall, extends to architecture as a whole. A project defined by its formalism will be displaced by a project defined by its strategy.

Thus, we no longer design buildings but strategies. Designing strategies means designing spaces and their relationships. These spaces may be real or not, but the connections between them will always be real. Architects must be able to enter fully into this world, which at times is built and other times is not. We no longer speak of new shapes or bubbles, creases or blobs, since strategies have no shapes; instead we speak of purposes and goals.

To test so much theory, we shall start by considering retail as the ideal place for analyzing strategies. As "living" spaces that need to be updated to sell, their cost effectiveness is frequently under review. They are also the departure point for tactics that spread out to encompass architecture in all its breadth.

Who is number one in retail? Who sells the most? The Apple Store

Looking at the numbers, the record for revenue corresponds to Apple Stores, which managed to reach the magic number of one billion dollars in annual sales in its first three years.

*"Apple's store were the fastest retail operation to ever reach \$1 billion in annual revenues, taking just three years to reach the mark, beating out the previous record-holder, clothing retailer The Gap." Apple has a list of 100 Potential Store Sites (ifoAppleStore, April 2004)*

Designed on the basis of strategies, the first consideration for Apple Stores was what they would contribute, since their products were already being sold through authorized distributors and the Internet. If the only goal was to boost sales, the investment was too high. Changing the manner of selling was the order of the day. The idea was to make a store where everything could be touched, where everything was dynamic, where employees could lend customers a hand. To materialize the idea, Apple decided to hire a person capable of leading the change, so as to give him management powers. The choice was Ron Johnson, an economist at Stanford University with an MBA from Harvard (1984). He had been working for 16 years as head of merchandising at Target, a large American chain of low-cost supermarkets. Johnson revolutionized Target by scrutinizing how Gap, a clothing manufacturer and retailer - the American Zara - had achieved growth.

## TECHNOLOGY III: PERFORMATIVE TECHNOLOGIES

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Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **AGGREGATE ARCHITECTURES: OBSERVING AND DESIGNING WITH CHANGEABLE MATERIAL SYSTEMS IN ARCHITECTURE**

Karola Dierichs, Institute for Computational Design

Architectural Systems commonly seek to form static and permanent material assemblies. The elements of these structures are geometrically well-defined both in morphology and location by the designing architect. However, there is a class of material systems that defies these notions of architectural design through its very nature: Loose granular systems – widely known in their bound form as an additive in concrete construction – consist of large masses of loose elements, such as in sand or snow. If applied as an architectural construction system in their own right, they question both assumptions of permanence and of control over the eventual design outcome. The designer is instead required to carefully observe the aggregate's behaviour as it settles into a temporary configuration.

There are only few precedents for the application of aggregates in an architectural context, ranging from vernacular applications to more recent studies in form-found structures with designed aggregates. The relevance of these loose granular systems however lies in their capacity to re-cycle and to create macro-graded material properties. A granular material structure moves from one stable state to the other, thus entering cycles of de- and re-stabilisation. Varying the grading, i.e. the characteristics of the individual grains in proportion to each other, allows for rendering a range of architectural material properties, such as heat insulation or load-bearing capacities.

In its first part, the paper will introduce methods of observing granular material systems in architectural applications. System-specific tools of Material and Machine Computation will be explained in detail and relation to each other. The second part will focus on identifying at which stage in the process the designer can intervene with and affect the evolving granular system. Special emphasis will be given to delineating the novelties and specifics of using CAM processes of both manufacturing and arranging in combination with a self-forming system. The third part will introduce two case studies that investigate different degrees of permanence within a specific granular system. The first one uses the naturally occurring granulate sand and deploys its capacity to form aerodynamic wind-shadows to develop wind-shelters in a coastal area. The second case study deploys designed granulates that are developed to interlock into self-supporting dome-structures, which are poured over pneumatic formwork. The case studies in comparison will introduce two different notions of change, which are possible in an architectural aggregate system, namely that of a naturally induced one as in case study 01 and that of an artificially triggered one as in case study 02, which is thus controllable by the designer in its occurrence in time. To conclude, the possibilities of observing and designing with different degrees of permanence within an aggregate structure will be discussed.

### **FLEXIBILITY - CURRENT DEVELOPMENTS IN FABRIC FORMWORK**

Mark West, University of Manitoba  
Ronnie Araya, University of Manitoba

This paper will describe current technical and design research that allows for a fundamental change in how reinforced concrete architecture and construction can be imagined and built. This change is both radical and simple: an inexpensive flexible fabric membrane is used in place of conventional rigid formwork molds. The results and implications of this simple change in materials are manifold. The flexibility of the fabric mold can spontaneously produce structurally efficient geometries of great natural beauty, using very simple, economical, and universally accessible construction methods and materials. The efficiency of using a tension membrane as concrete formwork provides for significant reductions in materials consumed in construction, with attendant reductions in both embodied energy and greenhouse gas production. For example, the pure tension resistance of the fabric can be transformed into extremely efficient compression structures by the simple act of inversion (much like Antoni Gaudi's hanging Chain model for his Colonia Guell church). This inversion is inherent, for example, in the mold-making and casting procedures of precast concrete manufacturing. The natural structural efficiencies obtained by this method are accompanied by a new sensual architectural "language" of pressures, folds, and energized curvatures. The surface qualities of the concrete itself can also be greatly enhanced by the use of permeable fabrics that allow air bubbles and excess mix water to bleed through the mold wall, significantly improving both surface appearance and concrete quality and strength.

This research, which has been undertaken in an academic architectural laboratory/studio, has spawned a growing number of other funded academic architectural and engineering research projects that have branched off of these original research findings. These include investigations of efficiently curved reinforced concrete beams and shell structures that consume significantly less concrete and reinforcing steel than conventional rectangular prismatic structures formed in rigid formworks. Work is currently taking place to develop design and analysis software for fabric-formed structures. Significantly, These structural engineering research programs are taking place with, and within, schools of architecture. More informally, there are a growing number of student initiated flexible formwork experiments taking place in both design studio and technical projects in architecture schools around the world. This paper will examine these international research projects and their findings, as well as current and future work taking place in our own laboratory/studio. The paper will also outline some of the central questions raised by this work and seek to incite conversations about approaches to architectural design and sustainable construction in light of this more flexible way of building and thinking about reinforced concrete. These issues include questions of "biomimetic" design and construction; structural poetics, structural determinism; architectural indeterminacy; relationships between engineering and architectural design; high- and low-capital design/construction strategies; and simplicity vs. "hi-tech" approaches to sustainability.

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## TECHNOLOGY III: PERFORMATIVE TECHNOLOGIES (CONT.)

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### RECOGNITION - SOFTWARE AS SPACE

Nicholas Puckett, University of Kentucky

In 1936 Ernst Neufert published *Architects' Data* as a means to streamline the architectural design process. This book also presents, in analog form, a clear description of the world we currently live in: an endless set of data points and relationships. In 2010 Microsoft released the Kinect as a means of controlling characters in Xbox games via your body's movements. Soon after its release the opensource hardware community released its own drivers for the device that allowed it to function as a general purpose, DIY motion capture system. From this moment, a device that was meant to be essentially a "toy" began showing up in research labs around the world in fields as diverse as medicine, geology, and music. The ability to actively track the movements and positions of users in a space presents an especially unique opportunity to architects and in the Fall of 2010 architecture students began research to develop prototypes which used the Kinect as means of designing a new type of augmented physical space.

Over the course of the semester students, working in teams, developed interactive spaces that used programming as a means to define spaces in the physical world. Since the medium defining the spaces is infrared and thus invisible to the naked eye, the teams worked by designing and producing the spaces as working 1:1 scale prototypes and then developed drawings which explained these "invisible" constructs. After the initial studies the research developed into two distinct strands: Augmented Zones and Spatial Gestures.

Physical spaces are typically defined via walls or surfaces, but in this research a user's position is tracked and compared to the various spatial zones that are defined in the software. The differences in the zones are relayed to the occupant of the space by changing digital data displayed on a local screen or projection. Since the spaces are able to understand the position of 24 data points on a person, other experiments determined how more detailed information could be relayed to the system. To do this, teams researched how different types of gestures are used to communicate between people in a variety of situations and how they could be converted to "talk" to a space. The goal for this research was to understand how a conversation could be established between the user and the space via various feedback loops.

These initial research prototypes uncovered some of the potentials this technology holds for the field of architecture as the line between digital and physical is further blurred and the technology of implementation shrinks dramatically in size and cost.

### SURFACE CHANGE

Vera Parlac, University of Calgary

Over the past decade, there has been an increasing interest in exploring the capacity of built spaces to respond dynamically and adapt to changes in the external and internal environments and to different patterns of use. Such explorations are technologically and socially motivated, in response to recent technological and cultural developments. Advances in embedded computation, material design, and kinetics on the technological side, and increasing concerns about sustainability, social and urban changes on the cultural side, provide a background for responsive/interactive architectural solutions that have started to emerge.

This paper presents an ongoing design research project driven by an interest in adaptive systems in nature and a desire to explore the capacity of built spaces to respond dynamically. The paper underlines architecture's inseparable link to technology and projects a vision of architecture that, through its capacity to change and adapt, becomes an integrated, responsive, adaptive and productive participant within larger ecologies.

The SKiN project consists of small scale prototypes of an adaptive kinetic surface capable of spatial modulation and response to environmental stimuli. The emphasis is on the nature of material systems in the built environment and their capacity for change and adaptation. Elements, structure, surface and performance of the developed networked kinetic material system are designed as integrated layers that make up a "tissue" capable of accommodating dynamic nature of human occupation.

The "Soft" Kinetic Network (SKiN) surface is organized around the network of embedded "muscle" wires that change shape under electric current. The network of wires provides for a range of motions and facilitates surface transformations through soft and muscle like movement. The material system developed around the wire network is variable and changes its thickness, stiffness, or permeability within its continuous composite structure. The variability in the material system enables it to behave differently within surface regions; to vary the speed and degree of movement; to vary surface transparency; to enable other levels of performance such as capture of heat produced by the muscle wire and distribution of heat within the surface regions. The main idea is that variability of the material system can bring us closer to the seamless material integration found in biological organisms.

The focus on seamless material integration and capturing of emitted energy hints at our broader goal that architectural intervention should find a more productive place within larger ecologies. I am very much interested in suspending a challenge of finding a non-permeable and clearly defined boundary between inside and outside in exchange for a surface that fosters constant flow of information, matter and energy. This project is situated between several disciplinary territories. By exploring theories, techniques and tools of architecture, engineering, material science and cybernetics the goal is to develop technologies and designs that are capable of transforming static building components into active responsive surfaces that produce added functionalities in architectural and urban environments.

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## TECHNOLOGY III: PERFORMATIVE TECHNOLOGIES (CONT.)

Branko Kolarevic, University of Calgary  
Peter H. Wiederspahn, Northeastern University

### **THICK FUNICULAR: PARTICLE SPRING SYSTEMS FOR VARIABLE-DEPTH FORM-RESPONDING COMPRESSION-ONLY STRUCTURES**

Brandon Clifford, Matter Design

Particle-spring systems are commonly used to develop compression-only form finding systems. This paper proposes to use a particle-spring system to respond to a desired form in order to generate a variable-depth, compression-only structure. As a variable-depth system, loads can be re-directed through the depth of material in order to result in a desired form, as opposed to a structurally optimal form that assumes a uniform thickness approach. This paper proposes to generate, build, and test compression-only structures in response to a desired architectural geometry. This research will allow for integration with external programs to input a desired form, and result in a constructible compression-only structure.

Thin-shell compression-only structural systems are relatively new to the built environment. Compression-only structures on the other hand are ancient. Thin-shell structures assume a minimal and consistent cross-section. This assumption is driven by material efficiency. The results are forms developed exclusively by structural concerns (typically gravity), hence the term form-found. Architecture has to respond to structural concerns, but it also has to address a variety of other issues — acoustic, formal, program, etc. It is not necessary for form to be driven strictly by structural requirements. For example, Gothic Cathedrals contain the thrust-vector within the variable depth of the stone's cross-section. These Cathedrals are not determined by idealized catenary form, but through a confluence of architectural desires with compression-only principles. With this approach as inspiration, this paper addresses the potentials of compression-only systems to be resolved through a variable-depth in order to obtain a desired form.

Much research has been done in analyzing existing variable-depth structures to determine if a thrust vector falls inside the depth of material (Block et al, 2006). Other methods assume a fixed depth of material in order to generate a design. The method proposed in this paper assumes a desired geometry and allows for a variable thickness to re-direct the thrust vector as a means to produce a viable design that concerns both structure and other formal concerns. If typically one assumes thin, this paper assumes form.

This method is dedicated to addressing architectural concerns with structural results. This paper does not advocate for the reversion to a past architecture. It promotes the insertion of lost knowledge into our current means and methods of making.