

ARCADE

DIALOGUE ON DESIGN

30.3

LIVE/LEARN DESIGN EDUCATION


Feature Editors: Karen Cheng + Annabelle Gould

SUMMER 2012 NORTHWEST VIGNETTE Past Present: Cama Beach Renewed Jeffrey Karl Ochsner ART MATTERS Pigeon
Disobedience Jayme Yen PRACTICE From Pencil to Mouse and Back: Design Process and Exploration in the Age of Computing
Pierluigi Serraino + John Marx

A collection of white wireframe architectural models of various building forms, including rectangular blocks, curved volumes, and stepped structures, set against a black background.

FROM PENCIL TO MOUSE AND BACK

DESIGN PROCESS AND EXPLORATION IN THE AGE OF COMPUTING

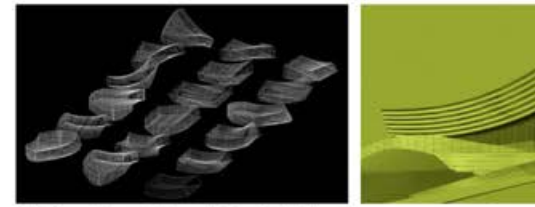
A 3D architectural rendering of a building complex, rendered in a light green color. The scene shows a large, multi-story building with a curved facade, surrounded by smaller structures and a landscaped area with a path. The background is a solid light green.

Pierluigi Serraino + John Marx

All drawings courtesy of John Marx



↑ Initial sketches



↑ Deformations studies ➤ First digital iterations

We're twenty years into the digital revolution, and much has changed in the architecture world. Practices have been redefined, sculptural forms have been built, legal contracts have been restructured and the workplace has undergone major revisions in layout and workflow. Such an extreme overhaul, unimaginable when computers first made their appearance next to drafting tables, has dislodged the certainties architecture had relied upon for centuries. What we consider the prime tool for design's conception and production has been called into question; in the hands of software engineers and programmers, what was once The Pencil has now become a multitude of computer applications. The ability to represent (photorealism), the means to simulate the behavioral performance of a building and the speed at which highly complex design-options may be explored constitute the three-legged stool on which the present and future of architecture lies.

Winston's celebrated dictum "We shape our buildings; thereafter, they shape us" could be edited to: "We shape our tools; thereafter, they shape us." The T-square along with the 30-60- and 45-degree triangles undeniably have profiled much of the built environment since the Renaissance. Thinking of architecture two-dimensionally (façades as urban pictures) and proportionally (the relation of parts to the whole) emphasized surface as opposed to space. Architecture was something to be seen rather than experienced. Thinking of architecture in this way also activated cognitive processes uniquely tied to drafting that are not always exercised when using 3D-modeling technology: constructing space with the grammar of perspective (ground plane, horizon and vanishing points), visualizing without the aid of machines, and intimately comprehending tectonics—i.e. the good old "how buildings go together." This last point — that with the loss of physical drafting and modeling we experience a decreased intuitive understanding of building construction — is the side effect of the lack of gravity and other physical attributes on digital sculpting, where the veritable and the fictional blend seamlessly. Plans and elevations provided a volumetric and rational matrix upon which to structure land use and civic life within human experience. The fit of digital forms in our typical urban reality is a prominent topic of debate nowadays.

While digital tools have fostered a new expressionism and liberated architectural forms from the restricted palette

of Platonic volumes, they have also created an anathema of the language of proportion; they have disseminated illusionism the same way the etchings of Escher did (you can see the space, but you can't build it), and they also put too much focus on the outside of buildings at the expense of a holistic view. A case in point is the famous Aqua Building, of which no notable interior is known, though the glamorous waving of its floor plates in space is public knowledge.

A new set of terminology has become standard in today's generation of digital modelers, replacing both the classicist and modernist nomenclature of space formation. Deformations, mapping, meshing and parametric modeling — scripting that enables designers to explore non-Euclidean geometries — provide the arsenal of formal strategies that in their countless sequencing possibilities return the final architecture of our time. It is irrefutable that specific digital tools have allowed architects to articulate shapes that might have been impossible otherwise (perhaps even facilitating the creation of structures to a point of exasperation, in which form beats function). But how do these tools and the possibilities they offer play out in the evolution of an actual design?

The dialogue between hand and mouse is exemplified in Form4 Architecture's *Crashing Waves*, a study for an invited competition for the design of a music complex in Korea initially dedicated to controversial composer Isang Yun (1917-1995). Through a concrete exploration, this case study, designed with the aid of an acoustical consultant, offers tangible insight into the iterative journey between analog sketching and the 3D-digital modeling environment. It is important to note that the same person produced both the hand sketches and the digital-model rendering included in the study, collapsing what is today still the breakdown between a senior designer's conception and an associate designer's supervised execution of an idea.

In visiting the prominent site, visible from all sides of a generous bay, the group identified a theme — two waves crashing into each other — meant to connect the program brief (a recital hall, a concert hall and accessory spaces) with the magic of the place. Early hand sketches established the key ideas; an accretion of small spaces surrounds two arched, shallow boxes facing each other and culminates into a vertical, luminous element. In a matter of days, the exploration of the site



↔ First digital iterations



↑ Selected option on site model



➤ Photomontage of project on site



↑ Initial sketch

THAT ARCHITECTURE IS A FULL SENSORIAL EXPERIENCE IS A WELL-KNOWN TRUISM, AND YET DIGITAL SIMULATION IS STILL FAR FROM BEING ABLE TO SERVE THE OTHER SENSES AS WELL AS IT SERVES THE EYE.

options yielded over 33 schemes within a very tight time-frame. Plan sketches were then produced around certain design constants to visualize numerous permutations of the same idea. All of them were scanned and quick massing models were produced on the computer and positioned on a digital site-model representing existing conditions. Much effort went into creating digital deformation studies—bulging bending, tapering, twisting and folding the basic shape. Inserted on a virtual table, each option was then compared to the others and classified by its merit.

A selected sample of these options were then presented to the client through weekly updates. Upon receiving feedback, additional hand sketches were produced, and editing on the computer started to generate variations within the theme. Following a few cycles in this phase, the client settled on one massing option that the architect further developed and detailed.

Although a physical sketch-model was made, the time it took to create and the information it yielded proved to be inefficient when compared to the digital process. Additionally, in the exploration of the buildings' skin treatment, the speed of generating and assessing options when sketching and 3D-modeling informed each other took center stage. Given the prominence of the complex within the bay, an accurate representation of various versions was pivotal for both client and architect to make reliable decisions and move the design forward. From the texturing of various metal-paneling options to more structural-driven imagery, one after another, dozens of building envelopes were studied, represented and evaluated, straddling tectonic credibility and rigorous design inquiry. The combination of one person designing, sketching and modeling dramatically sped-up a process that could have taken significantly longer had the tasks been distributed in a team.

However, such ease in visualization increases the risk of certain side effects. That architecture is a full sensorial experience is a well-known truism, and yet digital simulation is still far from being able to serve the other senses as well as it serves the eye. The evaluation of a design on its visual merit alone would be a setback on the path of awareness to what architecture can do in the twenty-first century, but clinging to past modes of production would be just as irresponsible and out of touch with our time. If the drafting table is gone, freehand sketching is here to stay. And because any architect interested in building will eventually confront the economics of construction and real estate, the competitive edge gained through the efficiency of digital modeling is hardly a negligible factor. With that said, physical models can still play a role beyond client representation, yielding critical information as sectional artifacts. But even more importantly, aside from the pressure of market forces on professional practice, would any significant knowledge be lost if the process of conceiving architecture were to go fully digital in the future? This may be a question that various generations of architects would respond to differently. The next twenty years will tell. ✕

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JOHN MARX, AIA, is the design principal of San Francisco-based Form4 Architecture. Over his long career, he has designed more than 150 buildings in 11 different countries. John began designing digitally in 1991 and has widely lectured on this topic; in 1996, he became a lecturer in the Department of Architecture at UC Berkeley, where he developed a course in digital design and co-taught a course in Internet-based placemaking.

Written by Serraino, Marx's first monograph, *Wandering the Garden of Technology and Passion* (Balcony Press, 2012) has just been released.