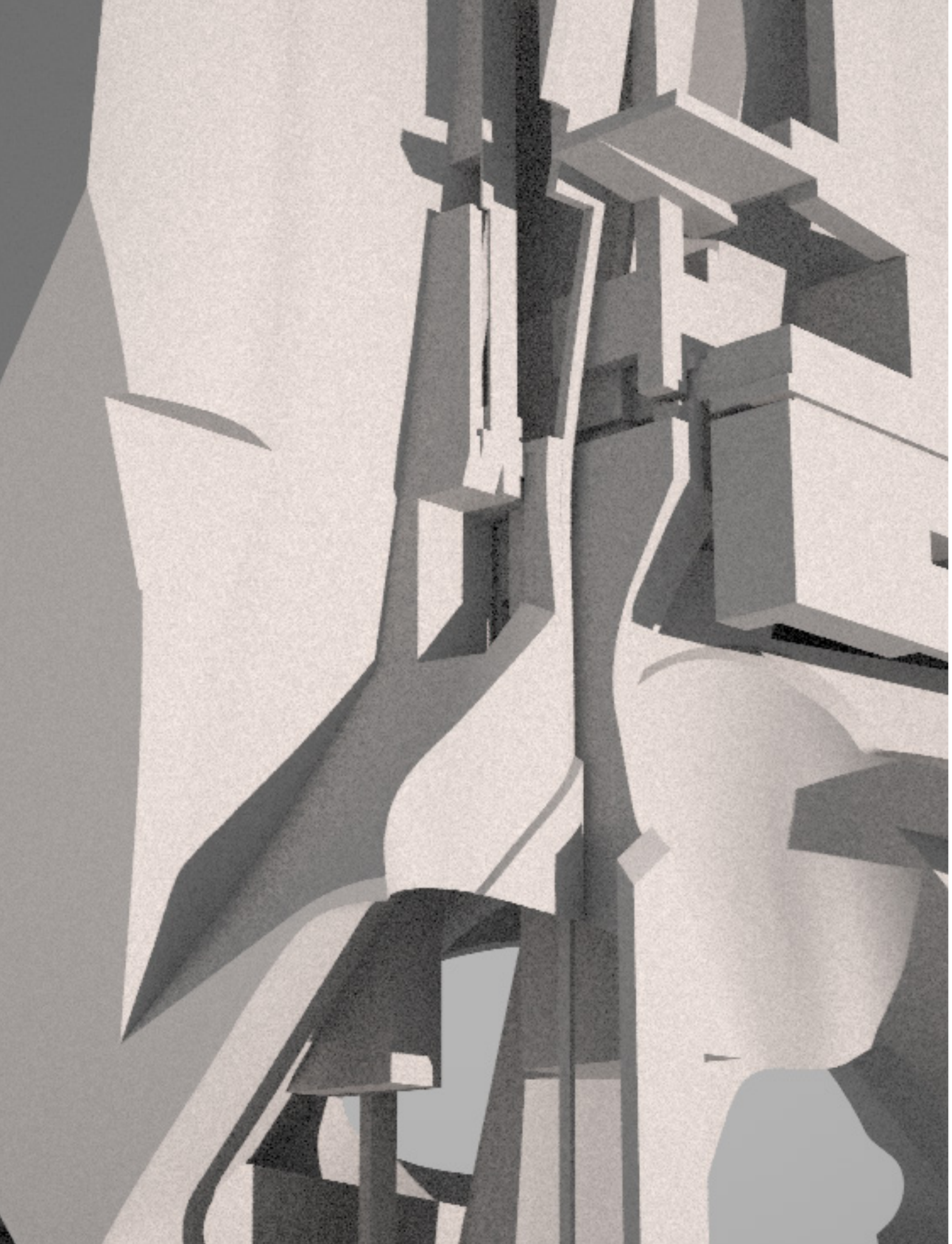

Disruptive Continuity [Explorations *in*-Form]

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Matter and all the structure it embodies is, at its most basic level, predicated upon the existence of the edge, a transformative instant, the moment at which an other manifests. Thus, it is not the thing in itself to which we should refer for meaning but, rather, what it is not and how it interacts with other things. –Ian Monroe [1]

CONTEXT MATTER[S]

Architectural education provides a foundation for future professional practice, while simultaneously delimiting an edge in the continuum between academia and the profession. This contradiction produces friction with regulating bodies outside the academic institution which are responsible for defining standards and professional registration, and with service-oriented professionals who often view education as training for future employees. These goals are understandable, but they are generally in tension with the core purpose of academic research, which is to produce new knowledge, to experiment, and to innovate. The academy is continuously balancing these external pressures with its own collective vision of the profession, which is projected outward through the work and research produced. From this perspective, the delimiting edge between academia and the profession can be a productive site for intervention, providing a gap from the day-to-day constraints of professional practice and the time to intensively focus on specific research agendas.

The current academic environment leverages its freedom to explore contemporary issues of aesthetics, computation, and manufacturing processes by using advanced software to drive physical output or responsive environments. At the same time, in practice, building information modelin (BIM) drives constructed reality by increasing coordination and maximizing efficiency under tighter schedules and budgets. These tools are commonly taught in academia in ways that reinforce perceived divisions between formal, material, and computational innovation (academy) and integrated modeling (practice).[2] Students graduate discovering they have immediate but specialized skills built out of academic research that traditional offices have yet to absorb, or they have made a strategic decision to learn BIM software to help land a job.[3] The best students tend to operate across several of these camps. They develop a new career path, most likely not currently

Figure 1: Examples of Distruptive Continuity, taught from Spring 2011 to Spring 2014

an identifiable job, and use their facility across a suite of software to seek the leading edge of the profession or leverage their education outside the field.[4] Adding to this friction caused by academic and professional pressures, students lack professional knowledge that is gained through direct experience, and the expediency of studio production leads to bad habits and poor digital workflows. This produces a situation where employers train recent graduates and perceive them to be unprepared for professional responsibilities—exacerbating this friction. Since the apprenticeship model has a long history in professional development, this friction is not new, but what is distinct is the focus on the tools of architectural production and the continual unfolding of a technological revolution.

CHANGING PRACTICE OR PRACTICING CHANGE?

We are in the early stages of a revolution, a paradigmatic shift that is unsettling the old dialectic between traditional forms of academic and professional practice. Advanced technology such as parametric tools and direct-to-fabrication processes are increasing constructability, efficiency, control, speed, and variation while informing architectural solutions that integrate performance and construction criteria. In a sense, this paradigmatic shift is the return of the "master builder." Formal innovation and dynamic relationships in combination with direct-to-fabrication workflows and advanced manufacturing challenge standard models of project delivery and standardization. These tools are driving innovation in both academic and professional environments, and require a re-examination of design processes and of pedagogical models.[5] While these tools are directly connecting the academy and practice, we cannot simply teach their application to smooth the professional transition (nor is that the responsibility of academia)—the profession is being revolutionized by these very tools, and in many cases, recent graduates are leading this charge. We must teach future architects to critically analyze "what," "why," and "how" they produce within a broader set of cultural values. Students must learn to leverage technology to rapidly iterate, evaluate, and synthesize solutions, subsequently adapting them within a fluid feedback loop of making and discovery (fig. 1). They must also consider new forms of practice as a means of adapting to a profession in constant flux.

Early career practitioners who were students in the '90s and '00s began confronting a professional context where design software linked to physical and material production challenged the norms outlined by prior generations. This also became a specific area of research within the academic context during this time, formatively shaping expectation of what future practice would be. These practices integrate fabrication and direct-to-fabrication workflows in their projects, and in many cases, use the academic setting to test their ideas.[6] As part of the 2016 Exhibit Columbus Symposium, "Foundations and Futures," these issues were brought forth in a poignant conversation among several Miller Prize finalists.[7] As the participants' individual practices continue to grow, projects once physically constructed by the office now confront issues related to scale, "means and methods," dissemination of knowledge through construction documents (now somewhat antiquated), increasing liability, and proprietary knowledge about constructability that gets monetized later by contractors with whom they work. These practices intimately understand how to build their projects via an internalized knowledge base and are confronting and rewriting dated norms. Is this a new delimiting edge in the continuum of academia and the profession, where the distinction has been blurred, or has the prior paradigm been dislocated under new types of practice? What is clear is that technological and material experimentation, adaptation, computation, and critical thinking are required more than ever to effectively operate in this current and future context. The academy must adapt to this revolution with a shift in thinking, not focused on changing practice but constructed around a pedagogy that practices change.

DISRUPTIVE CONTINUITY – ADAPTIVE STRATEGIES ACROSS SCALES

Attempting to address perceived edges within the continuum of academia and the profession has been one focus of my research. It has allowed me to frame my own award-winning practice (fig. 2) in a more direct relationship with design pedagogy that I test with students at the University of Kentucky College of Design's School of Architecture. In my own work, these two realms, academia and practice, are developed in a reflexive way so that each informs the other, establishing continuity and allowing space to seek out new and productive edges. Secondary areas of my research that I test through design pedagogy are: definitions of performance; poché; adaptive strategies; aesthetics; error; glitch; integrated practice; advanced fabrication; intuition; and critical thinking. These issues are introduced in architectural design studios via an exercise titled *Disruptive Continuity*, forming the foundation of each studio's broader research project. (fig. 3).

Disruptive Continuity liberates students from specific technical considerations of a traditional architectural brief (program, specific site, context, budget, materials and assemblies, environment, etc.) and supplants them with more abstract constraints. This abstraction allows students to look at formal typologies and new combinations to develop a geometric and spatial intelligence where form is employed to increase the positive qualities of variation, resolving increasingly complex problems from the scale of a transit shelter to masterplanning portions of a city. While the exercise determines an initial, type-based formal language to increase speed, the focus of the exercise is less about the visual result and more about introducing decision-making within a complex field of interactions. Form, in this case, is performative, operating with precision to solve specific localized relationships while operating conceptually in a looser macro-framework. New tools and workflows are layered into the exercise, where students learn to operate strategically within an ambiguous set of requirements—analyzing their own initial production

Figure 2: PLUS-SUM Studio – "Gray Matter," Louisville Children's Museum, International Design Competition, 2014

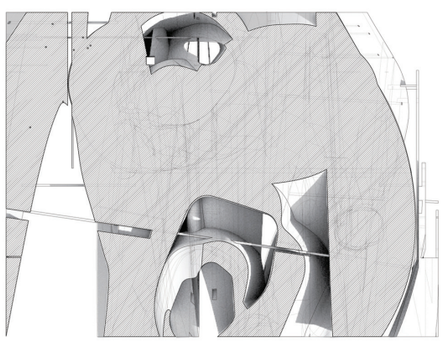


Figure 3: Drawing from Disruptive Continuity – By Owen Duross, First-Year Graduate Student, Spring Semester, 2015

within broader conceptual, organizational, and aesthetic goals. Formal issues are now understood within a field of relationships where the architect controls specificity across scales, primed to seek out novel combinations to manifest win-win (a.k.a. positive-sum or plus-sum) solutions. One's ability to control the shape of matter and its construction leads to new spatial possibilities and geometrically embedded intelligence within the model that drives it—one of multiple issues in a complex web of interactions. In short, *Disruptive Continuity* puts parametric thinking before parametric tools.

Within the exercise, macro- and micro-interactions are not limited by the organizing rules of each other. This is instilled through a constant zooming in and zooming out of the model, which happens naturally in virtual space but is foregrounded conceptually as a way to develop a responsive relationship to a complex problem that one cannot predict. Here, the student's individual design decisions are focused on maximizing the problem seeking/solving opportunities, increasing overall design coherence (fig. 4). Discussions occur between professor and student, professor and group, student and student, and student and group to share discoveries or techniques that can be adopted within an individual workflow. For example, take a student that is struggling to find a resolution to a complex formal interaction. As their professor, I demonstrate options on their digital model while verbalizing the thought process and considerations. This is furthered by attaching the student's computer to a projector and using the problem as a collective tool to increase understanding and demystify how experience leads to thoughtfully designed solutions. As the project evolves, students internalize knowledge gained via iterative feedback loops where intuition is valued and foregrounded, engendering more reasoned and nuanced solutions as the project develops. All of these issues facilitate an introduction to a scalable, strategic design method that maintains a productive gap from day-to-day constraints while increasing the student's ability to become nimble practitioners.

VIRTUAL TO PHYSICAL – MODELING FUTURE PRACTICE

The continuity between digital design production in 3D software and the production of the built artifact is now demonstrable with access to 3D printing technology, CNCs, laser cutters, and others. Having these tools in the academic environment allows for fluid testing of the studio projects, effectively simulating future practice. *Disruptive Continuity* takes advantage of these tools by introducing and leveraging 3D printing as physical feedback in a largely digital project, requiring students to see the model as constructed reality. 3D printing brings additional and subtler concepts to the studio environment as well. It requires that the design model be "watertight" or "solid," which is important in several ways. Solid modeling requires a "clean" modeling process, which encourages an awareness of digital

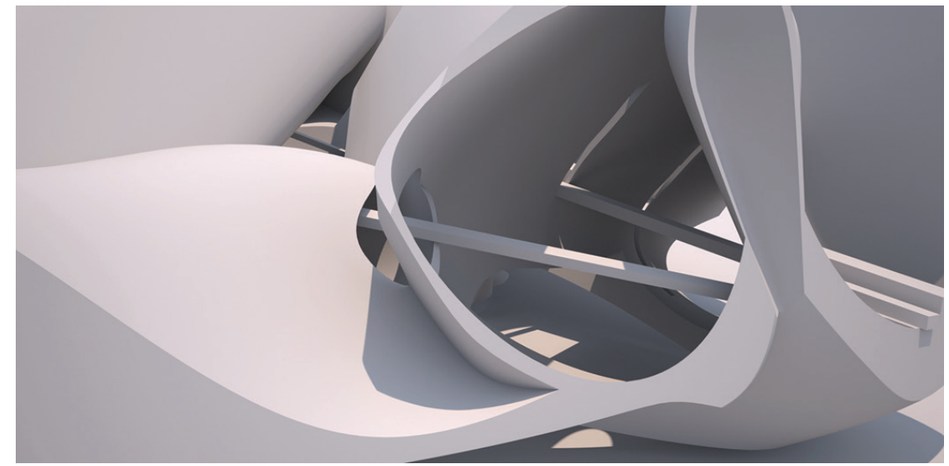


Figure 4: Rendering demonstrates a high degree of formal control, where the student is now able to address additional performance constraints. By Owen Sadrzadeh, Third-Year Student, Spring Semester, 2015

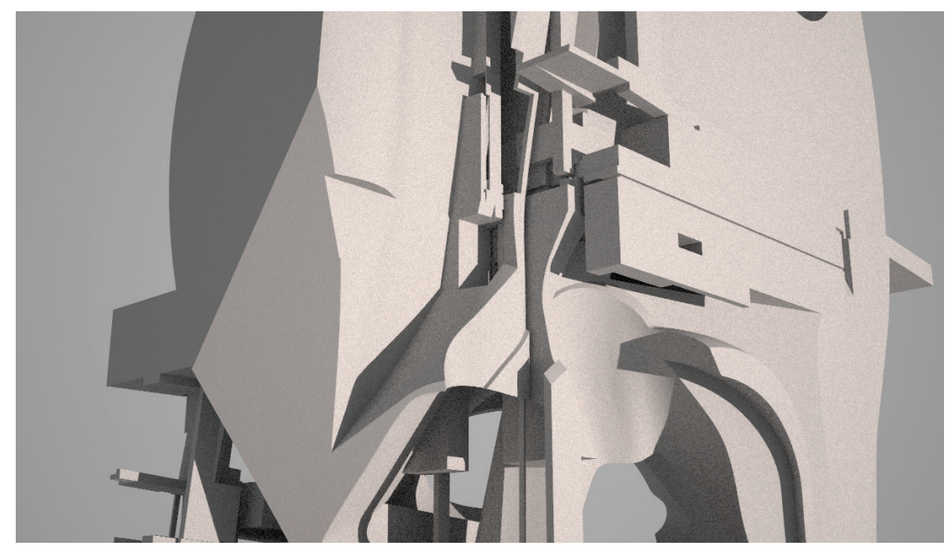


Figure 5: Rendering from Disruptive Continuity – By Owen Duross and Thompson Burry, First-Year Graduate Students, Spring Semester, 2016

Figure 6: 3D Prints from Disruptive Continuity – By Owen Duross and Thompson Burry. Left models, individual from Spring Semester, 2016. Right models, shared designs from Fall Semester, 2017.

organization and design methodologies. One cannot simply make something and 3D print it; rather, it requires knowledge of the machine and engages processes of translation from digital model to physical reality (figs. 5 and 6).

Modeling in solids also challenges students who typically develop impossibly thin surfaces as a means to represent what is visible to the eye, namely the rendered architectural surface. While students still use a variety of surface-based modeling tools to their maximum effect within the exercise, the shift to solids-based thinking is not insignificant. With this new way of thinking and modeling, mass and poché are foregrounded in the design process. Mass has operative potential as an index of interactions within the exercise, while poché is the territory in which systems integration and integrated design occurs. The students are introduced to these concepts in studio discussions and through presentations that show how this translates to building design, demonstrating the adaptive process in a less abstract context. At this point, students must consider how the various surfaces (front, back, top, etc.) solve specific conditions (spatial, structural, code, material, etc.), allowing conversations to develop around the different performance criteria required for these different surfaces whose digital "normals" now imply interiority or exteriority. This re-contextualization shifts production from pure representation to implicate material constraints, construction, tolerance, precision, error, and poché as integrated, performative territory.

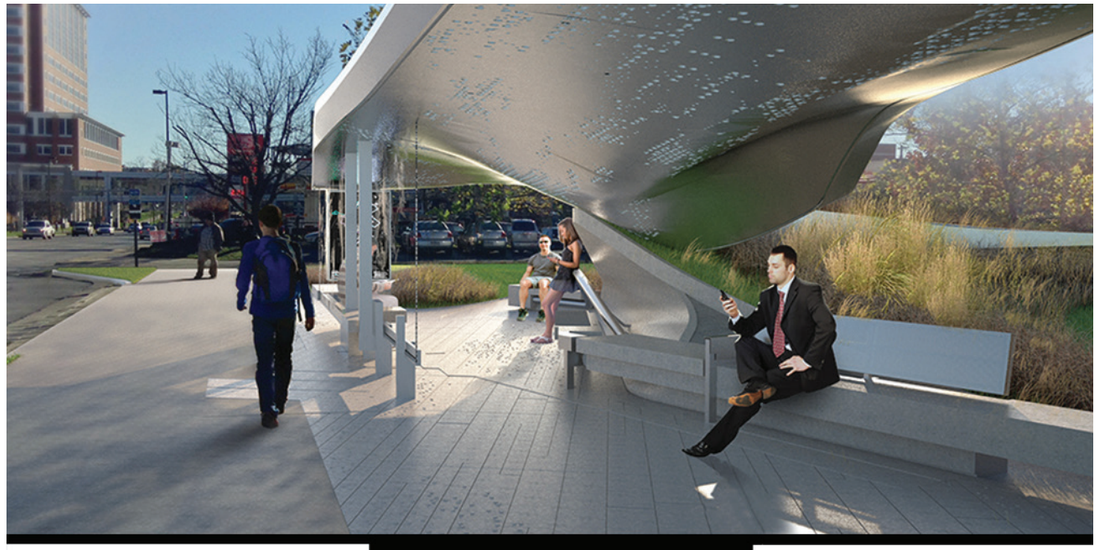
Now that a clean model and effective workflow are understood to have tangible results, I am able to introduce digital file management and organization in a way that is meaningful to the students' own workflow. While initially met with skepticism, it is explained that this rigor allows them to work faster and communicate more effectively with their professor, classmates, jurors, and even their future selves when they need a specific file for their portfolio or website and don't have half a day to search. The faster the individual can iterate ideas, the more effective they become at solving complex problems while managing their time and the deadlines that must be met—realities of academic cycles and professional responsibilities. The process now transitions from taught method to lived experience, leaving an indelible imprint. Good digital organization also allows for an introduction to iterations via a non-linear methodology. Discussions in the studio form around how good ideas at the wrong time do not make them bad, just temporally challenged. Every day, the students grow in their understanding of a problem by working hard in their search. Every day, they have more experience with the problem and gain feedback from what works and doesn't. Why do students put pressure on themselves to know from the beginning what they cannot, or to assume the way they begin determines the way they finish? Good design is not linear! Through this method, personal delimiting edges are challenged and professional edges eroded, even if the student is not fully aware of the ramifications. These expectations are what the exercise breaks, replacing them with a fluid process where students can now mine their own research and discover great ideas that did not work when initially produced—but may have been ahead of their own understanding. A feedback loop of their own making, a foundation for practicing change into their own future practice.

> *My "Intimate landscape" is my "knowledge base" as an architect. (my "introverted compass")* –Yael Reisner[8]

TRANSLATING TO ARCHITECTURE

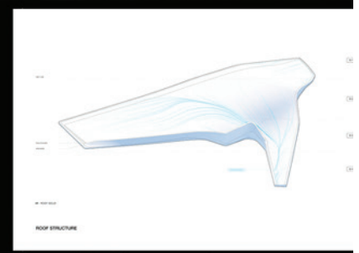
Once confronted with the primary studio project that consists of a larger and more complex series of architectural, infrastructural, and urban interactions, the knowledge gained from *Disruptive Continuities* is reinforced through conscious decisions across all scales to develop a conceptually driven solution. Using the techniques introduced in the exercise, students develop strategies to maximize and rethink the site, program, and formal relationships within an expanded context of the city's networks, adjacencies, and real estate value where the organizational and strategic thinking of the exercise begin to shape the urban and architectural strategy (fig. 7). These strategies enable students to work between larger regional and urban scale networks and material and programmatic relationships where they are now able to adjust and adapt to the new knowledge gained through an iterative design process and reshape the project using this increasing intelligence, speed, and precision. Discussions in the studio now contextualize this new knowledge in terms of geometry, form, gestalt theory, relationships, perception, pattern, and structure. Further issues are raised regarding the construction of complex projects where the architect's internal knowledge of the problem, when combined with an adaptive and rapid design process, allows one to address time-sensitive decision making within the project's broader conceptual framework (fig. 8).

Figure 7: Bourbon Tourism Center, Lexington, Kentucky – By Zack Martin, First-Year Graduate Student, Fall Semester, 2015



Macro | Master Plan

Abstraction | Landscape Pattern



Micro | Performative Form

Figure 8: Images from the Point of Departure Project – Sustainable transit shelter research for the University of Kentucky campus. The project is led by Martin Summers (co-pi Michael Wilson of CAER) with project designers Thompson Burry and Owen Duross within a multidisciplinary team of engineers and consultants, along with campus authorities and constituent groups. The project explores the object within a constructed landscape where the two strategically inform each other, producing an identifiable space on campus and a living laboratory for design and sustainable thinking. Slated for construction.

PRACTICING CHANGE

While delimiting edges produce friction, they also provide a register against which a new terrain can be surveyed. That terrain reveals the intensive and rapid transformations happening across the architectural continuum, where the lines between academic research and professional practice are beginning to blur. What remains difficult to simulate or engage within an academic setting is the experience that can only be gained via professional practice, which by its nature can only be understood over decades—well beyond our ability to simulate. The academic context, however, provides a critical distance from the day-to-day constraints of the profession and is opening up potential new models of practice where current students will thrive. By rethinking teaching methodologies, we can better prepare students for the ongoing, unfolding revolution, and can prepare them to lead and embrace the instability.

> *When the outcome drives the process we will only ever go to where we've already been. If the process drives the outcome we may not know where we're going, but we will know we want to be there.* –Bruce Mau[9]

ENDNOTES

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6. Julia Ingalls, "Does Teaching Architecture Enhance Architectural Practice?," Archinect, October 24, 2016, http://archinect.com/features/article/149973599/does-teaching-architecture-enhance-architectural-practice.

7. T. Kelly Wilson (Moderator), Benjamin Ball, Eric Höweler, Mark Lee, Jonathan Olivares, Dwayne Oyler, and Jenny Wu, "Miller Prize Finalist Panel Discussion" (2016 Exhibit Columbus Symposium: "Foundations and Futures," Columbus, Indiana, September 29–October 1, 2016).

8. Yael Reisner, "Architecture & Beauty: A Troubled Relationship," lecture at SCI-Arc, September 15, 2010, slide content, 22:40, https://www.youtube.com/watch?v=NqugFwa7v80.

9. Bruce Mau, "An Incomplete Manifesto for Growth," 1998, http://www.manifestoproject.it/bruce-mau.