Assemblies of Labor

> Wherever the workman is utterly enslaved, the parts of the building must of course be absolutely like each other; for the perfection of his execution can only be reached by exercising him in doing one thing, and giving him nothing else to do. The degree in which the workman has been degraded may be thus known at a glance, by observing whether the several parts of a building are similar or not.
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> - John Ruskin, The Stones of Venice 1

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Thus did John Ruskin, in 1853 draw a relationship between the well-being of the craftsman and the aesthetic conformity of the building under the rubric of “changefulness”. Ruskin’s taste for the variegated surfaces of Venice was not simply an aesthetic decision but also an ethical one. When the craftsperson is given a certain degree of latitude in the performance of work, that latitude is visible as a compositional vitality of surface.

Edward Ford2 and Peggy Deamer3 in turn have noted that perhaps the most fundamental difference between 19th and 20th Century architects is that those of the 19th were more interested in the wellbeing of people who built their buildings while those of the 20th pursued altruism in the social configuration of buildings after they had been built and people inhabited them. With the Industrial Revolution and the repercussions of its far reaching effects on the process of building, Ruskin’s notion of a workman, able to express himself within the parameters of an overall building scheme in the carving of stone motifs gathered from natural observation, was beyond the abilities of specialized trades and the increasingly high demands of standardization required for ambitious structural tectonics.

In the past 20 years, with the advent of parametric design and digital fabrication, it would appear that the varied surfaces and ornament that Ruskin eulogizes in Stones of Venice has reappeared without the craftsman. Variation in form within defined parameters is achievable now albeit under radically different conditions. Techno utopian declarations of “mass customization” or “building without drawing” promised a situation in which the architect would be able to master huge amounts of complexity. Yet, the return of “changefulness” to use Ruskin’s word, is paradoxically only possible with robots.

The following article details the ways in which our office has sought, through design, research and teaching, to interrogate the new relationship that architects could potentially have with labor during the process of construction and use. In that sense, our research aims to undo the false dilemma of a choice between the laborer and the user.

Initially we pursued this research through the design and/or construction of site-specific

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installations. Due to their explicitly temporary nature, the installations that we have designed come close to having equally long construction and use phases. This encourages us to approach construction not as a means to an end but something more like the production of a film: a time in which labor can be understood as a series of performances, an occasion for rare instances of finesse and grace in the demonstration of skill and training. Not surprisingly the work overlaps with the creation of ornament or at least the presence of pattern. Thatch, marbling, hydrographics, all of these involve a necessary aspect of hand-craft that leads to a visible manifestation of individual agency by a number of different actors. The tradesperson's labor is de facto visible in the finished product, not as a transgression of quality control or as a mistake, but simply as a performance of craft in labor.

Hair, Spikes, Cattail, and Turkeyfoot, a University of Michigan Research Through Making grant recipient involved the research, design, and construction of a thatch pavilion at the Matthaei Botanical Garden in Ann Arbor. The project's primary goal was to overlay the seemingly opposite craft practices of digital fabrication and oral building traditions. Oral traditions often involve intricate techniques that are difficult to represent and are therefore seldom documented; the thatch research required physical demonstration and instruction by William Cahill, one of the few master thatchers left in the United States. At the same time, digitally fabricated designs often catalogue an array of the produced parts, but lack thorough explanation in the assembly of the components. Hair Spikes combined these two methods of construction – digital and oral – to explore the role of sequence-based drawing in current architectural practice. As such the project interpolated its own labor and guided the work of students through the representation of a discrete set of movements and processes.

Since the 19th century architectural discourse has recognized that labor practices emphasizing the exercise of craft by the individual go hand in hand with ornamental elaborations of surface. One of the consequences of employing hand-craft for the thatch component of Hair Spikes was that assembling the grasses in place led to a variegated ornamental surface. Similar to Ruskin's "workman" fulfilling an expression of ornament within the parameters of a load bearing wall and column system, Hair Spikes' parametrically modeled structure provided discreet apertures for disordered bundles of organic matter. One important distinction in the process is that the student laborers were essentially unskilled; although they had a great

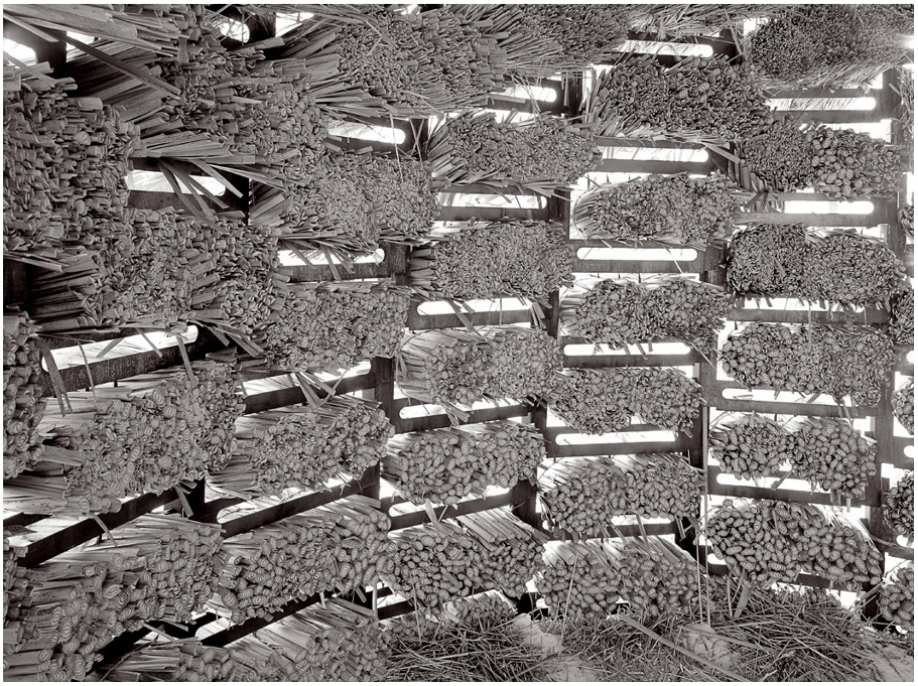

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Figure 1: Construction Drawings for Hair, Spikes, Cattail, Turkeyfoot

Figure 2: Interior view of Hair, Spikes, Cattail, Turkeyfoot.

deal of agency in the process their actions were circumscribed by the formal structure of the project.

Underberg, our firm's entry to the PS1 Young Architects Program, addressed this context of unskilled student labor but similarly made that labor central to the design and appearance of the project. *Underberg*'s economic viability lay in the fact that it maximized the use of student labor by keeping as much of its assembly as close to the ground as possible; this avoided the use of scaffolding, booms and union labor that would escalate costs, ultimately relying on an Amish style barn-raising for the erection. The project also envisioned that the students would be using pattern and ornament as a way to differentiate large swaths of Tyvek™ fabric. Once the large shapes of Tyvek™ were cut on a ZÜND digital cutter, the students would have used the centuries old craft tradition of aqueous marbling in which colored paints and dyes are floated on the surface of water and then transferred to a pliable surface. This rather free use of ornament in the project was a direct response to the labor involved, but one which ultimately sought to elevate the laborer as central to the installation's production.

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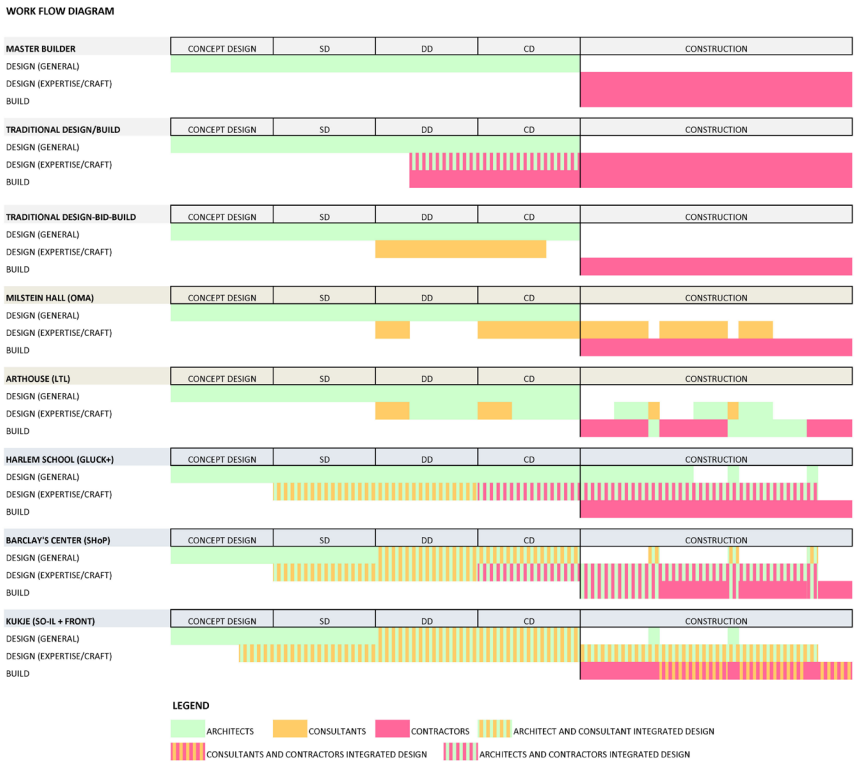
In a sense, these initial forays into the dilemmas of post digital craft and labor represent a willfully naive attempt to recapture Ruskin's "fulfilled workmen" and the abundant ornament that accompanies them. They were at once concerned with making use of digital fabrication and mass customization, but also with the revival of craft traditions that are nearly extinct. Ultimately however the auspices for these craft revivals and retoolings were perhaps in an inauthentic labor milieu. Unskilled student labor for *Hair Spikes* and what can only be called an absurd economic proposition from MoMA's Young Architects Program meant that as successful as these projects were at elucidating an approach to labor, they did so outside of the architectural market.

And yet there do exist architectural practices that are working with new technologies to redefine relations with labor which might not be altruistic, but that depend on at least an empathetic appreciation of what the various trades do. Originally a seminar at the University of Michigan and the University of Toronto our forthcoming book, *Building Stories* presents

Figure 3: Underberg and marbling experiments on Tyvek

copious amounts of original research on the interaction of architectural labor and construction labor. Building Stories documents the project management expertise embedded in contemporary buildings by looking at the design and construction processes in 12 case studies. These include work by OMA, SHoP, LTL, HWKN, Steven Holl, SO-IL and SOM among others. Each case study is predicated on the initial participation of the architect, project manager, and/or consultant in a lengthy interview process to document the entire project, from the beginning of programming to the completion of construction.

Inspired by Studs Terkel's seminal compilation of interviews called *Working: People Talk About What They Do All Day and How They Feel About What They Do*, the primary material of the interviews combined with full access to project photographs, drawings and schedules is the raw material of the book. What is apparent from the stories is that there really isn't a normative architectural profession as such, only the appearance of one. As disparate as these practices are, the thesis of the book asserts that due to the complexity of contemporary buildings, project management has become its own kind of design and is a new type of craft.



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The model of project delivery that a firm chooses will determine how it spends the months or years that it is engaged with a project. It is determined by the number of factors at play (client representatives, contractors, subcontractors, fabricators, consultants) but it could also determine whether these people play a part in the project at all. Managing a project cannot be accomplished by rote. It involves a rapid, almost frantic attainment of expertise on a subject that has not existed before the client, the site and the building came together. It involves the performance of a series of actions and dialogues which, although perfectible in theory, are never perfect in practice due to the fact that the finished building concludes the first and only performance.

Figure 4: Diagram analysis of design to build workflows in Building Stories

Yet project management is in many ways hard for the discipline to recognize. As Peggy Deamer notes, "For those trained in assigning singular value to the aesthetics of the object, it

is an adjustment to assign creative thought to the efficacy of process."4 Since it is the framework within which design takes place, it is easy for it to fade into the background.

The book charts the project budgets, staffing and schedules as well as diagramming the organizational structure of the parties involved in the given project. Along with these informational diagrams the book also assembles distinct artifacts of design and construction administration. From the accumulated material it is readily apparent that the production of things like punch lists or redlines of shop drawings is by no means boilerplate but involves design and craft. As we follow the progression from conventional practices to the more radically reconfigured ones there is a marked increase of empathy towards the building trades in all aspects of the building's representation. In other circumstances labor relations are present in architectural firms that have in-house communication with fabricators and builders or a close working relationship during early phases of design with expertise consultants. In general, contemporary design processes have much more engagement and integration with the construction phase -- this is perhaps closest approximation to the idea of modern architectural craft, or expertise craft.

A few key case studies can demonstrate this transition from the traditional design-bid-build process. In the methods laid out by the AIA contract, there is a distinctive break between phases that are considered to be solely dedicated to design and the moment of the hand off towards construction. If architecture in this mode is at some level the pursuit of singular buildings, it is ironic that the more unique the building is the more it is necessary for the architect to reach outside of the discipline for the expertise of consultants.

Two projects, Milstein Hall by OMA and The Herning Museum by Steven Holl Architects demonstrate this traditional model. The technical challenges of Holl's gestural design were executed largely through the expertise of local architect and an extremely involved group of mechanical and structural engineers. SHA's role was circumscribed by their own agreement with the local architect and consultants due to the fact that the Danish system affords those consultants a much larger role, well into construction management, with the requisite compensation. Thus the consultant in this case forms a totally legitimate bridge between the architect and construction laborer helping to avert any oversight.

Conversely, when OMA had trouble with the concrete finish of the domed ceiling of the basement at Milstein Hall, they brought in the expert concrete consultant Reg Hough. Hough, through his intimate knowledge of concrete specifications, but more importantly how those specs are understood by concrete subcontractors was able to solve the problems with the finish by redesigning the formwork and specifying a different release agent. In this case, after construction had begun and quality control problems arose, the consultant was hired in an interpretive role between architect and labor.

In formally ambitious projects where budgets don't allow for the interpretive layer of the consultant or expert, architects seek to suture the gap between design and production through the elimination of the interpreted artifact of drawing. If drawing is the medium of architecture it is surely also the locus for so many of its epic misunderstandings. "Building without drawing" through parametric software like Building Information Modeling averts these misunderstandings by refusing to create the artifact of drawing. The architect, contractor and subcontractor share a virtual model of the building in which the building's geometry can be compared and updated. Any conflicts of building materials occupying the same space can be flagged and resolved before they become problems in construction. Ideally, all cut files and shop drawings are outputted from the model without the intermediary step of the orthographic set.

However, in most of the case studies that pursued this model, there were either disparities of

computer literacy among subcontractors or there were discrepancies between the computer model and “as built” conditions. In these cases the projects required more drawings. At the Barclay’s Center for example before SHoP Architects could accurately install their facade system, they had to contract an extremely precise point cloud laser survey, and then direct the adjustment of existing conditions through grinding and welding until they conformed to the virtual model. For Koning Eisenberg Architects at the Pico Branch Library one subcontractor was not following the model and consequently threw off the entire ceiling geometry. In their case they adjusted the design with a series of chalk line drawings done on the concrete floor and projected upwards rather than rip out the sprinklers.

In the case of LTL’s Arthouse, up against a small budget and a lowest bid contractor, they chose a more low-tech version and self-performed many of the signature design elements. The deployment of this technique at Arthouse was in fact the result of years of experience at self-performing. Paul Lewis, one of the partners of the firm describes the development of the method as follows: “we could produce the base drawing that a contractor could do fairly quickly because he’s not detailing, and then we would be building the details, which was where the shop drawings came from. There are benefits to this kind of process. We didn’t have to represent the detail information to anyone else but ourselves. It cut out the middle man. I would call it a productive naivete.”5

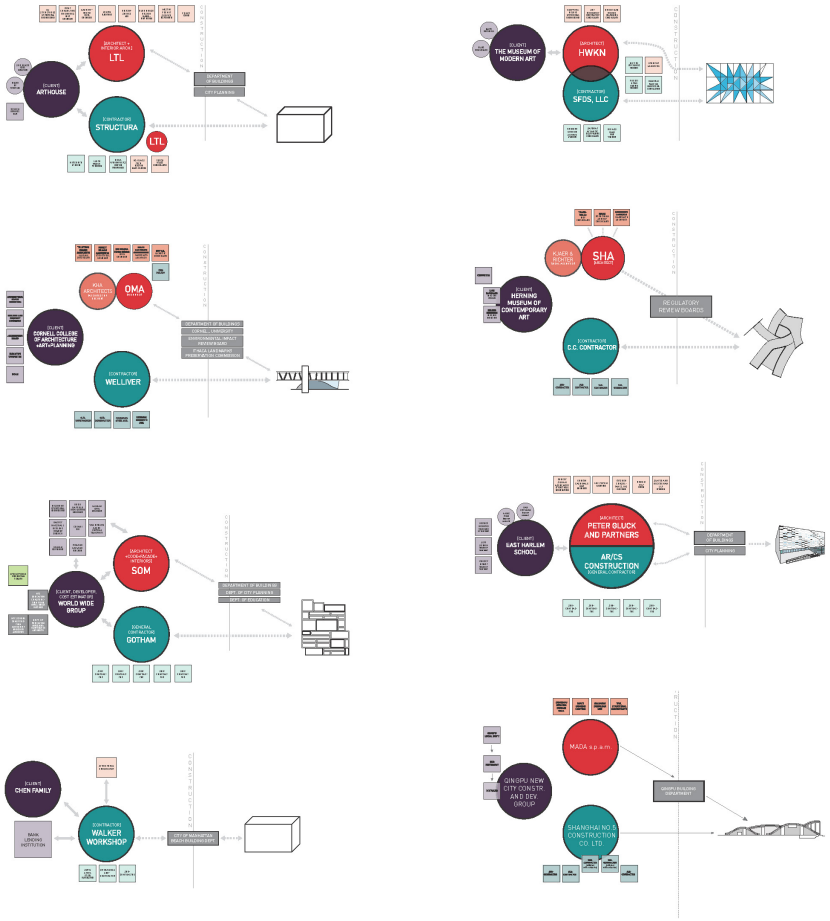

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Figure 5: Diagram analysis of parties affiliated with each case study and their collaborative relationships in Building Stories

The most radical of the practices in the book are those that look at practice itself as a design opportunity. Concomitant to the revolutionary changes brought about by digital fabrication

and BIM, the new development in the 21st Century has been a tentative awareness that the boundaries of practice are at best a collective agreement. Practices that sought to take more responsibility or control over certain aspects of building have been emboldened by the fact that what they perceived as borders were only conventions on the edge of a void. The freedom of "no one's running the show" means that practices have been able to reshape their business model whole cloth. Sometimes these practice models are the result of several years of trial and error, other times they are groomed by venture capital for an IPO.

GLUCK+ for example has coined the term "Architect Led Design Build" for their project delivery model, likely due to the fact that there was no industry name for it. They operate an architectural firm and construction administration company under the same roof. Not only do their employees take on several different roles in architecture and construction at various points in a project, but they also bring the consideration for construction management backwards into the schedule, often as far as Concept Design. By consulting and pricing with subcontractors during early stages of design, the firm is able to visualize the project's budget long before a conventional bid and tender process at the end of Construction Documents.

Perhaps the most fascinating aspect of this firm's process is the role that technology plays in the design to build process. Not so much in the use of BIM, which they are only starting to contemplate, but the design of custom representation as a means of communicating with the building trades. Their drawing sets are short and custom tailored to the individual trades, with copious diagrams and even instructional videos that anticipate the questions that might cause a subcontractor to throw contingency at a bid. This empathic process extends back to architects and even clients; the firm has produced a series of videos that explain the construction process through diagrams, photographs and visual metaphors.

As much as the AIA seeks to get ahead of the changing relationship between architectural labor and the labor of construction by funding research on subjects like Integrated Project Delivery, there isn't really a monolithic or even a legible response in the profession to the new opportunities provided by parametric modeling and digital fabrication. In a sense there are as many responses as the market allows. Each project instantiates an individual response that with greater or lesser success can be carried forward into the practice model of a single practice. From the admittedly limited case studies in Building Stories, it becomes apparent that the greater crisis and opportunity arises from empathy between architects and the building trades. We needn't resort to Ruskin's imagery of "degradation" and "enslavement" of the workman to make the point that the changefulness of contemporary architecture is successful inasmuch as it acknowledges labor and seeks to accommodate it. Ironically it is by this act of empathy that contemporary practices begin to feel less degraded themselves.

ENDNOTES

1. Ruskin, John., Links, J. G. *The Stones of Venice*. (New York: Da Capo Press 1985) p. 64
2. Ford, Edward R. Introduction to *Details of Modern Architecture* (Cambridge, MA: MIT Press, 2003)
3. Deamer, Peggy, "Detail Deliberations" *Building (in) the Future: Recasting Labor in Architecture* Deamer, P. and Bernstein, P.G. ed. (New Haven, CT: Yale School of Architecture, 2010)
4. Deamer, Peggy "Bim and Contemporary Labor" *Pidgin 151*. Princeton, (NJ: Princeton University School of Architecture Graduate Studies, 2006)
5. Kedan, E. (2010). *Provisional: emerging modes of architectural practice* USA. New York: Princeton Architectural Press. p.132