Scaling for Non-Expert Production: The Littleton Trials

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Scaling for Non-Expert Production
The Littleton Trials

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This project addresses scales of production by repositioning the architect as a non-expert. The Littleton Trials consists of a series of solid wood huts designed, fabricated, assembled, and monitored 26 miles northwest of Boston in Littleton, Massachusetts. The huts are an alibi to evaluate not just the thermal performance of different solid wood construction logistics, or the forestry that presupposes them, but to design production anew through trans-scalar and non-expert forms of feedback. The buildings are only small spatially. This project makes the claim that a building can no longer be the sole scale of response to the question of building. The insights made from this project reflect a close collaboration between the members of the Decentralized Design Lab and our advisor, Kiel Moe.

For every expert, there is an equal and opposite expert.

—A. Clarke, Profiles of the Future: An Inquiry into the Limits of the Possible (1973)

Prohibitive Procedures
The production of building today has become a BIM-enabled configuration of certified products into organizations that more or less serve programmatic and performance needs. The description of the architect in an age of neoliberal production—at once space manager and product selector—limits the architect’s ability to discern alternate modes of production by constraining agency to geometry and the configuration of fully determined and warranted product systems. More than anything else today, architects need to first design new modes of production and practice that are much more cosmopolitan in the most literal sense possible: kosmos (world) + politeis (citizen).

The central issue with the current mode of neoliberal production is that it is at once too narrow in its sanctioned scope and imperceptibly large in its unconsidered ecological effects. The constitutive materials and energy flows attached to building are so large, and of such confounding complexity, that few architects comprehend or act on them, nor are they trained to do so. Accordingly, design is too narrow: preoccupations with building geometry and program as central parameters occlude decisions based on more cosmopolitan dynamics that inevitably have trans-scalar environmental impacts and opportunities. These impacts are not evident in the building or methodologically relevant in this modality but are nonetheless inextricable from building practices. The architect is not particularly expert at these scales of production otherwise claimed by life cycle assessors, industrial ecologists, manufacturers, product designers, and systems engineers. Yet, within the inevitable divides of expertise, there is great agency for architects in redefining the scales of production in contemporary building, especially if the architect can leverage the position of the non-expert. To operate at appropriate scales of building requires a postprofessional, non-expert disposition. In short, a building can no longer be the sole scale of response to the question of building.

This project addresses scales of production by repositioning the architect as a non-expert within the larger material-energetic system that presupposes building and the smaller-scale thermal phenomena that are a critical form of feedback across trans-scalar modes of

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production (Figure 1). The Littleton Trials consist of a series solid wood huts designed, fabricated, assembled, and monitored 26 miles northwest of Boston on a 106-acre parcel of land in Littleton, Massachusetts. The huts are an alibi to evaluate not only the thermal performance of different solid wood construction logistics or the forestry that presupposes them. The project is foremost an opportunity to design production anew. The buildings are only small in spatial scale, not in terms of ambition as a model of practice and production.

**Becoming Non-Expert**

The initial aim of the project was to claim burgeoning expertise among the relevant scales and systems of wood building: forest management; tree harvesting; timber milling; wood aging, staging, and drying; the operations of wood corporations; the small-scale thermal behavior (and misbehavior) of wood, to name a but a few. But, having substantively engaged these scales, we opted for conscious non-expertise instead, because we soon realized that no one is expert in the cosmopolitan state of contemporary building.

While experts still have relevance, modernist claims on expertise are proportional to the narrowness of system boundaries. The efficacy and “expertise” of the non-expert is knowing enough to meaningfully jump boundaries and disciplinary and professional habits as a model of design. Knowledge is gained through the adaptive reorganization of the architect within the growing complexity of these expanded system boundaries. The term non-expert is neither pejorative nor unspecific, but a particular position that must be held fast when operating within a system whose complexity outpaces our capacity to characterize its interactions. The architect as non-expert is ideally situated within this context to make associations between dissimilar forms of expertise that represent potential “design interventions.” In our case, engaging seemingly “small” wood building practices exposed both the enormity and intricacy of disciplinary opportunity that more conventional modes of production occlude.

**Sourcing Design**

As an illustrative excerpt regarding sourcing design, the New England Forestry Foundation (NEFF) helped...
determine critical tree species for harvest. NEFF focused on finding markets for low-grade woods such as red maple, eastern hemlock, and black locust (Figure 2). The aim here was twofold: (1) to cultivate more ideal forests for higher-grade species like eastern white pine and white oak through timber extraction and (2) to develop local markets and economies based on low-grade material. In contrast, the Northeastern Lumber Manufacturers Association focused on finding new uses and describing the performance of softwoods within developed markets and economies such as eastern white pine or southern spruce/fir. Together this led us to develop a hybrid wood system that consisted of high-grade softwood and low-grade hardwood, a mongrel that better addresses New England forestry and industry interests. In this way, forestry pushes design and building feeds back into forestry.

The selective red maple harvest prompted conversations with the Massachusetts Department of Conservation and Recreation (MDCR), who secured a portable mill for on-site timber processing (Figure 3). The mill’s portability and MDCR knowledge helped yield a high quantity of usable lumber from low-grade logs (Figure 4). Consequently, nonstandard lumber sizes—slightly larger at times to compensate for defects in the wood and slightly smaller at times to increase the overall yield of the milling operation—demanded non-standardized panel designs. Here again there is reciprocity in the mode of production between forest and building. As a recursive mode of highly contingent production the project operates at a relatively small scale, but it is not constrained to this scale. As the implications of this model scale up to the New England forestry context, the ecological implications and architectural opportunities abound. These
implications and opportunities do not scale linearly in this more cosmopolitan model of production.

**Shifting Scales (and Ambitions)**
Parallel to sourcing concerns, two other experiments helped characterize underarticulated thermal performances of solid timber wooden assemblies (Figure 5). Existing lab-based infrared imaging methods were modified to calculate the thermal effusivity of varied wood species in situ. Likewise, temperature and heat flux sensors measure in situ conductivity and diffusivity, together evincing considerable variation from the closed systems of lab methods and normalized material properties (Figure 6). This empirical knowledge feeds back into the thermal design and assembly of subsequent solid wood panels by dictating the thicknesses and composition of mixed species panels.

In this case, forestry and heat transfer “speak” to each other through the non-expert design of systems and system boundaries otherwise not in the purview of architectural practice and production. A central aspect of this reciprocal process is an awareness of how these
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Figure 6. Wood thermal parameters. Heat transfer through wood is highly contingent on density. High-density hardwoods (oak, maple, locust, etc.) have twice the thermal heat capacity of lower-density species (eastern white pine, spruce/fir, eastern hemlock). The opposite is true regarding their insulating capacity with less dense species containing more voided air space at the cellular level, thus decreasing their conductivities. A careful configuration of different wood species in relation to both the body and the type of heat transfer being designed (top, bottom left, bottom right: conduction, diffusion, effusion) greatly extends the ecological and thermal impact of solid wood architectures. (Image by the author.)
A Postprofessional, Cosmopolitan Ethos

Even the smallest of huts can engage big questions about the mode of production of contemporary building. More than any idiosyncratic visual composition of architecture alone, the composition and coupling of phenomena at multiple scales is central to a postprofessional, non-expert agenda for architecture in this century. Again, no one is expert in design and dynamics that are observable at multiple, simultaneous scales. The virtues of non-expertise help reposition architectural production, and architectural production can no longer externalize these dynamics to address pressing obligations and opportunities for design in this century. Questions about the production of architecture must today engage the effects and phenomena that are not legible at the scale of individual buildings but that are nonetheless constitutive of building as a process of planetary urbanization.8

That which is too small and too large to perceive, or otherwise removed from the training of architects, needs fresh attention as one basis of new practices and agency for architecture. Large-scale ambitions, coupled with small-scale inquiry, establishes an agenda to devise and design agency, not just projects. The Littleton Trials are an attempt to design through the scales and dynamics of, in this case wood, building (Figure 7). The huts are but the hardened edge of other imperceptible but actual dynamics. Their apparent “simplicity” allows us to peer into complex domains and systems boundaries otherwise not evident in the narrowed concerns of modern building design but that can be designed as part of a postprofessional, cosmopolitan design ethos.

Author Biography

Jacob Mans is an Assistant Professor of Building Technology and Construction at the University of Minnesota’s School of Architecture and Cofounder of the Decentralized Design Lab with David Kennedy and Benjamin Peck, a group of designers and thinkers finding simple approaches to complex problems at the intersection of social, economic, and environmental forces.

Notes