
Journal of Architectural Education

ISSN: 1046-4883 (Print) 1531-314X (Online) Journal homepage: http://www.tandfonline.com/loi/rjae20

# Scaling for Non-Expert Production: The Littleton Trials

Jacob Mans

**To cite this article:** Jacob Mans (2017) Scaling for Non-Expert Production: The Littleton Trials, Journal of Architectural Education, 71:1, 82-87, DOI: 10.1080/10464883.2017.1260929

**To link to this article:** https://doi.org/10.1080/10464883.2017.1260929

Published online: 06 Mar 2017.

# Scaling for Non-Expert Production
## The Littleton Trials

**Jacob Mans**
University of Minnesota



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)[1]

### 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 warrantied 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) + politēs (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.[2] 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

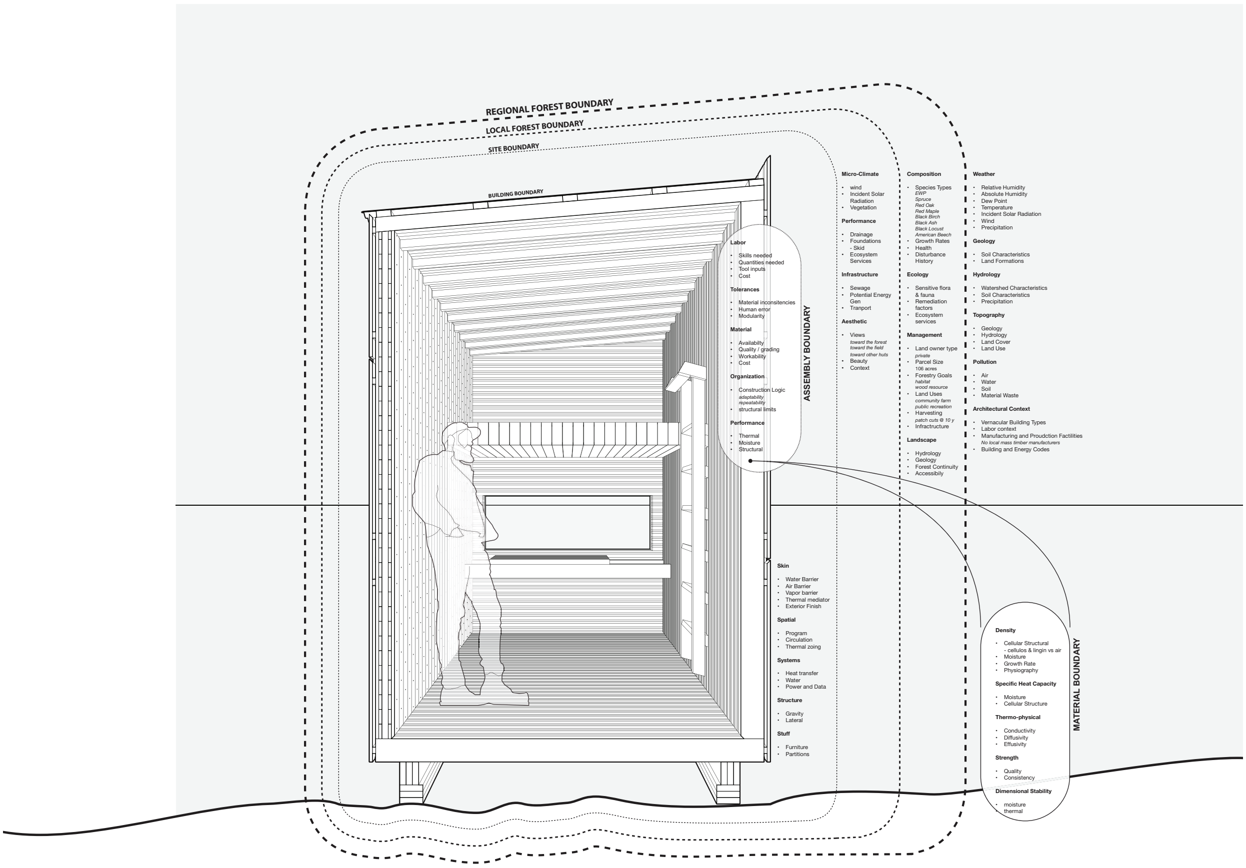



**Figure 1.** Section perspective test hut #1. While physically constrained, repeated design feedback loops extend the system boundaries (material, assembly, building, site, forest, region) of the experiment well beyond its envelope. Spatial impacts of the project grow through small-scale forestry and milling operations that find material and ecological value in harvesting low-quality timber as inputs to site-specific multispecies wood construction logics. (Image by Decentralized Design Lab. Reproduced with permission.)

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.[3] 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

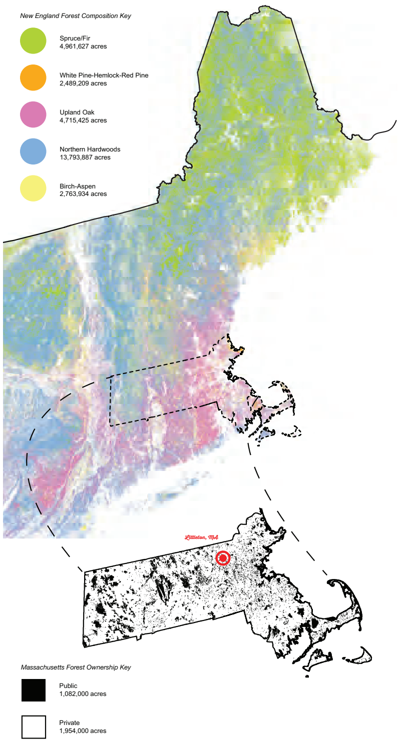



**Figure 2.** New England forest regime map. Forests make up approximately 80 percent of New England's landscape. The majority of woodlands in New England (43 percent) consist of northern hardwoods with indicator species such as ash, maple, beech, and birch with interspersed hemlock and eastern white pine (EWP).[4] Wood's species-specific thermal properties make New England's forests a unique local source for a thermally tuned wood-based architecture if forestry, timber harvesting, and milling experts are allowed to inform this architectural agenda. (Image by Decentralized Design Lab. Reproduced with permission.)

**Figure 3.** Timber harvest and milling operation. (Photograph by Decentralized Design lab and Charlie Reinersten. Reproduced with permission.)

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


**Figure 4.** Cutting plan. NEFF identified a number of low-grade hardwood trees in proximity to more valuable EWP trees; the hardwoods were harvested for their high-density wood (to be incorporated into our panel designs) as well as to redirect solar and nutrient access toward the EWP trees. The selective disturbance of felling one low-grade tree became the local opportunity to add overall value to the forest. Smaller, selective cuttings produce a more diverse, mixed-age ecology in the long run, while immediately funding increased management efforts. (Image by Decentralized Design Lab. Reproduced with permission.)

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[5] were modified to calculate the thermal effusivity of varied wood species in situ. Likewise, temperature and heat flux sensors measure in situ conductivity[6] and diffusivity,[7] 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.

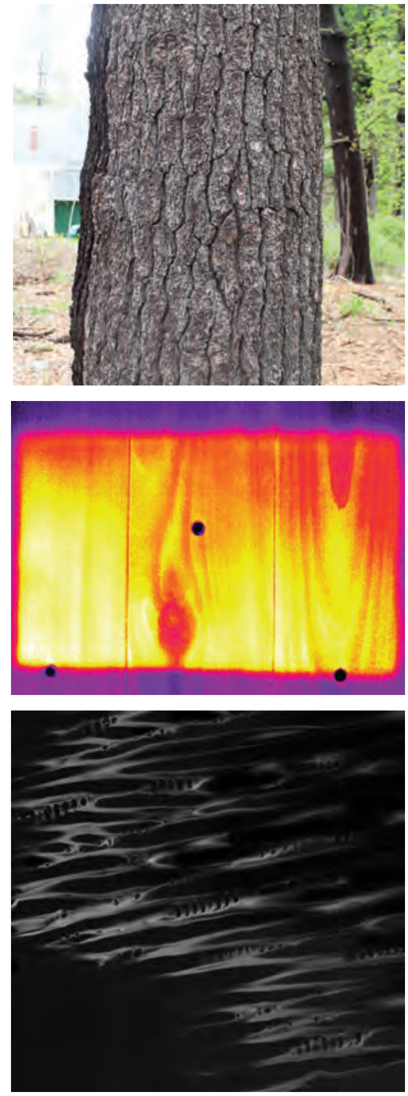
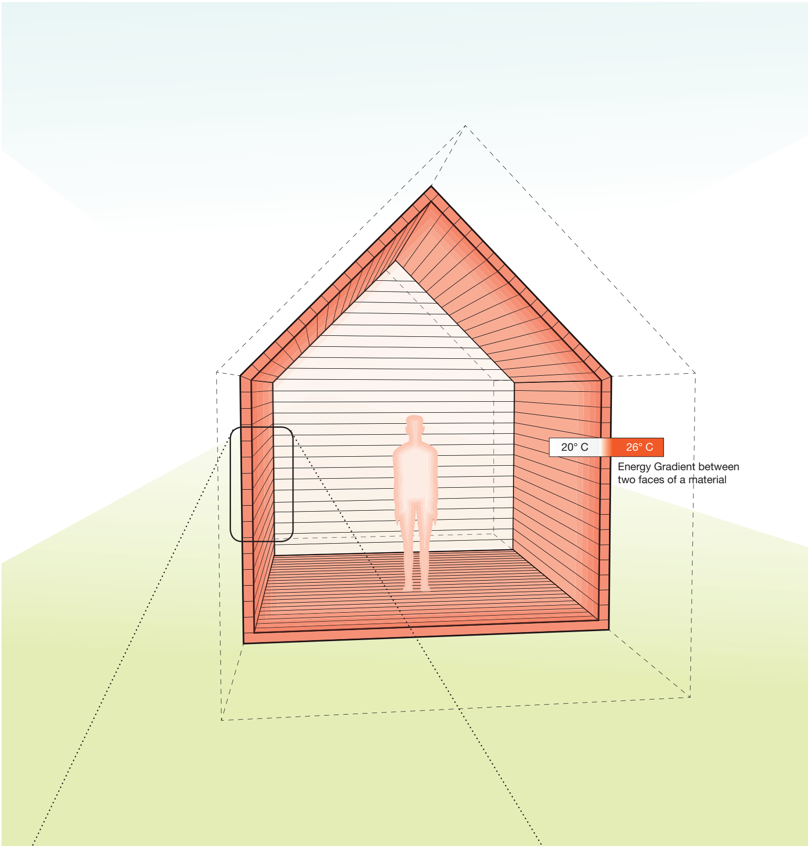


**Figure 5.** Scaling eastern white pine. Different modes of production focus on different scales of thermodynamic exchange. From top to bottom, trees: production of biomass, water transport, climate, and habitat production; wood tissue: heat transfer, heat storage, material assemblies; wood cells: density, thermal behavior (conductivity, effusivity, diffusivity). (Photographs by Decentralized Design Lab and Erin Diel, Department of Molecular and Cellular Biology, Harvard University. Reproduced with permission.)

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




smaller-scale, thermally designed panels can affect the economies of local mills, distributed production sites, and the dynamics of the small-landowner basis of New England. More familiar, homogeneous cross-laminated panels, for instance, occlude engagement with all these scales and dynamics. The promise of a more cosmopolitan mode of production eclipses the current product substitution paradigm that dominates pedagogy and practice, especially in the mass timber building discourse.

**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.)

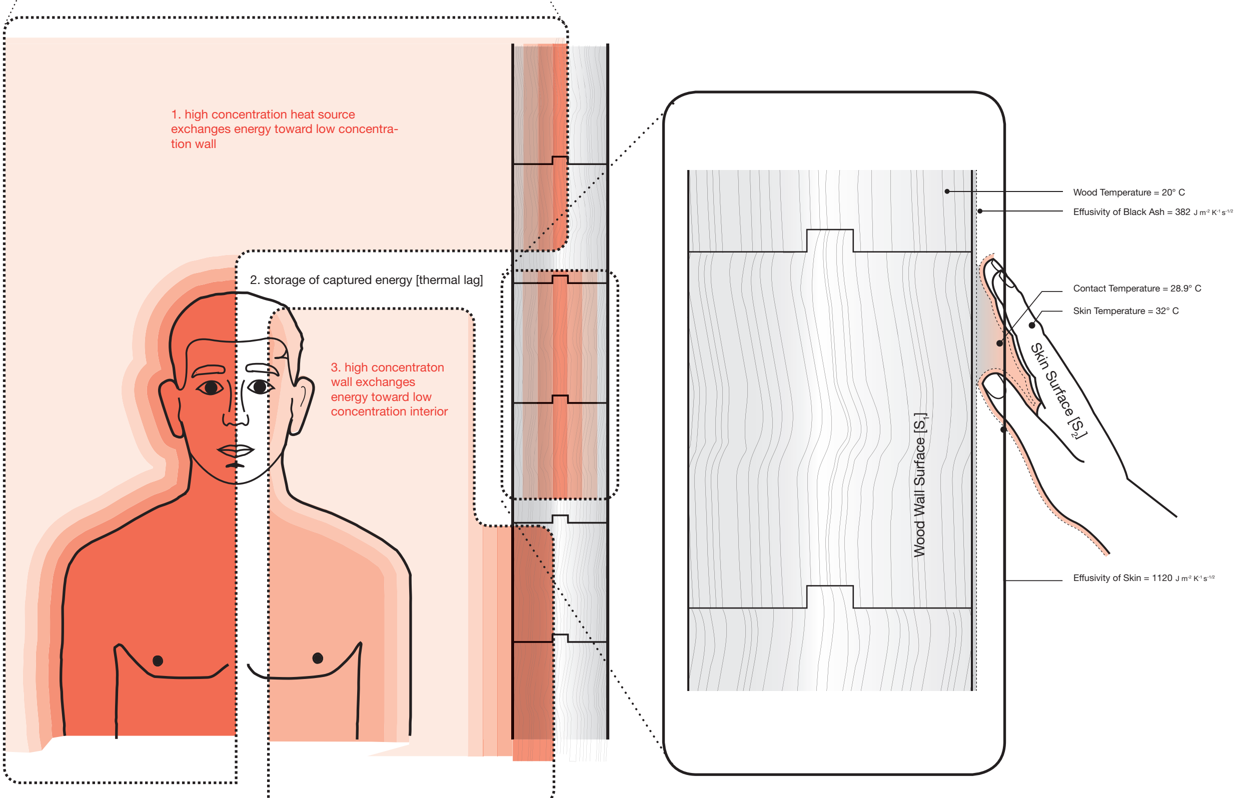


**Figure 7.** Hybrid panel iteration installed in test hut #2. The hut explored fabrication challenges and thermal opportunities associated with multispecies panels. The panel above consists of low-density spruce/fir nail laminated timber backup panel and exploded high-density black locust dCLT front panel with introduced air spaces to increase heat transfer. (Image from Decentralized Design Lab. Reproduced with permission.)

## 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 Peek, a group of designers and thinkers finding simple approaches to complex problems at the intersection of social, economic, and environmental forces.

## Notes


1 A. Clarke, *Profiles of the Future: An Inquiry into the Limits of the Possible* (New York: Harper & Row, 1973).
2 Ivan Illich, “Disabling Professions,” in I. Illich, I. K. Zola, J. McNight, J. Caplan, and H. Shaiken, *Disabling Professions* (London: Marion Boyars, 1977), 38–39.
3 E. Hutchins, *Cognition in the Wild* (Cambridge, MA: MIT Press, 1995), 289–90.
4 New England Forestry Foundation, *New England Forestry: The Path to Sustainability*, 2014, www.newenglandforestry.org (accessed March 15, 2016).
5 C. Boué and D. Fournier, “Infrared Thermography Measurement of the Thermal Parameters (Effusivity, Diffusivity and Conductivity) of Materials,” *Quantitative InfraRed Thermography Journal* 6, no. 2 (2009): 175–88.
6 C16.30 Thermal Insulation, *Standard Practice for In-Situ Measurement of Heat Flux and Temperature on Building Envelope Components* (West Conshohocken, PA: ASTM International, 2011).
7 M. Koo and Y. Song, “Estimating Apparent Thermal Diffusivity Using Temperature Time Series: A Comparison of Temperature Data Measured in KMA Boreholes and NGMN Wells,” *Geosciences Journal* 12, no. 3 (2008): 255–64.
8 Neil Brenner, ed., *Implosions/Explosions: Towards a Study of Planetary Urbanization* (Berlin: Jovis, 2014).