Modeling the Pro-Forma: Integrating Financial Analysis with Site-Responsive Urban Design

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In the high-value downtowns of North America, large-scale buildings and associated public spaces typically result from protracted negotiations between private real estate developers and the public over the project’s height, density and programmatic makeup. This paper argues for a new methodology that integrates financial modeling with physical modeling to empower stakeholders to make smarter decisions about form, density, public benefits and financial returns in a streamlined, more integrated process.

Recent large-scale projects in Boston, Chicago, Los Angeles and New York have required intensive investment in infrastructure, such as decking over railroad tracks, parking lots and/or highways. The cost of decking is partly subsidized by the development’s own profit, and partly by public subsidies. In addition, affordable housing and “at cost” space for cultural institutions are either mandated or negotiated in exchange for public support from elected officials. Like decking, these programmatic add-ons must be offset by the revenue stream of the project, creating additional pressure to increase development density. The political impact of this equation is well-known. As Robert Campbell, the architecture critic of the Boston Globe spelled out recently: “In return for granting permission to break the rules, the city negotiates a trade, in which it will gain some kind of public benefit – maybe some off-site affordable housing, let’s say. Every building becomes a deal between the developer and the city. And the bigger the building, the bigger the benefit it can spin off.”

Despite the clear conceptual relationship between socially beneficial programming and the need for increased revenue in the financial pro forma, the political arena within which the project is shaped and trade-offs made has not been theorized as a design methodology. Now that BIM (Revit) and quick digital modeling software (SketchUp) is ubiquitous in architecture firms, these tools can be harnessed to better inform such processes by making transparent the design implications of negotiations about density and program-mix. The methodology proposed converts digital models of design scenarios into color-coded three-dimensional spreadsheets against which economic feasibility can be tested.

Using this methodology, financial expectations about investment returns are understood at the same time massing and other design decisions are being examined. Once the financial bottom line established, this value of profit becomes the basis for negotiations about density and program mix as a component of the parametric model. In the case of a development proposal that includes both the cost of decking over a railroad yard and specific requirements for affordable housing, the diagrammatic content of the massing model can be enriched to show how much of the volume of the building is necessary to pay for those components. The result is a process that can demonstrate the physical implications, in terms of increased...
density, of the addition of loss-leader social programs or less profitable, but socially advantageous program mixes.

Utile, Inc., a Boston-based architecture and planning firm, is currently using this approach for two different assignments. In the first, the firm is using a BIM model to help a real estate development company determine the best redevelopment scenario for thirteen existing 19th century loft buildings and a vacant development parcel in Boston’s Fort Point District. The lease terms, income streams and phased relocation scenarios needed to be analyzed to determine the best steps for moving an international financial company into a new building in the final build-out. Given the complexity of the phasing, BIM software allowed the architects and developers to better understand the phased financial performance of development options, as well as urban design opportunities and environmental impacts.

Utile’s second assignment is a planning study and zoning update for the Stuart Street Area, a large segment of the commercial area of Boston’s Back Bay, commissioned by the Boston Redevelopment Authority (BRA). The study will explore build-out scenarios on the remaining potential development sites in the study area to inform recommendations for a new form-based code that will replace existing zoning in the district. Fundamental to the assignment is the need to understand the threshold for viable real estate development in the area since the BRA wants to incentivize both appropriate development in the area and as-of-right adoption of the new code. The use of BIM software to demonstrate the interrelationship between building design and financial performance has helped communicate decisions about form and density to the BRA and representatives from the adjacent residential neighborhoods.