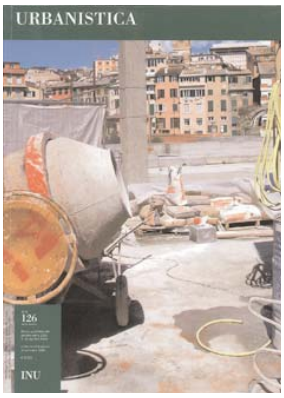

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Authenticity, simulation and entitlement

*Peter Bosselmann**

A city derives authenticity from many sources, but at its most fundamental level the authenticity of a city is related to the shape of the land upon which the city is built. Each city has an authentic location defined by rivers, shorelines, plains, hills or mountains, and the form of the city should serve to reinforce it. This notion of place within the ecology of a region warrants reflection, because it holds many answers to a better understanding of sustainability.
Acknowledgement of the qualities of authentic form also emphasizes a city's unique attributes in an era when global economic forces are encouraging sameness.
Though the forces underlying a city's qualities of authenticity may be immutable, every city is subject to constant, if gradual, change. Often this means that its sense of authenticity can only endure if it is monitored. Normally, in democratic societies this process is the purview of elected representatives who, through methods of entitlement, assign allowable building heights, forms and densities to various properties.
Generally, these decisions are based on standards for the design of new buildings and open spaces that are arrived at through open, public processes.
Simulation studies have long offered tools to facilitate this work. Indeed, without simulation, even a politically involved citizenry could not understand the effects of cumulative change, driven as they often are by speculative forces.
However, the use of such simulation studies is only as valuable as is the commitment of those who produce and evaluate them to protecting accepted public standards. Without such commitment, the sense of a city's authenticity may be compromised, no matter how technologically sophisticated simulation methods become.
Like other cities, for many years San Francisco has monitored these processes of change using simulations to inform urban design decision-making. In San Francisco, decisions regarding building height have been the subject of particular controversy. It is in this regard that two recent building proposals have tested the nature of the relationship between simulation and public-policy formation. The story of these proposals underlines how important it is for simulation experts to remain neutral with regard to position and affiliation.

City form and topography

The shape of land and water are remarkable in San Francisco. When describing their city, residents often refer to their location of residence in topographic terms. They refer to hills and valleys, heights and hollows. The sense of dwelling and moving through a complex topography further heightens the experience of the city. Many locations have regional views, and from a number of places a person can look out over the rolling topography and comprehend all three geographic boundaries of the city's 49 square miles of surface area: the Pacific Ocean, San Francisco Bay, and the San Bruno Mountains.
Such an experience is possible because the city's buildings appear like a carpet uniformly stretched across its hills and valleys. Historically, this condition did not result from building regulations; there were few of these in the late nineteenth century when much of the city was rapidly built with riches from the Gold Rush. Rather, structural limitations imposed by wood-frame construction were largely behind a uniformity of building heights. When it did become economically advantageous to build highrise structures, the city adopted rules preventing such building along the waterfront and on the down slope of hills. These limits were imposed in the early 1970s in response to great pressures for highrise office buildings in the financial district and for residential towers in the affluent neighborhoods. For thirty years these height limits stayed in place with few changes.
Understandably, there have been many challenges to these height limitations. Over the years the San Francisco Planning Commission has heard frequent arguments in favor of lifting allowable heights in certain locations. However, neighborhood opposition has generally always backed existing rules. A certain truth has seemed to be embodied in the height limits, which the people of San Francisco have understood and shared.
There were also sufficient parcels of land in the city where highrise structures were encouraged. In particular, highrise buildings were allowed in a well-defined area of the financial district, and by arranging height limits here like natural contours, a 'constructed hill' emerged to complement the city's natural topography. This design principle embodied certain flexibility because as long as building heights stepped down gradually toward surrounding neighborhoods, the image of a 'constructed hill' would remain intact. This happened especially in the early 1980s when the downtown highrise area was permitted to 'swell' to the east and south.
The method of setting height limits would have lost none of its validity if it had been allowed to continue on the course first set in the 1970s (1). However, San Francisco's building rules need periodic monitoring, interpretation and alteration by the professional staff of the city planning commission. And to assist them in making such decisions, they have relied on simulation studies.
Starting in the 1970s such studies were made in the Environmental Simulation Laboratory, located at the University of California, Berkeley. A large wooden model of San Francisco was kept underneath a large crane here for movie-making purposes.
Periodically, the computer-guided cameras would drive down streets in the model to simulate changes to allowable building heights.
In the late 1980s the staff at Berkeley gradually augmented the modeling technique and then replaced it by constructing a digital model that used computer simulations based on geographic information science and digital representations of actual and proposed buildings in the vicinity of downtown (2).
This new technology has opened the field of simulation to other sources than the Berkeley laboratory. In fact, it has become quite simple for digital-imaging contractors to furnish developers and their architects with their own feasibility studies and make high-tech design presentations. A small industry of lawyers, architects, and technical support staff has grown up in San Francisco around this activity. Their prime occupation was and is to help developers increase building entitlements (the rights to develop certain parcels to prescribed densities and heights).
Equipped with their own digital models developers now routinely try to persuade decision-makers to increase entitlements.
Not that developers would

openly lie; they simply distort the truth by presenting information selectively, showing the proposed building from only the best perspective, or leaving out important aspects of its context. Such privately produced models also never show the effects of cumulative change if neighboring properties receive similar increases in entitlement. By contrast, the staff at the Berkeley SimLab includes all factors that can be shown and that are representative of the existing and proposed conditions. They have also provided openness to accuracy tests in their assumptions and methods.
Indeed, anyone doubting the accuracy of a particular simulation has access to its underlying data files. As a public institution, information produced at the University is in the public domain, and will by disclosed upon request.
Interestingly enough, proponents of developments have rarely challenged the accuracy and representative nature of the laboratory's simulation work. Instead, developers have attempted to influence the building entitlement process by preventing the laboratory from getting involved in the first place. These efforts have sometimes made use of backdoor political channels. For example, contracts for simulation work between the city and the university have been quietly canceled by the mayor's office without informing the planning staff that commissioned them.
The reader should not assume that any undue level of conspiracy has operated in these matters. Viewed from a financial standpoint, everybody is simply operating in a most predictable manner, using whatever political influence may be at his or her disposal. The stakes are high, and if increased entitlements are granted, the potential financial gain for property owners may be substantial.

Highrise living downtown

Downtown building values in San Francisco remained depressed for a decade and a half following the collapse of the highrise building market there in the mid-1980s. Existing highrises had high vacancy rates, and there was little demand for additional high-quality office space. Whatever demand for new office space existed in the Bay Area was accommodated in suburban office parks. But by the late 1990s demand began to grow for highrise residential towers in an area south of the financial district near the Transbay Terminal, a commuter bus depot primarily serving office workers from across the bay.
Initially, this demand for highrise residential towers was triggered when the State of California resolved to modernize the bus depot with an ambitious design that included a new terminus for future high-speed train service linking San Francisco to Sacramento and Los Angeles. The State also owned ten acres of land adjacent to the terminal on parcels that had previously been occupied by the Embarcadero Freeway. These parcels had been vacant for almost ten years since the structure had been demolished after it was damaged in the 1989 Loma Prieta earthquake. In a nutshell, the State proposed building high-rise structures on the vacant land from the freeway as a way to help offset the costs of the new terminal.
One important side effect of the state plans was that nearby property owners began to hire developers to perform feasibility studies for highrise structures on their own parcels.
Collectively, these owners, through their architects, also pressured the city to lift building height limits in the area to a uniform 400 feet. In keeping with the idea of a downtown 'constructed hill', these limits had formerly varied from an allowable 80 feet in most places, to 140 feet elsewhere, to 240 feet on top of the adjacent Rincon Hill. Responding to this pressure, in January 1999 the mayor's office, without much consultation with the planning staff, sent a message to the owners that a 400-foot height was under consideration for all properties in the area. This message clearly broke with thirty years of public policy in San Francisco, which had been to set allowable building heights with respect to the 'authentic' topography of the city.
Whoever advised the mayor to allow highrise residential towers near downtown in all likelihood used sound logic. However, the arguments in favour of highrise towers were selective chosen. The larger argument went something like this.
Downtown San Francisco will eventually become a neighborhood. In addition to the 300,000 commuters employed there, more people will soon want to live downtown. Granted, they will live on land originally intended for commercial development, but as demand for housing has outpaced demand for offices, housing is now the highest and best use of this land. The location is in some ways ideal. Residents can live near their work; or if they do not work downtown, they can walk to a range of transit providers that will take them to employment centers anywhere in the Bay Area.
According to initial estimates, a total of 10,000 people could be accommodated on the state-owned properties, and an equal number on adjacent privately owned properties and on the slopes of nearby Rincon Hill. Many of the new units would have great appeal because they would have views of downtown and the Bay Bridge. But even units facing the south and the east would have sweeping regional views over the city and toward the Berkeley and Oakland hills. The mayor's advisors also cited the precedent of another West Coast city, Vancouver, where a graceful highrise community had emerged over the last thirty years on former industrial areas. It could happen in San Francisco too.
Responding to obvious political counter-arguments, the mayor would have asked about affordability. Naturally, the tower units would be expensive, the equivalent of a traditional single-family house in a decent San Francisco neighborhood, or more, depending on the views. But, advisors would have assured the mayor, for every tower unit there would have to be a unit in the podium portion of the project. Those would be more difficult to sell or lease, and could easily be set aside as subsidized units.

Density

Overall, the density of typical San Francisco neighborhoods is relatively high compared to those in other cities in the Bay Area. There are on average about 35 units per acre in a typical San Francisco neighborhood. However, the densities envisioned for the twenty-acre area around the reconfigured Transbay Terminal and on the nearby slopes of Rincon Hill was much higher.
In fact, it was expected to exceed 400 units per acre, and this computation did not include surface areas occupied by city streets. There was clearly no local precedent for how to design livable communities at such densities. Throughout all San Francisco the highest existing density on an equivalent ten-acre site was in an area reconstructed following the urban renewal

era of the 1960s, and even here residential densities had only reached 150 units per acre. To come to grips with this reality, the San Francisco Redevelopment Agency hired a consultant team to study the feasibility of accommodating 6,000 units on the ten acres of state-owned property near the terminal.
Meanwhile, after some study, the architects and planners hired by developers began to offer proposals for this area to the mayor. Their initial plans and accompanying simulations showed how it was true that for every tower unit there would be a unit in the podium of their buildings. The reason is that a tower can only occupy a small portion of a site. Depending on the size of a property, there might be room for two towers; but the rest of the site would need to be covered by a structure that, for reasons having to do with codes and planning laws, could only rise to eight stories.
According to the developers and their architects, apartment units in this podium would necessarily have windows facing only one direction. Such an orientation to natural light and ventilation could either be to the street or to an internal courtyard, but never from two sides except at building corners. There would be no choice for the lowest units but to have them wrap around an internal multistory parking garage.
Meanwhile, the towers would need to have footprints of close to 100 by 100 feet and reach all the way to the 400-foot limit. Each floor would accommodate eight units. And to optimize views, they said, towers would need to be placed in a checkerboard fashion, facing each other on the diagonal, separated by a 65-foot gap. Before the Redevelopment Agency's own consultant team completed its study of the development potential of the downtown state-owned lands, private developers had already made two proposals to the city based on the above design parameters. These received preliminary approval from the mayor's office. Then, with some delay and reluctance, this decision was confirmed after hearings in front of the appointed city planning commission and elected city council in early 2004.

An alternative view

The consultant team hired by the San Francisco Redevelopment Agency responded to their assignment from a different standpoint than the architects hired by the private developers. Among other things, they wanted to demonstrate that not only would the tower units be of high quality, but so would the units in the podium portions of the structures. Furthermore, since a substantial population of the new neighborhood would be expected to use the sidewalks in the area to walk to work or other destinations, it was imperative that the pedestrian experience be as pleasant as possible. Their plan formulated a list of four design goals. These were based both on design explorations and simulation studies.
Towers had to have sufficient separation. Unlike office towers that frequently sit right next to each other, residential towers of 40 floors should at least be 150 feet apart. The consultants determined that such a distance was needed to protect privacy and views and provide sufficient light to lower-floor apartments and nearby streets. The wider separation would also prevent an accumulation of towers from seeming opaque. Thus, a person driving or walking alongside the amply separated towers would still be able to catch glimpses of the nearby skyline, natural topography, and occasional sky. In this regard, the placement of towers in a checkerboard pattern also had to be avoided; such a pattern would allow a small number of towers to merge together into a solid wall.
Lower units had to be of high quality. Development of the state-owned lands near downtown offered the unique opportunity for an innercity neighborhood that might indeed provide a true choice to living in suburban locations. For this reason, all units, including those in the lower portions of the structures, should receive light from two sides whenever possible. As a measurable standard, the consultant team proposed that all apartments should be guaranteed direct sunlight for some hours every day, even in winter. Also, every apartment resident should be able to step outside onto a private space, however small, and be able to look up to the sky. Only under such conditions could the housing offer a true alternative to a freestanding home within commuting distance of the city. Streets had to be designed in an attractive manner. To ensure the quality of the pedestrian experience in the new neighborhood, the consultant team proposed that one public right-of-way, Folsom Street, should be widened to 95 feet. Such a width would allow double rows of trees to be planted and a separate vehicle lane to be constructed to give access to adjacent properties. They further proposed that all sidewalks in the area had to be designed with an active frontage. In this regard, they calculated that even at the proposed high densities, not all frontages could support retail stores. Many frontages would thus have housing units at ground level, and these units should be given direct entrances off the side-walk. To maintain the privacy, these would need to entered from exterior staircases ('stoops') leading to private or semiprivate landings raised at least four feet above the sidewalk. Such a design would also allow residents of the lowest units to enter their townhouse units directly, without using the same communal lobby for the tower units above. Finally, the consultants also proposed that car entrances to underground garages should be restricted to one per block.
The new neighborhood would need one or two high-quality public squares. Such public gathering spaces should be located at street level, not on the roof of an underground garage. This would allow large trees to grow there, ones that would not be dwarfed by the scale of the surrounding buildings. The consultant team recommended that when they reached maturity, these trees should be as tall as the podium portions of the residential buildings. Furthermore, the parks in which these trees would be located should receive sunlight from 11 AM to 2 PM for six months of the year on their entire surface area.

Testing value through simulations

These four goals were conceived by the consultant team as an expression of values reflecting the existing urban design culture of San Francisco. It was recognized that they might be different in other cities. For example, the tower separation rules advocated by the consultant would be considered generous compared to the standards used in Asian cities. Once agreed upon, however, the standards would set an appropriate baseline for the design of individual structures. The relative performance of these structures could then be measured through simulations.
The accompanying images

illustrate how this evaluation might make fair use of simulation studies. In this case the evaluation is based on the experience of entering San Francisco by driving across the Bay Bridge. This entry to the city must surely rank among the most memorable urban experiences in America.
Among other things, the animated sequence shows why an appropriate separation of residential towers south of downtown is so important. This type of simulation can only be done in motion. It shows that without adequate separation, new residential towers in the area will create a sense of opaqueness. The hills and ridges that form key components of the city's natural topography would be obscured; so would the nearby skyline existing office buildings.
By contrast, the damaging effect of the developers' proposed checkerboard spacing is evident from views in the Yerba Buena Island sequence. This spacing causes all four towers to appear to merge into a single large volume.
This same view also explains the merits of the city's 'hill policy'. As mentioned at the beginning, allowable building heights in San Francisco have traditionally concentrated highrise development to create the sense of a 'constructed hill'. The same notion can be tested in the view sequence from the Hall of Justice. If, indeed, the height shown here were approved, significant pressure would be exerted on the properties in front of the viewer. Instead of marking the end of the hill with a very high structure, the heights would have to come down gradually to make the transition to the allowable height in this neighborhood.
Finally, sunlight simulations can be used to measure the performance of the new square in the Transbay development in relation to the standards proposed. Among other things they indicate where towers may be placed to avoid shading this new park. The consultant performed additional simulations of this type to evaluate access to direct sunlight for near-street-level apartments and for apartments facing onto internal building courtyards.

The public trust

There is an underlying belief among those who do this type of simulation work that the public should be given an opportunity to understand the implications of decision-making. It is not an outlandish belief. Public assets are at stake. Topography and sunlight are assets protected by the city charter. A well-designed public space is an asset; so are views, and so is good urban ecology and the sense of authenticity of landform and shorelines.
In this regard, simulators make an important contribution to the political discourse in cities. But with the advent of sophisticated, accessible technologies, the opportunity grows for misuse of the public trust in simulation work. Therefore it is important that those who do the work adopt a neutral stance toward those who assign it. Realistically, this means the work is best done at facilities affiliated with a university. Among other things, the staff here may be somewhat removed from the pressures of political influence, and insulated by the circumstances of their employment from the temptation to tailor their findings to the needs of high-paying clients.
More difficult to advocate is the timing of such work. Simulations need to be done early in any design-review process, prior to the granting of entitlements for particular properties. If done early, an urban design sense can be introduced into otherwise abstract decision-making. Decision-makers can also more fully articulate values that later detailed design should respect. Large projects of the nature discussed here go through the hands of many designers and the final outcome will look differently from what is shown here, but decisions in the early phase of such projects are crucial for the design of the city as a whole.

* The visual simulations were produced by Cheryl Parker (Urban Explorer), John Bela, Blaine Merker, Maria Vasileva and the author.

Notes

1. The projects mentioned here were developed by Tishman Speyer.
2. The author was a member of the consultant team that was directed by John Kriken and Ellen Lou, Skidmore, Owings and Merrill, San Francisco.