Introduction: Grid As Tool for Large-Scale Territorial Organization

In this moment of global urbanization, it is important to reexamine recent past experience with large-scale territorial expansion.

This is particularly urgent for those parts of the world where unprecedented, often informal intensification is turning urban centers into sprawling mega-cities, as well as in places such as Brazil, where entire territories will be opened up to new development. Not that the new challenges are limited to the Third World and to the emerging economies: In the United States and elsewhere, what were once discrete and imageable city-centered metropolitan regions, now are sprawling into each another, creating new continuous agglomerations at the scale of the mega-region. These new patterns are straining existing models of infrastructure, governance, and settlement design.

In that context, this essay considers the legacy and the potential of that most fundamental of formal strategies for organizing territorial development—the large-scale grid. The grid is the most ubiquitous and fundamental organizing tool of urbanization, seemingly cutting across time, geography, and culture. While apparently neutral—a rational and repetitive organizational platform—the fact is that grid systems, both in cities and in larger urbanizing landscapes, are heavily preloaded with cultural meanings related to property disposition, political power, and civic life. Also, different grids are suitable for different types and scales of development, and grids vary in their ability to respond to landscape conditions and to adapt to change over time.

This essay introduces these issues by comparing the origins and the legacies of the large-scale grids in three countries on three continents: the western United States, southeastern Australia, and the eastern frontier of the former Soviet Union. The implications and strategies for managing future growth are considered.

Congruence and Origins

There is a remarkable congruence around the basic scale of the grid on these three continents. In both the United States and Australia, the landscape is ordered by a mile-square grid and the successive subdivision of that grid into half- and quarter-mile sections. In Russia, since the time of Catherine the Great (late eighteenth century) until and through the Soviet era, the landscape has been ordered by the accretion of blocks into larger districts of approximately 430 meters, or 1,400 feet. This district size, which is close to the mile-quarter section of 1,300 feet, would later become the increment for the Soviet “microdistrict,” the building block for urban expansion and new settlements in the eastern frontier.

This formal coincidence may be attributable to the fact that these subdivision systems have anthropomorphic origins. In both the
Australian and American cases, the mile-square grid has its origins in English cultivation: it builds up from the amount of land one man could cultivate in one day, or a "day work." This became standardized in the sixteenth century as 4 square perches, an area of 33 feet by 33 feet. There were 40 day works in an acre, the amount of land that could be worked by a team of oxen in a day. There were 640 acres in a square mile. (1)

In the case of the Russian grid, the land subdivision was based on multiples of the "sajev"—the height of a man with his arm extended above him (not unlike Le Corbusier’s ideal man measurement)—approximately 2.13 meters, or 7 feet. A single house was on a lot 10 sajev by 20 sajev. A block two lots wide was 40 sajev, or 84 meters, and five or six of these created the larger district that approximates the English, American, and Australian quarter-mile section. (2) (10)

Ambition and Deployment

However, this convergence in the overall dimensions of the grids disguises the very profound differences in the philosophies underlying the deployment of the grids across the landscape and the very different manifestations of the grids in each of the three countries after the Second World War.

In America, the gridding of an entire continent was not simply about the commodification of land. Thomas Jefferson tried to create equivalence between land ownership and concepts of participatory democracy pioneered in the Enlightenment. There was quite literally a relationship between the scale of government and the scale at which land would be subdivided and sold.

To Jefferson the possession of land was the Newtonian principle that made a democratic society work. It guaranteed the independence of the individual and gave each one an interest in building a law-abiding community. Consequently, all the political systems he devised, for counties as for nations, shared one fundamental quality: the widest possible distribution of land.

Land ownership by individual citizens was the central idea. There was an explicit political agenda and an implicit scale. When using the mile-square grid to organize settlement, the American model was to anticipate successive subdivision into quarter and eight sections—the famous “40 acres and a mule.” That comported with the scale of settlement Jefferson associated with agrarian democracy. This ambition for the grid and the political philosophy it manifested was to be extended literally over the entire continent, theoretically starting from a single “place of origin.” (1)

In Australia, on the other hand, the grid was more directly associated with facilitating the disposal of land to promote settlement but without...
being preloaded with any particular political philosophy. The Australian colonies were separate entities, but in 1831 the British Government changed its policy for the disposal of land and promulgated the Ripon Regulations, applying to all the colonies, whereby the land could be sold at auction, rather than merely leased, at a minimum of five shillings per acre, and lots were to be no less than 640 acres. Henceforward the square mile grid was used in all new rural surveys. (7) (12)

It is important to note that unlike the United States, the Australian model was to use the entire mile-square grid as the increment of development. No doubt it was expected that wherever compact settlements were created the grid would be progressively subdivided. But the grid was laid out without explicitly anticipating further subdivision or a concept about the ideal size of a settlement. As aerial photography suggests (as well as this author's own experience at the western edge of Melbourne), subdivision has defaulted in many cases to a quarter-section subdivision of the mile-square grid, but in a way that is less consistent and less rigorous than in the American landscape. (5) (6) Also, unlike the United States, there was no ambition to extend the grid across the entire continent. The extension of the grid proceeded incrementally from the settlements on the east and west coasts but was not extended, even as a surveyor's concept, into the vast and difficult-to-settle terrain in the middle of the continent.

In Russia, the relationship of the grid to national ambition also dates to the eighteenth century, although it starts not with expansion into new territories, but with Catherine the Great imposing new regularized master plans onto 160 established cities. (3) The plans are based on new territories, but with Catherine the Great imposing new regularized landscape; (4) (10) Also, unlike the United States, there was no ambition to extend the grid across the entire continent. The extension of the grid proceeded incrementally from the settlements on the east and west coasts but was not extended, even as a surveyor's concept, into the vast and difficult-to-settle terrain in the middle of the continent.

Realities and Outcomes

In the United States the notion that the grid would manifest the power of the individual citizen would be completely undermined by speculation and the creation of larger-scale fiefdoms controlled by single, powerful individuals who had the wealth and power to control large expanses of the landscape. In fact, Jefferson was upset when he discovered that single purchasers and companies were buying up entire ranges, a pattern that still marks the rural economies of southern Appalachia. Recent studies have shown that in eight counties, three-quarters of the land owners are absentee, and more than half of the 20 million acres are owned by 1 percent of the tax-paying population. This is hardly Jefferson's model of the self-sufficient citizen-farmer. (1)

And despite the ideal in America of subdividing the mile-square grid into smaller quarter- and eighth-section homesteads, the full square mile is a benchmark land area for both model town plans and market-driven developments since after the Second World War. In the first category of model town plans is Frank Lloyd Wright's Broadacre City (see image), which is composed of subdivisions of the mile squares. In the second category are places like Broward and Palm Beach Counties in Florida, where the mile-square grid is the increment for the gated communities that constitute Yes. Good call. most of this landscape.
The reality of development in the American West, at least in the last few decades, is that development takes place in increments that far exceed the single square mile. One study by the Sonoran Institute and the Lincoln Institute of Land Policy found that the average size of new communities in the West was about 10,000 acres, or about 15 of the mile-square sections. Interestingly, within the new communities themselves, the individual properties are much smaller than the agrarian homesteads Jefferson imagined or that Frank Lloyd Wright used as the essential building block for Broadacre City. In terms of dwelling-units-per-acre scale, the overall densities are relatively high, but because these densities are so uniform, they do not support transit, which relies on concentrations of density along corridors or in nodes for effective bus, streetcar, or light-rail networks. Discontinuous street networks between neighborhoods have made this settlement pattern hostile to non-auto mobility.

The Australian experience in metropolitan Melbourne is in some ways similar. Although unlike the sprawling edges around most American cities, there is still a relatively clear urban edge and there is still a relatively intact zone of undeveloped land between this edge and the established smaller cities farther out, places that will ultimately be absorbed into a continuous urbanized landscape around Melbourne. The closer to Melbourne, the more consistently has the mile-square grid been subdivided into a finely grained street and block network. Interspersed are several large industrial estates where the grid is not subdivided but where the mile-square arterial road pattern is still apparent. Farther from the center, but still within this urbanized edge, are several large master-planned communities, such as Caroline Springs, that have attempted to create new compact mixed-use town centers surrounded by neighborhoods organized around compact streets and blocks. As with planned communities in the American West, potential connections from the larger development to the surrounding areas, which might have resulted from more successive subdivision of the larger grid, are compromised to create more self-contained neighborhoods with their own figural street and block patterns.

The zone of open space between the urban edge and the surrounding town centers is the next great opportunity. The mile-square grid is still legible in the landscape, manifest in the location of arterial roads, the edges of cultivated lands, and the boundaries of some scattered developments. The pattern is not as rigorous as it is in the American West, and the degree to which the subdivision of the grid is used to organize development into compact, connected neighborhoods is not yet clear.

In Russia, the collapse of the Soviet regime and the introduction of private land markets have removed the philosophical underpinnings
behind the form of the microdistrict and the use of that increment for city design. In the 1990s, the social infrastructure and spatial organization of the microdistrict were seen as obstacles to new investment. Changes in social organization meant that it was no longer necessary for the microdistricts to function as complete communities, with shopping and schools. Older “Soviet school” planners struggled unsuccessfully with these new realities. The microdistricts started to be subdivided into private properties, but in ways that destroyed the spatial integrity of the interior of the microdistrict as a place for communal use, as well as destroying the network of connections into and through the microdistricts that held the larger blocks together. Some retrofitting of the microdistrict blocks is being done in more carefully considered ways. For example, the master plan for Berezniki in central Russia includes renovating some of the older blocks through selective demolition combined with the reintroduction of new buildings to create well-defined public spaces.\textsuperscript{(10)}\textsuperscript{(11)}

At the scale of metropolitan expansion, the existing microdistrict grid is sometimes extended into undeveloped areas, but without the associated forms and land uses. The recent master plan for Tolyatti, one of the original eastern cities built up around the microdistrict, is an example.

These city plans now are developed under the Urban Planning Code, adopted by the Russian Planning Federation in 2004, which ratified a Western model of functional zoning and master planning. These changes promise relief from the relentless patterns that resulted from centralized planning, and in fact, recent developments reflect the more varied and place-based patterns that result when multiple developers and local civic stakeholders are involved. But at the same time new market-driven development is raising some concerns that are all too familiar in the West—discontinuous development patterns, environmental degradation, and auto dependence.\textsuperscript{(10)}

\section*{Lessons Learned}
Although they are both associated with ideal notions of civil society at the continental scale, the Jeffersonian and Soviet experiments are at very opposite ends of the political spectrum. In the United States, the grid was associated with Jeffersonian notions of agrarian democracy and individual citizen participation, while in the Soviet Union, the grid was associated with the relationship between the scale of an ideal collective and the imperative for equitable access to mobility and services required by the Marxist critique. As different as they are, the legacies of the Jeffersonian grid in the American West and of the Soviet grid in the Russian East, both reveal the limitations of trying to capture a particular political philosophy of any kind within a formal strategy for territorial settlement.

In the United States, the legacy of the Jeffersonian grid includes
an unwillingness to impose larger-scale planning objectives onto individual property owners, even onto the very large-scale property owners and developers of master-planned communities. These other objectives include planning around natural systems or legislating transit-supportive land-use patterns and densities. In Russia, the legacy of the Soviet grid is the lack of alignment between existing settlement patterns and emerging lifestyles and development practices. Hand-in-hand with this has been the dissolution of Soviet central planning, which has created the need to reestablish planning practices that are better suited to the privatized development market.

Prescription and Performance
At the center of this comparison is the degree to which—beyond the scale of the larger grid itself—the specific form of settlement is prescribed. In the United States and Australia, the lack of prescription has facilitated the unchecked expansion of metropolitan areas in ways that will be unsustainable. There are some exceptions to this, such as Civano (Tucson, Arizona), where a highly figural plan is meant to showcase sustainable development practices, such as compact mixed-use development, a connected street network, and resource conservation. The problem, however, is that this highly figural plan is ultimately inward-looking and is organized around its own neighborhood center. Because the figural plan trumps the successive orthogonal subdivisions of the grid, connections to future developments are difficult. Also, the neighborhood turns its back on the adjacent arterial corridor, which ultimately might have supported transit if this and other future developments were also organized around the corridor instead of their own internal centers.

yes, let’s lose it.

In Russia, by contrast, the overprescription of neighborhood form has resulted in structural obsolescence. Many of these microdistricts now need to be rehabilitated or intensified at great cost. It may be that these recent experiments with retrofitting the microdistricts will have lessons for the United States, where many superblock-scale public housing projects similarly are becoming obsolete or need to accommodate new populations. (3) (10)

Toward Performance and Recalibration
The recent American, Australian, and Russian experiences reveal some of the fundamental challenges of deploying the large-scale grid. On the one hand, deployment of the grid as a purely neutral, utilitarian instrument for the disposal of land and the rationalization of infrastructure, absent any values-based agenda, is likely to facilitate rapid development at the expense of the continuity of natural systems, transit feasibility, and other parameters of sustainable development. On the other hand, deployment of the grid as a highly figural manifestation of a particular social or political philosophy is likely to create development patterns that are ultimately resistant to growth and
change over time. Recent experience in Russia with the privatization of the land within microdistricts is illustrative. It may be easy to assemble divisions of the grid into larger increments, which developers may want to do in order to finance construction of roads and other infrastructure. But reimposing a more finely grained public realm and private property pattern after ownership patterns are already established is extremely difficult.

Instead of thinking of the grid as either a formal strategy for land exploitation or as a manifestation of a particular philosophy about civil society, the grid should be thought of as a framework within which different, and sometimes competing, agendas can be negotiated, such as the preservation of natural systems or investments in transit and other forms of non-auto mobility. These systems operate at different scales: natural systems will conform to neither the scale nor the orthogonal orientation of the large-scale grid. Similarly, different modes of transportation will be more or less successful at different levels of subdivision of the grid. The resultant landscape is likely to be a collage of different grid types and scales, which are not simply nested as successive accretions or subdivisions of the basic grid increment. In the United States, the resulting pattern of overlapping grids of different scales may yet provide the armature for organizing the hybrid landscape that is emerging where formerly isolated and disparate developments are colliding.

Recent experiments in the American West and in Australia suggest the value of a performance-based approach in which a series of operations for accreting or subdividing the grid, and in particular for establishing the scale of the street and block systems, are calibrated to the underlying green infrastructure of natural systems or the anticipated gray infrastructure of transit nodes and corridors. In other territories in other parts of the world planners and designers will need to develop their own performance-based criteria for imposing and subdividing the grid. It will be essential for these criteria to be developed in a way that does not simply rely on technical and scientific analysis but on a shared understanding of the civic infrastructure necessary to manage ongoing modification and adjustment over time.

Endnotes

2. I am getting the Russian source name


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