Soft Infrastructure Applications

The concrete fallout of mid-century industrial progress is now nothing more than ossified infrastructure consuming the American city. Euclidean zoning, the agent of this movement, brought about single-use land subdivisions that encouraged excessive transportation channels to connect their disparate functions. For decades, zoning codes and highway corridors outlined scaleless tensions that engineered urban socioeconomic partitions and mobility dispositions. Development based on this zoning led to problems in cities across the United States. From Detroit to Dallas, the focus on the automobile has led to visible problems of scale and separation. Many current planning strategies for cities across the U.S. attempt to rectify these problems by creating density, live-work communities, and transit solutions, as well as the infrastructure needed to support them.

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OKLAHOMA CITY & MAPS

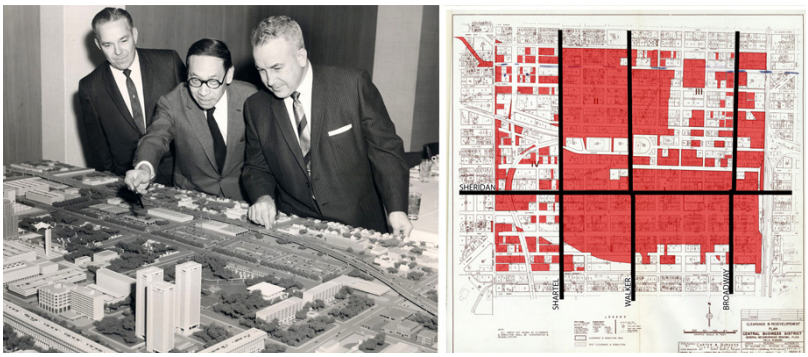

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Figure 1: Map of the Pei Plan reconstruction area, with demolition sites highlighted: www.okc-history.org (right), www.imaginativeamerica.com (left).

Oklahoma City offers a cityscape accessible for design scrutiny: it's broad array of city center surface parking lots, substantial presence of brownfields, and recent realignment of the downtown Interstate-40 corridor have resulted in a conspicuously unoccupied central business district. This topography resulted from decades of planning policies which failed to create an environment conducive to living and working.

In 1964, architect I.M. Pei re-envisioned Oklahoma City's large Central Business District (CBD), proposing the demolition of hundreds of buildings to form 'superblocks'. The Urban Renewal Authority implemented the principles of Pei's plan during development of the area, acquiring many pieces of land in the 528-acre CBD. New structures built under this plan included a convention center, commercial towers, botanical gardens, and a federal building, as well as the rerouting of Broadway Avenue. However, financial support dwindled during the Nixon administration, and the redevelopment lacked adequate residential and retail components to support the density needed in the area. This further exacerbated the problem of urban blight.

The Metropolitan Area Projects (MAPs) program for Oklahoma City first passed in 1993 as a taxpayer-funded initiative to renovate and construct several civic and public projects in Oklahoma City's Central Business District. Projects ranged from a new ballpark, convention center, canal, library, and music hall renovation. The original program was a success, and was soon followed by MAPs for Kids in 2001, which provided much-needed improvements to OKC schools. With many civic improvements achieved with the initial MAPs phases, MAPs 3, passed in 2010, sought to address infrastructure and housing in order to achieve a better live-work environment for the CBD. The current MAPs 3 phase continues to address improvements to existing facilities, but focuses more fully on infrastructural projects: a large downtown public park, modern streetcar system, trails, sidewalks, and river improvements.

Figure 2: Mark Klett's Photographing Oklahoma 1889/1991 (Oklahoma City Art Museum 1991) and OKC's Downtown aerial view: www.douglouden-back.com/downtown/maps/1890okcmaplarge.jpg (top), www.aerialok.com (bottom).

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All of the MAPs projects have contributed to solving the challenge of creating density driven by culture and amenities in a place where density has never been a necessity. With the abundance of inexpensive land in Oklahoma, suburban sprawl has been and continues to be a problem. As these programs and development continue in OKC, we raise the question of how to create infrastructural framework that will allow for future adaptation and change; to avoid the mistakes of the past by creating a more open and accessible system.

As part of MAPs 3, the city's ambitious "Core to Shore" plan proposes a redevelopment of 3,000 new housing units apportioned along one mile of mixed-use spaces connecting downtown with the man-made Oklahoma River to the south, to create a dense urban residential community. The plan proposes a large central park space to foster gathering and recreation, as well as adding alternative modes of transportation such as light rail. In reality, this plan provides little flexibility due to the prescribed separate zones for low, medium, and high density residential, mixed use and commercial development. Utilizing Oklahoma City's transition in this projected fifteen-year period as a case study, this paper proposes the application of new soft infrastructural measures to safeguard the Core to Shore program's adaptability.

Figure 3 : Central Park concepts: www.okc.gov/maps3/Park%20Master%20Plan%20Presentation%20Dec%2018%202013.pdf.

SOFT INFRASTRUCTURE

First, what is Soft Infrastructure? The idea refers to measures that provide a framework for improvement through the use of technology. Soft infrastructure is adaptable and capacious; it has latent scalar responses that can adjust to

the human scale while still sustaining a “default redundancy” across the urban spectrum. This necessary redundancy both safeguards a common blanketing of infrastructure and permits unique deviations for ad hoc community input. Soft infrastructure can take many forms, and the continuous development of technology creates a constantly evolving concept. Studying Oklahoma City’s Core to Shore plan as a platform for soft infrastructure, three development strategies emerge: open-data programming, participatory form-based codes, and interactive design for cultural spaces.

Computers play an integral role in these infrastructural concepts. Because technology changes patterns of behavior, we can utilize it at the urban scale to support smart development as soft infrastructure. “Networks do not simply interconnect within the fabric of existing settlement patterns. They create a transformative pressure which produces new patterns” (Mitchell, 67). These new patterns of behavior drive the development of new technology in a reciprocal cultural relationship. Dourish and Bell describe “how the infrastructures of space and of pervasive computing are mutually, reciprocally coupled to social and cultural practices” (Dourish and Bell, 418).

The future of urban development will only continue to be more driven by the influence of computer use. “Ubiquitous computing suggests that each user will be served by tens or hundreds of computational devices...spread throughout the environment”(Dourish, 414). “Each device may be small, but the overall effect to be achieved through the combination of hundreds or thousands of devices distributed through a physical environment can be massive” (Dourish, 415). The integration of technology and culture can drive fundamental changes in the way spaces are configured, and how we utilize them.

OPEN-DATA PROGRAMMING AND LINKED DATA INFRASTRUCTURE

An open-data approach to programming the proposed “Boulevard”, the thoroughfare replacing the demolished I-40 Crosstown Expressway Bridge, could streamline the measurements of mixed-use functions, office vacancies, and on-demand transit along this new downtown corridor. This cloud-based data system would render the Boulevard a forum for recording concurrent market and transit studies to sustain the city’s Central Business District. This concept could offer free access to information about the area for all users and stakeholders. “Infrastructure is broadly democratic. It represents the investment by the state into systems that allow the movement and exchange of information, without specifying the content of that information or range of movement” (Allen, 43). By providing a centralized data forum, users can contribute to ongoing programming in a real-time fashion. This can strengthen the community, provide transparency, and utilize cloud technology to its fullest.

In addition to providing a community forum, the open-data approach can be applied to draw businesses to the area, by allowing prospective businesses access to information about the area and it’s users. In exchange for this information, businesses would in turn provide the financial support for further infrastructural development, instead of the taxpayers. Through this proposed ‘open linked data infrastructure’, the private sector will lead the development financially. For example, by specifying (anonymously) how many users in the area have searched for a 24-hour gym, or an organic grocery store, businesses can gage their potential for success in the area, and their willingness to contribute to infrastructural costs to aid in developing the system.

This strategy for interactive programming can insure future success and adaptability of urban areas and allow for adjustments over time. Author Stan Allen theorizes that concepts from landscape and ecology offer a good model for architecture and urbanism; their complex interactions of species and environment create a slow evolution over time (Allen, 36).

THE FRAMEWORK DIAGRAM
The completed Framework Diagram carefully locates the land uses to be compatible with each other, and together create a lively urban district based on the land forms, culture, and goals of Oklahoma City.

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OPEN-SOURCE FORM-BASED CODES

Open-source form-based codes can offer a participatory method to urban planning in which user-generated constraints reference each neighborhood's needs; initial street mapping passes through the hands of prospective tenants. While this has been incorporated in many planning projects, technology now allows a greater access to the process. In the planning for the Brooklyn Bridge Park in New York, the community had ample means of commenting and participating in the planning process. While the Port Authority had initially planned housing to occupy the waterfront space, "nearby residents imagined recreation, relaxation, and direct access to the waters of the East River" (Solano, 92). A decade of planning and programming followed, which was heavily influenced by multiple public meetings, where community members were encouraged to share their visions with the design team and developers (Solano, 93). Most of this communication process was enhanced by the employment of physical models to show development. Today, this could also be achieved through online resources incorporating digital 3d imagery.

In Oklahoma City, open-source form-based codes could empower the residents of the dense townhome West Park quadrangles and the live/work and workforce housing of Parkview to collaboratively define the current and future grain of the streetscape. The framework has been laid for this by creating a variety of housing, particularly with the West Park Quadrangles, but the current plan calls for general groupings of low, medium, and high density housing. This zoning could potentially be replaced by 'Cap and Trade Zoning', which would create

Figure 4 : Core to Shore Plan: www.okc.gov/Planning/coretoshore/resources/CoreToShore-Plan_2008.pdf.

form-based codes dependant on proximity to mass transit (Chakrabarti,148). This approach would allow for a more natural progression towards increased density, because it can be applied incrementally over time. This type of zoning would lead to a much better mix of residences, businesses, and cultural event spaces in Downtown OKC, and would reduce the need to commute to places of employment. The dispersion of businesses would improve coverage and validate the model of open linked dated infrastructure.

The concept of Active Forms is another important part of form-based development. According to Keller Easterling, “Active forms establish a set of parameters or capacities for what the organization will be doing over time” (Easterling, 61). This potential for change, and the ability to create multifunctional mixed use spaces with capacity to evolve with the needs of users is the goal. “The designer of active forms is designing not the field in its entirety, but rather the delta or the means by which the field changes - not only the shape or contour of the game piece, but also a repertoire for how it plays” (Easterling, 61).

INTERACTIVE DESIGN FOR CULTURAL SPACES

Extending our focus south to the shore of the Oklahoma River, soft infrastructure can also be studied in application to cultural projects such as the planned Riverlake or existing Wiley Post Park. The planned Riverlake, part of MAPs 3, will feature housing with retail below, and potential informal gathering spaces around a water feature. Existing Wiley Post Park is located immediately to the south of the Oklahoma River, with an indoor event center, playground, and water feature for summer use, as well as outdoor picnic areas. Proposed changes to Wiley Post Park include the addition of an amphitheater, which will terminate the south end of the north-south axis connecting downtown (core) with the new shore developments. Both of these venues could be enhanced with performance-based metrics to generate a feedback loop of public-cultural design. The city’s empirical assessment of personal and cultural interaction will sharpen its ability to engage in adaptation. This type of ongoing measurement tool can assess the success or effectiveness of a particular installation or approach and provide ideas. This allows for a ongoing evaluation, which supports the continuous evolution of a place over time, rather than only allowing for larger periodic changes.

Public service spaces and cultural venues offer an excellent opportunity for this feedback-loop approach. With the integration of technology in these spaces, users can connect to a public forum for idea sharing and evaluation of their experiences. Creating public access points for specialized segments or cultural activities that promote interaction, such as libraries, music centers, craft centers, or video arcades could be other potential venues for this type of connection (Mitchell, 74). Wireless networking is increasingly strategically placed to support informal encounters, such as that in a conference center or public space (Dourish, 424).

Interface technologies and the concepts of responsive environments could also be applied to these various cultural venues, to provide a real means of interaction and feedback on an experiential level. “We are beginning to see possibilities developed for how people can control their environments through integrated touch-and-gesture-based languages with software and hardware that were developed for media projects. Some of the current themes continue to be based on a desire to create user-friendly, customizable, and immersive interactive experiences for users” (Fox & Kemp, 216).

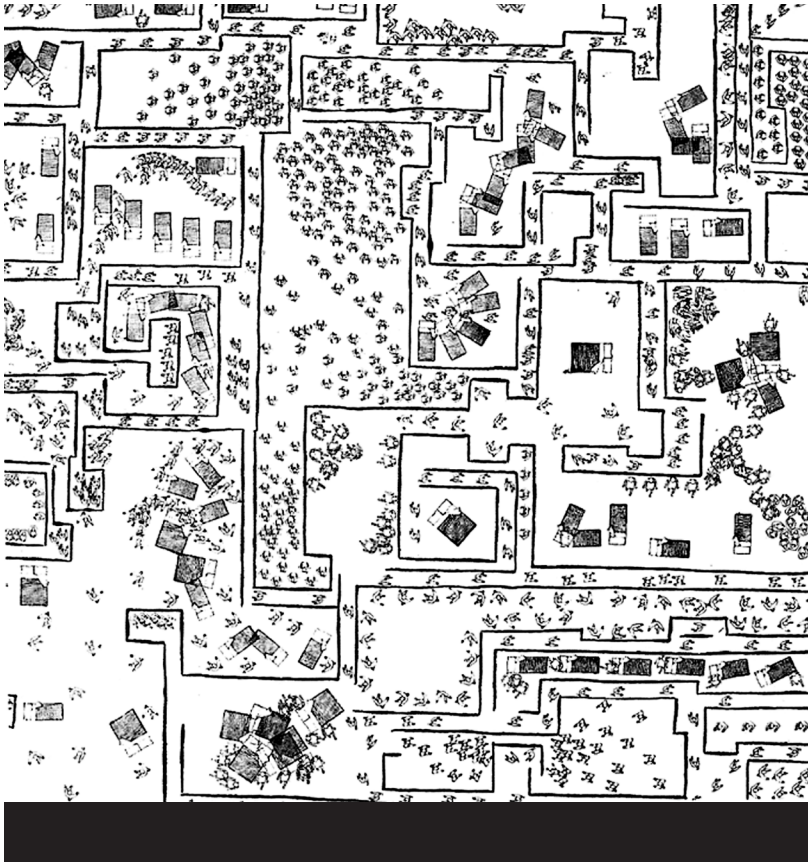

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Figure 5 : city, León Ferrari, The Architecture of Madness, University of Essex Gallery, 2002: www.gabrielasalgado.co.uk/wp-content/uploads/2012/11/City-detail.png.

CONCLUSION

These approaches to soft infrastructure contribute to sustainable and flexible environments that can support adaptive reuse and responsible redevelopment in the future. While these potential strategies were applied and investigated in terms of development for Oklahoma City, they were conceived to apply to future urban development in other cities around the globe. According to Dourish, "the power of infrastructures is their ability to reconfigure the relationship between local and global" (427). With the connections afforded by current and future technology, we are able to experience the breadth of culture, knowledge, and humanity that the world offers from the smallest of handheld devices in our homes. The concepts of openness, participation, feedback, and performance-based design, work together to enhance users' quality of life, connectedness to place, and cultural relevance for an open city and a global society.

ACKNOWLEDGEMENTS

Acknowledgement for Research Assistants Dylan Hames, Brett Meek, and Sara Williams.

ENDNOTES

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