

focus



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CAL POLY
City & Regional Planning
COLLEGE OF ARCHITECTURE
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I wish you a warm welcome to the nineteenth edition of FOCUS, the annual journal of the City and Regional Planning Department. The journal is our way of celebrating and presenting faculty activities, student work, and alumni accomplishments. It takes a lot of effort, dedication, and resources to produce FOCUS. The biggest applause and thank you goes to the managing editor, Dr. Vicente del Rio, who founded the journal in 2004. For almost two decades, Focus has beautifully captured our department's learn-by-doing spirit and keeps us not forgetting who we are and what values are important to us.



I want to thank and recognize my predecessor, Dr. Michael Boswell, the longest-serving active faculty member who joined Cal Poly in 1998. Over his six-year term as department head, Mike led the department through many successes, including celebrating our 50th anniversary, a successful re-accreditation, and record fundraising for student scholarships, to name a few. Under his leadership, the department continued to provide high-quality planning education, even during the COVID pandemic when, for four quarters, instruction was administered virtually. Mike secured the second round of the Errett Fisher Foundation gift of \$250,000 to support student scholarships and excellence in education. He will continue serving on the faculty and being a national leader in climate action planning education and a strong advocate for carbon-neutral cities.

I would like to use this opportunity to tell you how honored I am to have assumed the position of CRP Department Head on September 2022. For my first year as the Department Head, I anticipate that most of my attention will be on working with our faculty to respond to the university's mandate to revise both the BSCR and MCRP curricula from a quarter-to semester-based calendar.

This has been an opportunity for the department to rethink itself, revise existing courses, and design new and innovative ones for our students and also for those from other CAED departments and colleges who wish to widen their education.

Our revisions will incorporate the most current body of knowledge, skills, and values that students need to tackle today's most important planning challenges: the housing crisis; climate change; social, racial, and environmental justice; and technological innovations. Besides, I will

continue my predecessors' efforts towards:

- Reinforcing the BSCR and MCRP curricula to support hands-on, timely, and interdisciplinary education;
- Increasing and diversifying our student body;
- Providing more financial support to students and educational opportunities.

This is an incredibly exciting and energizing time. We are fully back to in-person education, benefiting from many tools and techniques we learned in hybrid and remote teaching modes and collaboration. Our studios will continue assisting communities by providing creative, low-cost planning services through community-based studios. CRP will continue to engage industry and individual supporters to help our students success.

I hope you are also excited about our academic horizons and decide to support and partner with us at this time; we welcome your advice and help.

Amir H. Hajrasouliha, PhD

*Associate Professor and Department Head
City and Regional Planning Department*

Welcome to the 2022 issue of FOCUS marking the first academic year we were able to fully return to in-person education. Also, as noted by CRP Department Head Amir Hajrasouliha in the previous page, this summer we were tasked with adapting our undergraduate curriculum from three-quarters to a two-semester mode, and making it so that transfers can graduate in two years. Yep, not an easy task as community colleges do not offer many planning-related classes and not certainly enough to cover two years. This transition will not only require concentrating our core classes in years three and four but also having community colleges to agree in revising their offers and facilitate transfers to planning. The whole process will require a significant amount of faculty and administrative work, and FOCUS anticipates reporting on the revised BSCR and MCRP curricula in the next issue.

FOCUS is fortunate to continuously count on important international contributors. This issue opens with a provocative commentary by international housing expert Geoffrey Payne on the inability of the UK's "property-owning democracy" and the need to move away from market-based housing policies and adopt more demand-sensitive approaches. His commentary has many parallels to the United States and points to directions we should consider in dealing with our housing crisis. The **Special Events** section includes a lecture by Dr. Ashraf Salama, professor and head of the Architecture and Built Environment Department at Northumbria University in Newcastle, England. Dr. Salama discusses the emerging places in the Arabian Peninsula rooted in distinctive hub visions that resulted in globalized urban spaces as nodal points within international networks.

The **Essays** section opens with an article by Allan Cooper and David Brodie, professors emeriti of architecture and founders of San Luis Obispo's Save Our Downtown community organization. They discuss the need to reassess our downtowns and prepare them for the challenges of the 21st century by improving livability while preserving character and sense of place. Professor Ivor Samuels, FOCUS's long-time contributor, follows on a discussion he initiated in previous articles about the effectiveness and appropriateness of design codes. In this article, he assesses the design code and the unique self-build initiatives of the new community of Graven Hill and compares the results to Victoria Road, an early 20th-century development, both in Oxfordshire. Isabel Wetzel, a management officer at the UN-Habitat, writes about the UN run challenge-driven innovation program and its importance for promoting sustainable urban development in African cities.

Four articles are included in the **CRP Faculty and Student Work** section. Professor Emeritus and former CRP Department Head Hemalata C. Dandekar gives us a taste of her new book *A House with a Door: Sugao Village Women ask of Development* where, through thirty-five testimonies and stories, she discusses the vulnerabilities of village women in India and how gender differences affect access to the benefits of development planning. Henry McKay follows with a discussion of his senior

project where he assessed the appropriateness of the "first and last-mile" methodology for determining the accessibility of rail stations in California. Graduate student Alexandra Lee-Gardner and Professor Cornelius Nuworsoo discuss the importance of combining physical proximity measurements with infrastructure information to provide a more complete picture of accessibility through studies of the Excelsior and Outer Mission districts in San Francisco. Finally, Professor Amir Hajrasouliha with a group of students discuss their assessment of 23 autonomous vehicle pilot programs in the United States with the hopes to provide a framework for future projects and contribute to autonomous vehicle technology.

In the **International** section, Professor Diogo Mateus and myself write about the 2022 Summer Workshop in Urban Design in Lisbon. The third iteration of this successful two-week program, coordinated by the authors for the Universidade Lusófona of Lisbon, included 19 undergraduate students from Cal Poly (20 from planning and 1 from landscape architecture) and 2 master's students from Lisbon who, after a week of visits and guided walks developed concepts for expanding the university campus to an adjacent blighted area.

In the **Spotlight** section's *Conversations with Alumni*, Juan Alberto Bonilla, Donald Nielsen, and Sean Tiedgen discuss their time at Cal Poly and their successful careers, sharing thoughts about the future of planning and tips for students and young professionals. The section continues with Learning from California, highlighting the client-based studios of the 2021-2022 academic year, and closes with this year's list of approved theses and professional projects.

This FOCUS includes three **Cartoon Corners** with art by Simon Taylor, Blaze Skyra, and Albert Robida. Simon (an illustrator and graphic designer from Brazil) and Blaze (BSCR alumni, planner, and illustrator) accepted our invitation and provided us with humorous but accurate cartoons on two of today's main planning issues. Albert Robida (1848-1926) was a French illustrator, writer, and visionary known for his predictions and accurate futuristic visions where his inventions were integrated into the social developments that arose from them.

I hope you enjoy this issue of FOCUS and encourage others to read it: hardcopies of the journal are available from the CRP Department and from Amazon, and electronic versions are available from the CRP webpage. Please consider our standing invitation to collaborate with FOCUS by writing an article on any planning-related issue or an assessment of cities, places, plans or projects. If you are an alumnus or alumna, please let us know if you would like us to feature your professional trajectory and share important lessons for students and young professionals

Vicente del Rio, PhD

*Professor Emeritus, CRP Department, Cal Poly
Founder and managing editor, FOCUS*

The Crazy Dream of the UK's "Property Owning Democracy"

Geoffrey K. Payne

Architect and Planner.

For decades, UK governments have promoted home ownership... yet fewer and fewer of us manage to buy our own homes. I suggest we could learn a lot from countries who don't share our obsession.

What should be the logical response if a policy you propose has not worked? Do you ask why, or double-down and try harder? For more than 40 years, UK governments have promoted home ownership and the notion of a "property owning democracy" Meanwhile, ownership has become increasingly unachievable, not just for those on lower incomes, but even for those on average incomes as prices soar out of reach. Despite the evidence, the current Government remains committed to the excessive promotion of home ownership and is now seeking to enable those living in social housing to become home owners, even if this only applies to a few thousand people.

If a policy has already received vast direct and indirect subsidies, but still failed to achieve its objective, it might suggest a need for reflection rather than pumping in even more money, yet there is no sign that the sacred commitment is being questioned, let alone modified. The only explanation can be that those who were able to buy a home in the distant past when housing was genuinely affordable are now basking in unearned wealth they could not have imagined, and so believe this can be realised by everyone.

Promoting home ownership for the majority of the population creates a big problem—it distorts national economies, by attracting excessive investment into property rather than more productive sectors of the economy. The countries that suffered



most from the 2008 financial crisis were those with the highest levels of home ownership, such as Spain, while those with levels around, or below 50 per cent, such as Germany and Switzerland, were relatively unscathed.

As Einstein noted, insanity is doing the same thing over and over again and expecting different results. The UK would therefore do well to learn from the experience of other countries facing far more severe challenges and with less resources. Many rapidly urbanising countries faced with far higher levels of demand for land and housing, and with far

lower levels of funding, have evolved a wide range of pragmatic responses to the diverse needs of their increasing, and predominantly low-income, populations. Most focus on supporting community-led developments, or providing only the things that people cannot provide for themselves, such as basic security of tenure, basic services and the freedom for households to provide their own housing on an incremental basis. When such approaches are adopted, housing becomes a means of self-financed economic development, particularly for poor households.

The inability to impose 'top-down' market-based housing policies and adopt more demand-sensitive approaches has enabled millions of low-income people in rapidly urbanising countries to have more control over the location, design and cost of their homes than most middle-income households in more affluent countries. If having control over key aspects of one's life is a measure of development, this indicates that the global north has much to learn from other parts of the planet.

Countries such as the UK also benefit from an established institutional structure that enables the state, at least in theory, to maximise the public benefit from private investment. After all, when agricultural land is redesignated for urban development, the uplift in value can be many hundreds of times, solely due to actions by the state in approving the change of use. For this reason, the state is perfectly entitled

Geoffrey K. Payne is a housing and urban development expert whose work focuses on the Global South. He has undertaken research, consultancy, and teaching throughout the world and has published widely. He has lectured for Cal Poly's CRP and features in FOCUS 17 (2020). He received much praise for his new book *Somewhere to Live - Rising to the Global Urban and Housing Challenge* (Warwickshire, UK: Practical Action Publishing, 2022). Geoff's website is <http://gpa.org.uk>

to require a reasonable proportion of the uplift in value in order to realise social and environmental policy commitments. There are many ways in which this can be achieved without discouraging private investment, though it does require the state to be effective in understanding land market behaviour and the level of the likely increment in negotiating the best deal for each parcel of land proposed for development. In this way, developers acquiring agricultural land in the hope of realising the complete increment in land value will need to accept that part of this increase will be captured by, or shared with, the state, for public benefit.

By applying these principles and ensuring that taxes on land and housing are progressive, urban land and housing policies can significantly reduce currently excessive levels of inequality and promote more sustainable and equitable housing markets. Inevitably, vested interests will find all sorts of reasons for resisting such changes, yet it is evident that as economic growth cannot continue indefinitely on a planet with finite resources and where such growth has already been a major cause of the climate crisis, levelling down from excessive consumption and pollution is as important in ensuring our collective future as levelling-up is for vulnerable groups.

Promoting compact, mixed-use urban areas and a wide range of housing options, including different forms of social or non-market tenure options would enable towns and cities to meet key social, economic and recreational needs within a 15-minute walk or cycle, or via public transport. Such approaches can dramatically reduce our carbon footprint and help address the climate crisis. It does not require high-rise developments, with their high levels of embodied energy, but can be achieved by efficient land use planning and medium-rise developments to create congenial places in which to live, work and play. Even more importantly, the evidence shows that we will all be happier as a result.

A different approach to achieve a different outcome could provide us all with a return to sanity.

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FOCUS 19

Special Events



Evolving Urbanity on the Arabian Peninsula: Questions on the Production of Diverse Hubs and the Emerging Place Typologies

Ashraf M. Salama

PhD, Professor of Architecture and Urbanism, Head of the Architecture and Built Environment Department, Northumbria University at Newcastle, United Kingdom.

This is the transcribed and edited public lecture by Dr. Salama to the The Bibliotheca Orientalis Attilio Petruccioli, SECA Foundation, the Polo Museum of Trani, Italy, on April 23rd, 2022. In this lecture, Dr. Salama discussed the newly emerging places and networks in the Arabian Peninsula that are rooted in distinctive hub visions and have resulted in globalised urban spaces as nodal points within international networks. The discussion manifests a continuous struggle to absorb modernity and construct identity, while interrogating aspects of the everyday urban environment, legitimising socio-spatial practices, and questions regarding challenges the production of architecture and urbanism.

Today, all major cities within global networks compete for being seen as important hubs. One of the preconditions for any emerging hub is the geopolitical location combined with the establishment of state-of-the-art infrastructure that will enable it to access international markets. In order to become independent from heavy industries and the public revenues of natural resources, each emerging hub city needs to attract key service sectors (Conventz et al., 2014; Alderson & Beckfield, 2007). The resulting city competition has put increasing pressure on emerging urban regions to enhance urban growth rates and thus sustain their momentum as new and attractive markets. While large-scale public investments are needed to provide modern infrastructure, urban governance has participated in initiating mega projects as important development catalysts (Altshuler & Luberoff, 2003).

The consequential construction booms have reshaped urban morphologies not only physically but also socio-economically. The newly created hubs are continuously challenged to become not only attractive investment opportunities for a limited period of rapid urban growth but to become regional and international service centers and thus the headquarters of transnational companies (Sassen, 1996). Governance, therefore, needs to mediate between both growth and consolidation strategies to establish sustainable hub cities. One key aspect in this regard



is the promotion and establishment of knowledge economies based on a highly educated workforce and thus dependent on continuous migration (Williams & Baláz, 2014, p. 147).

In the Arabian Peninsula, the Gulf region has recently emerged as a center of attention regarding new development dynamics driven by the bold vision to establish regional as well as global service hubs. Based on the remaining wealth from fossil fuels, the fortunate geopolitical location between global markets as well as the rather particular political conditions of aristocratic structures in small city-states, the vision of establishing hubs has been based on a clear top-down master planning followed by various investment strategies and restructured local governance.

The following presentation is based on evaluated national development agendas and a review of past and recent development patterns (Salama, 2011, 2014; Salama & Wiedmann 2014; Salama et al., 2016).

Pre-Oil Settlements: Desert and Tribal Tradition

From 1914 to the 1930s

It is argued that the desert climate and tribal tradition are the most prominent constituents for articulating a discussion about architecture and its wider context in the pre-oil era. Yet,

there were also significant geo-political events that had an impact on architecture and the shaping of settlements. These can be exemplified by the 1914 British and French agreement to establish a united and independent Arabian Peninsula, in the case of a successful defeat of the Ottoman Empire. The national awareness that subsequently emerged had long-term repercussions on urbanism in the Peninsula. In 1918, the end of the Ottoman reign in the Peninsula led to the introduction of new municipal structures in cities such as Jeddah and had a significant impact on urban development. This was coupled with the development of global trade in cultured pearls from Japan in 1921, which led to the end of the pearl diving industry along the Gulf coast. The subsequent economic collapse led to new socio-economic structures and the relocation of many merchant families from India and Persia who had been living in the Peninsula. Their relocation resulted in the loss of certain construction techniques and the shrinking of settlements during the 1930s. Nevertheless, the first electricity network in the Peninsula was introduced in Kuwait in 1923 and supplied electricity for the Seif Palace and other settlements.

The particularly inhospitable environmental circumstances of the Arabian Peninsula have made it one of the least populated regions in the world. Tribal affiliation and family structure have always been key elements in survival. Strong social networks and kinship groups helped weaker members to survive, and the clear hierarchy beneath tribal leaders or sheiks made for an effective organizational structure that advocated for and defended common interests. The size and wealth of a tribe determined the amount of land under its control and jurisdiction. As a result of the constant struggle for survival in the harsh environment, many tribal conflicts occurred in the history of the Arabian Peninsula; the need for protection and support led to the establishment of tribal alliances with a strong clan and kinship identity.

From generation to generation, tribes passed on the knowledge they gained on how to build settlements and houses, well-suited to environmental constraints. One example is the construction of wind towers, a traditional and practical architectural feature designed to keep dwellings comfortably cool, introduced by Persian merchants, builders, and craftsmen who settled in various harbors and hamlets along the Gulf coast.

Islamic traditions regarding male and female privacy prescribed stringent building rules. Privacy was ensured by following certain building practices such as a designated minimum building height, or constructing curved entrances, making it impossible for passers-by to look inside a dwelling. Also, in traditional settlements the Friday Mosque assumed a more important role than smaller mosques for daily prayers as they were congregational mosques hosting Friday noon prayers for

the wider community, typically associated with larger public spaces. Together with their immediate surroundings they acted as community centres where social gatherings took place. Besides functioning as religious centers, Friday Mosques are the most important public arena for the residents of the area, often used as a courthouse to arbitrate disputes or dispense justice, or as a religious school, particularly in smaller settlements. The mosque's simple cubic form included an internal courtyard and was adjacent to an additional square. In fact, the size of the Friday Mosque and its courtyard was often an expression of the number of inhabitants of an oasis town or coastal settlement. One traditional settlement could include more than one Friday Mosque depending on the spatial configuration of the settlement, its area, and population size.

The typical pre-oil settlement was characterized by a core that constituted an ensemble of the Friday Mosque, the courthouse, and the ruler's house. Along the roads leading to the core, which had to have the width of at least two packed camels, the *souq* or the traditional marketplace extended linearly, often sheltered and shaded by adjoining roofs. A settlement was characterized by the strong segregation of public and private life. Private housing and shelter occupied the most land. Smaller alleys led from the main roads to the private homes of the oasis settlers (Figure 1).

These narrow labyrinthine streets usually were obliged to be the width of one packed camel while the height of the camel dictated how low the boundaries of courtyards or *finas* could be constructed. The narrowness of the streets and the tight spaces between buildings served two major purposes; on the one hand, to maximize land use within the settlement and, on the other, to provide cooling and shade for passageways and the houses that lined them. Apart from these functional purposes, the network of narrow side roads and cul-de-sacs or dead-end alleys served to reinforce the private character of neighborhoods, known as *fareej*.

These neighborhoods can be regarded as urban cells: they were developed on a system of branching side streets, which ended in a cellular arrangement of houses of related clans and kinsfolk. Thus, traditional settlements were strongly segregated according to tribal or kinship affiliations. The *majlis*, or reception hall, was used by families to meet for religious debates or social gatherings and to discuss issues concerning the community. The application of the same building rules and the use of the same materials and construction techniques resulted in similar settlement typologies, with some minor variations. Differences in typologies were based on the unique particularities of a locality.

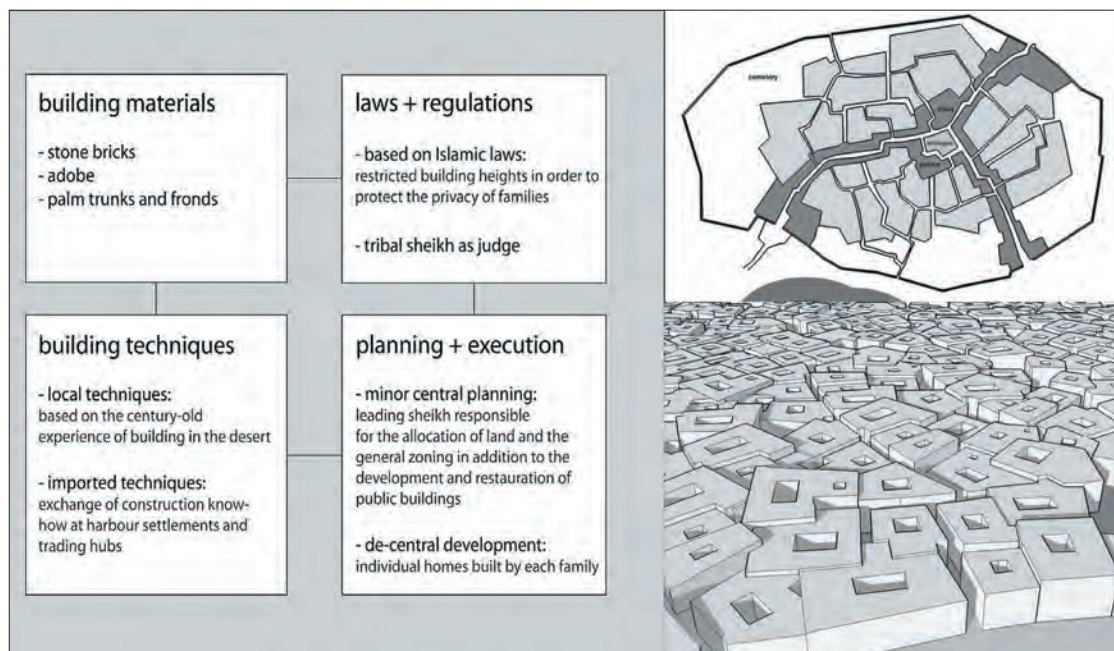


Figure 1: Major factors producing pre-oil settlements (source: Salama & Wiedmann, 2013).

In addition to the traditional courtyard house, which formed the most common housing typology, simple cubic buildings were often constructed in rural settlements. The height of houses was standardized and often limited to two floors. The Bedouin would construct temporary one-story houses on plots, which were surrounded by fences or walls, at the outskirts of settlements. Flat-roofed courtyard houses provided not only a protected open space for private family life but also a better supply of ventilation and light in the narrowly built settlements. The flat rooftops were important open-air spaces that the family could use for cooking or sleeping in the hot summer months. The ground floor, which normally had very few windows or openings to preserve privacy, was often used as a storage space and as a private majlis where male guests were received. In some settlements, it was common for the first floors to be extended over the street to link to the neighboring house opposite. Such a room bridging a street was called a *sabat*; this not only provided an increase in private living space, but also additional shaded areas for the streets.

Available building materials in the local context usually determined architectural form; for instance, in settlements along the coast, readily available coral stone and gypsum were often used for constructing walls, along with sun-dried adobe. Poor families often lived in *barasti* huts, which were simple structures, made from date palm fronds. Further inland, adobe deposits which could be found along the *wadis* or dry riverbeds, were used as a basic building material for walls and ceilings; these were supported by strong beams made from palm trunks.

Adobe was not only in plentiful supply as a local building material, but it also improved the indoor climate because of its natural insulation properties and its ability to absorb air moisture. The location of narrow rectangular openings positioned slightly above the floor or just below the ceiling served to maintain constant airflow and cooled the indoor temperature. This system of natural ventilation was perfected by the introduction of wind towers; these functional structures were up to fifteen meters in height with at least two separate chambers: one for catching the wind currents and one for releasing the air. Although the architectural design was mainly characterized by such adaptations to climatic conditions, there was also widespread use of ornamental features such as wooden screens and crenulated roofs. Such decorative elements could differ from region to region but were uniform within individual settlements.

In addition to the Ottoman-influenced urban houses of Jeddah, the most notable examples of the pre-oil era are the Seif Palace in Kuwait and Bayt Burj al-Riyah in Dubai. The prominent location of the Seif Palace at the waterfront of Kuwait City made it one of the first coastal landmarks in the region. The wind tower house, Bayt Burj al-Riyah, is located in the Bastakiya district and shows distinctive traditional elements (Figure 2). It is built around a courtyard, with two floors indicating that it belonged to a wealthy merchant family. Its foundations were constructed of masonry blocks, the upper level was constructed using columns of petrified coral blocks, the roof structure was made of wooden beams and palm fronds, and the wind towers were located above the major living spaces.



Figure 2: The Bastakiya District, one of the oldest settlements in Dubai (sources: Dubai Municipality, 2011; Salama 2016).

Petrochemical Dollars and Oil Architecture and Urbanism

From the 1930s to the 1990s

Oil production began on the Arabian Peninsula in 1938 when the first oil fields were discovered in the eastern province of Saudi Arabia and on the island of Bahrain, during explorations conducted by British oil companies and adventurers. No other region of the world is as rich in oil reserves as the Arabian Peninsula; approximately 50 percent of all currently known oil resources are located there. The largest single oil field, the Ghawar Oil Field, with a length of 150 miles and a width of 22 miles, was found in the eastern province of Saudi Arabia. Although the first oil fields were allocated to British and American oil companies in the mid-1920s, the oil boom and its inevitable effects on society and the economy, only began after World War Two.

Countries on the peninsula began to develop into independent nation-states a few decades after the commencement of the oil boom. The precise area and borders of each country's territories were demarcated sometime during the mid-1950s. At the beginning of the twentieth century, the western part of the Arabian Peninsula and most of its population were still under the control and influence of the Ottoman Empire. Only the settlements along the trade route to India were under the protection of Britain and its political allies. After World War One, the powerful Al Saud tribe of the Nejd succeeded in uniting various Arab tribes and factions in a concerted effort to liberate the peninsula from Turkish hegemony. In 1932,

the Kingdom of Saudi Arabia, incorporating the Hejaz, the northern Asir, the Nejd, and the Eastern Province, was founded under the leadership of the Al Saud tribe and its astute leader, Abdul-Aziz bin Saud.

Flushed with success, the Al Saud rulers harbored ambitions of annexing the neighboring coastal sheikhdoms. However, the attempt to unify the Arabian Peninsula under the flag of Saudi Arabia failed due to the opposition of the emirs in control of the coastal Trucial States (later the United Arab Emirates), who were fearful of losing their land, power, and influence. In this aspect, they were supported by the contracts and treaties that had been signed with their longstanding protector, Great Britain. In 1961, Kuwait was the first sheikhdom to become an independent state; this was soon followed by Bahrain. Qatar and the Trucial States parted ways in 1971 after their attempt at a unified entity failed; thus Qatar rejected the opportunity to become the eighth Arab Emirate. Except for Yemen and the Sultanate of Oman, the new Gulf coastal nation-states were founded as oligarchies, based on the tribal hierarchy of ruling families in each country: future successors are members of and appointed by the ruling family. Economic and political cooperation among the countries and emirates was not a major political priority until 1990 when Iraq invaded Kuwait. Then, all countries, apart from Yemen, joined forces to strengthen the Gulf Cooperation Council (GCC) initially founded in 1981 to unify regional foreign policies and defend common interests.

In tandem with increasing oil exports, an intense and accel-

erating process of industrialization began in the Peninsula in the 1970s; this industrialization was initially limited to several generally oversized projects and was the beginning of a short-lived industrial revolution lasting no more than three or four decades. In addition to aluminum and copper smelting industries, numerous dry docks and petrochemical plants were constructed. The new building industry started to boom and required vast investments from the state, as well as ambitious local entrepreneurs and shareholders.

At first, major infrastructure projects such as streets, energy infrastructure, desalination plants, airports, and harbors were the main focus of public investment; Eventually, however, after this first stage of industrial and infrastructural development, investment became more directed toward establishing industries designed to help decrease the need for the import of basic commodities such as food, furniture, and building materials. The industrial production of other non-essential consumer goods, such as plastics and fertilizers, was the last stage in the so-called industrial revolution. Most industries in the region were based directly or indirectly on oil and gas production and its profits. However, almost all the other elements needed by industry had to be imported, for example, labor, various raw materials, and trade licenses and permits. This meant that industry in the Peninsula often had to rely on public subsidies mainly derived from oil exports.

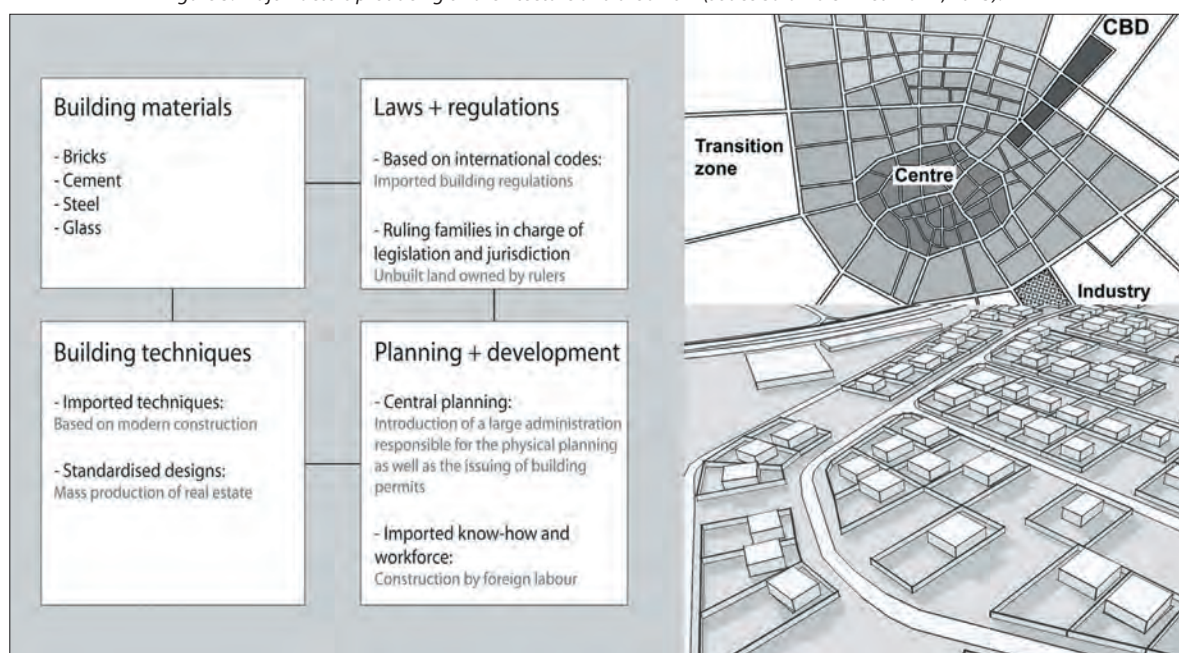
The introduction and development of modern infrastructure led to a rapid transformation process in most oil cities,

wherein the former compact town model with its clearly delineated boundaries was replaced by a new ever-expanding agglomeration of peripheries and outskirts. The inland or coastal topography also had a major impact on general land-use decisions: wind direction has led to the establishment of industrial areas in the south and, with them, poor residential areas occupied by substandard and badly maintained worker camps and accommodation. On the other and more salubrious side of towns, large areas were transformed into residential suburbs, predominantly for the local population and upper-income expatriate groups.

Airports soon developed into important regional and global hubs and therefore businesses as well as administrative buildings soon lined up along main roads, thus linking them to old centers and new facilities. Because of limited accessibility by vehicles, former core centers gradually lost their function and attraction as main commercial districts and were soon abandoned by local residents and entrepreneurs. Businesses and high-end markets were gradually replaced by multi-purpose commercial developments sprouting along newly built airport roads. The first shopping malls were built along the urban periphery and due to their attractive, modern air-conditioned environments and accessibility along main roads, they have become not only new marketplaces but also the most significant and widely used public leisure spaces.

Generally, the oil city can be understood in terms of three major areas – the old city core, new business districts along

Figure 3: Major factors producing oil architecture and urbanism (source Salama & Wiedmann, 2013).



growth corridors, and the suburban outskirts (Figure 3). The largest part of the urban area of an oil city is occupied by the suburbs which are typically structured within a system of streets and highways arranged in a rigid geometrical grid. The most common residential typology in oil cities became the walled two-story villa built on a square or rectangular plot. For the most part, the old city core remained a mixed-use center with the expansion and reconstruction of old market areas for lower-income locals and expatriate groups.

Additionally, foreign workers were often accommodated either in the city core or in fringe areas nearby, where multi-story apartment buildings were constructed to accommodate them. As a result, the densest spaces of oil cities tend to be found in these old core areas. In contrast, the mix of high-rise and low-rise typologies in the suburbs and outskirts, due to privacy concerns, was generally restricted.

While there have been different movements and trends within these 60 years, many notable examples can be selected to highlight various isms, primarily centered on striking a balance between tradition and modernity while endeavoring to meet

environmental, socio-cultural, and contextual constraints (Figure 4). In Kuwait, the water towers evoke high symbolism due to the reference they make to the ideals of humanity and technology that are signified by the globe and the rocket. On a square site, the National Museum represents an efficient response to climate with an intervention that comprises four buildings, rectangular in plan and irregular in their massing, set around a central garden and linked to each other through bridged galleries and a covered atrium. The National Assembly is inspired by the expansive structure of a bazaar street and tent structure. The building was one of the first projects to introduce contemporary modern design for a government building and it has a particular significance for the first democratic movements in the Arabian Peninsula.

In Saudi Arabia, the Tuwaique Palace, a central cultural facility for the Diplomatic Quarter in Riyadh, is another striking example. The concept is based on a sinuous spine that winds in on itself and reaches a length of 800 meters. Inspired by regional fortresses, the design includes three white tents attached to the main building that faces the inner gardens. The tents minimize the surface area exposed to the hot afternoon

Figure 4: Selected examples demonstrating 'oil architecture'.
(courtesy: The Aga Khan Documentation Centre at MIT and R. Salama).



sun. The Great Mosque of Riyadh and the urban development of the Qasr al Hokm district is another stunning example that represents a conscious endeavor at interpreting the past.

Other examples that attempt to balance tradition and modernity in search of a unique identity can be identified in the Qatar and Emirates. The old campus of Qatar University, the Post Office in Doha, and kindergarten prototypes throughout the UAE are clear manifestations of such endeavors. However, key interventions representing exploratory novelties with different interpretations have emerged here and there throughout the region including Sheraton Hotel-Doha and Sheikh Khalifa Stadium in Abu Dhabi, Intercontinental Hotel Muscat, and Al Thawra Hospital in Yemen.

From Ports to Hubs

Due to the harsh climatic conditions and limited fresh water sources, the Gulf coast has hardly been populated for centuries. During the 19th century, the British East India Company and its trade routes to India began to introduce a new evolutionary chapter along the Gulf coast and the emergence of small port cities. In addition to British colonial interests to gain influence along the borders of the Ottoman Empire, the world market's interest in pearls led to the move of inland tribes and the rise of small fishing villages to connected ports. Despite their limited size of fewer than 50,000 inhabitants, these port cities were the starting point of all Gulf cities today (Wiedmann, 2012).

Their rather diverse social structure made of local tribes, Persian and Indian merchants as well as East-African pearl divers led to early multicultural realities. After a period of economic depression, when the international pearl trade collapsed during the 1930s, all port cities shrank before the oil production and the subsequent modern urbanization commenced after World War II. The first modern infrastructure permitted and necessitated the migration of millions of foreign workforce to the Gulf region to establish modern cities, which were needed to administer the independent Gulf States after the end of the British protectorate (Scholz, 1999, p. 77).

Due to their limited wealth from fossil fuels, the leaders of Dubai and Bahrain were pioneers in exploring alternative economic sectors to sustain the growth of their settlements. While the initially established economies were indirectly linked to oil and gas industries, there have been early attempts to attract alternative service sectors by establishing free economic zones. In 1985 the Jebel Ali Free Zone in Dubai marked a new phase of regional and global trade in the Gulf region. The success of the emerging trade hubs was mainly based on three factors: (1) the fortunate geopolitical location between major global markets and a rapidly growing regional market. (2) the lack of

restrictions in free economic zones and access to cheap labor. And (3) the political stability due to aristocratic structures and welfare state mechanisms.

While increasing trading activities began to be manifested in first World Trade Centres, free economic zones, and new financial districts, the infrastructure to enable growing trading hubs inevitably led to another hub phenomenon, the transit hub. The recent expansion of national airlines has led to mega projects, such as Dubai World Central (DEC, 2013). In parallel to the extending regional and global connectivity due to international airports, tourism began to attract the attention of decision-makers as an important service sector (Abu Dhabi Council for Economic Development, 2008, p. 113).

The success of tourism strategies is rooted in both the high level of accessibility and the lack of regional leisure destinations. Tourism was furthermore used to market Gulf cities as rising investment opportunities. At the end of the 20th century, the permission of foreign investment in designated real-estate projects led to an unprecedented construction boom. The exponential urban growth and the economic success as emerging investment hubs established Gulf cities as pioneers of a new growth-oriented development vision in the entire Middle East (EDB, 2015, p. 97) (Figure 5).

The increasing internationalization of Gulf societies due to the continuous movement of guest workers led to a growing identity crisis, which is rooted in a shrinking share of the local population and the extensive import of goods, services, and policies resulting in new globalized urban landscapes (Salama et al., 2016). Subsequently, the preservation of local identities became one of the priorities of new national development strategies (GSDP, 2008, p. 7). In order to restore the traditional images of local identities various mega projects, such as the Souq Waqif in Doha, were launched. In addition to these attempts aiming to integrate traditional urban spaces, rulers began to perceive their cities as major cultural hubs redefining lifestyles and leading socio-political debates in the region, which is expressed by various media outlets and international events.

Large-scale investments have aimed to establish higher education as well as international research, which is expressed in initiatives, such as Dubai Knowledge Village or Education City in Doha (Salama & Gharib, 2012). The entire hub evolution can thus be summarized as a strategic plan starting from trading and transit towards tourism and investment and finally culture and knowledge economies, resulting in a set of various place typologies forming Gulf cities today (Figure 6).

Social and Spatial Implications

Despite large-scale investments and the fortunate geopolitical

Figure 5: Examples of emerging place typologies reflect the notion of hubs (source: Wiedmann & Salama, 2019).

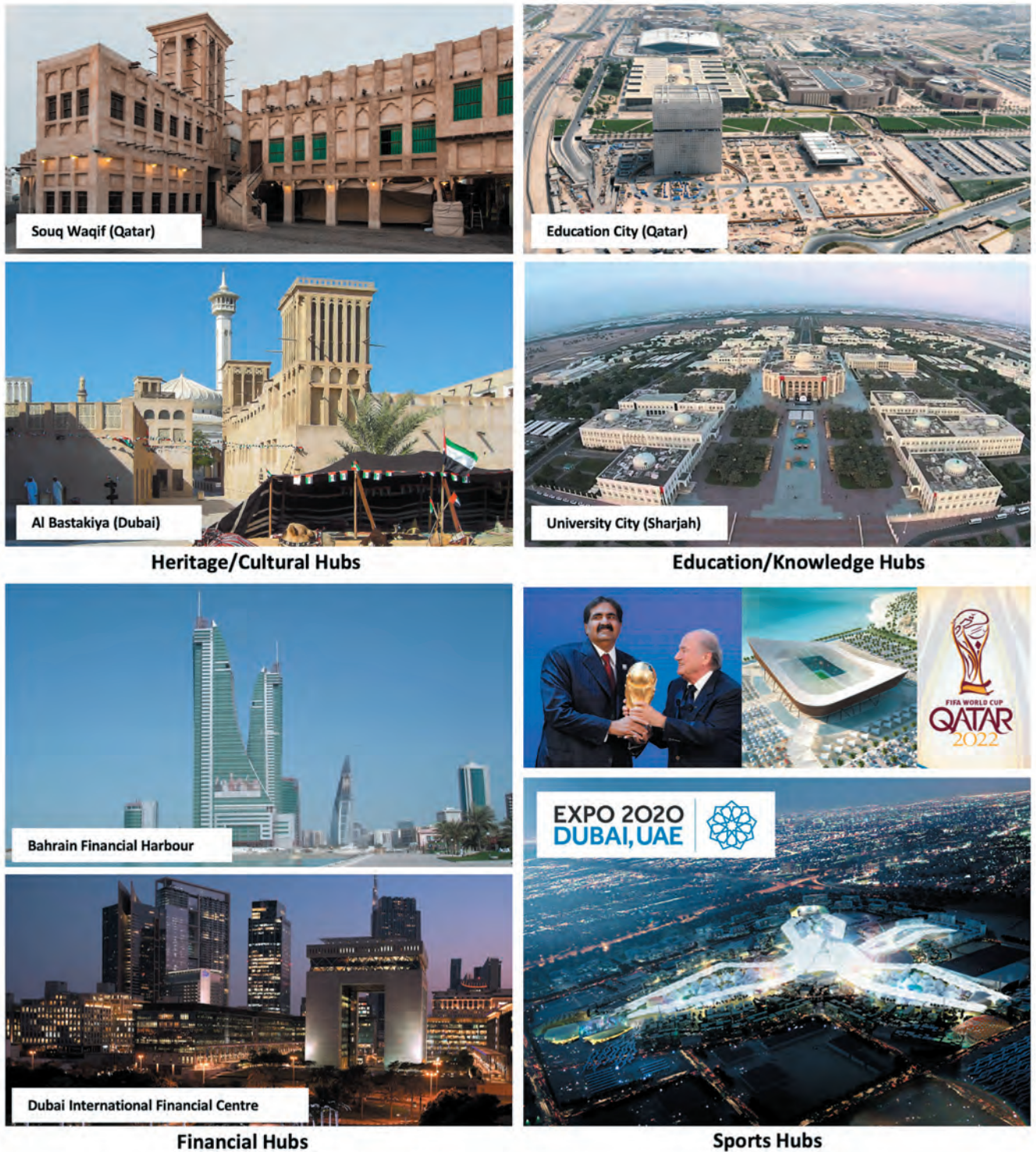




Figure 6: The six hub visions and the key resulting place typologies.

location, all six hub visions are still in the making. The plurality of hub visions and implemented development strategies have led to a variety of distinctive place typologies, perceived as islands, often disconnected and scattered. The free economic zones have led to separate cities within cities, which is contributing to the overall fragmentation of urban structures. International airports have been extended to airport cities attracting companies to relocate and thus leave well-integrated central business districts. Mall and hotel complexes have been established as multifaceted leisure centers offering a variety of shopping and entertainment opportunities in various locations depending on land price and accessibility.

The cultural hub vision has led to various contradicting place typologies, such as large-scale mega projects in inner city cores attempting to restore local structures by replacing a large percentage of previously grown spatial realities. One example in this regard is the Msheireb project in Doha, which has replaced an entire district resulting in large-scale demographic transformations (Law and Underwood, 2012; Wiedmann and Salama, 2019). Most cultural landmark projects have been launched in proximity to historic places. The exclusiveness

of these projects has however hindered their public realm to become new urban spaces for social inclusion.

The attempt to establish higher education as well as research and development to initiate emerging knowledge hubs in the Gulf region has led to various detached mega projects in the urban peripheries. In addition, the move of a highly educated workforce has led to new dynamics in local housing markets and commencing gentrification processes in central district (Salama & Wiedmann, 2013, p. 234). Consequently, it can be stated that all hub strategies have contributed to the rise of new place typologies, which are however hardly connected and hardly rooted in long-term demand-driven dynamics. Thus, the top-down approach to initiating hubs has led to the increasing challenge to establish a more coherent and integrated urban development in Gulf cities.

One key aspect of establishing consolidated hubs rather than temporary hub phenomenon will be the political will to accommodate and integrate migrant communities as a long-term necessity to sustain and develop new economies. Today, Gulf cities have become prototypes of globalized emerging cities and thus their place typologies are expressions of all five elementary frameworks introduced by Arjun Appadurai (1996): ethnoscapescapes, technoscapescapes, finanscapescapes, and ideoscapescapes. While most of these urban landscapes are the result of recent developments, ethnoscapescapes can be seen as the most rooted and thus most important aspect of contemporary urbanism in the Gulf region due to the persistent role of migration. As in the past migrants were the driving force of emerging port cities as well as the first modern capital cities, current migration has become the key precondition for realizing post-oil hubs within global networks.

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The Beatles on a daily commute in Abbey Road

by Simon Taylor

Simon is a designer, visual artist, and cartoonist from Curitiba, Brazil where he lives and works as a graphic editor, illustrator and cartoonist. He works for several Brazilian newspapers, published three books with his work, and has featured in several public exhibits in Brazil. Simon is an avid urban sketcher and was the president of the Brazil's chapter of Urban Sketchers International. Simon did this wonderful cartoon specially for FOCUS. See Simon Taylor's work at www.simontaylor.com.br

FOCUS 19

Essays



Stop and Reassess our Downtowns

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Allan Cooper and David Brodie are founders and engaged members of the Save Our Downtown community organization in San Luis Obispo. They have spearheaded several efforts to enhance the downtown's livability while preserving its character and sense of place. In this opinion piece, they raise important questions about the future of the downtowns of American cities and what needs to change in order to respond to the challenges of the 21st century.

Downtowns are iconic and powerful symbols for a city and often contain the most iconic landmarks, distinctive features, and unique neighborhoods all contributing to its identity. Given that most downtowns were one of the oldest neighborhoods citywide, they offer rare insights into their city's past, present, and future. Downtowns create a critical mass of activities where commercial, cultural, and civic activities are concentrated. This concentration facilitates business, learning, and cultural exchange.

But our cities are at a crossroads. Our downtowns are either dying and/or becoming extraneous, even alien, to the local residents who used to patronize them. Remote work will increasingly render downtown office space unusable for the purposes it was originally intended. Online shopping and big box stores have put most brick-and-mortar retail stores out of business. And all of this is compounded by the problems associated with the lack of parking, crime, and homelessness.

The housing we are producing hasn't demonstrably changed since the beginning of the 20th century. Sears Modern Homes pioneered manufactured housing back in 1908. Modern indoor plumbing and electrification came into their own back then as well. Yet today the pressure to build more housing has resulted in a 21st-century version of 19th-century tenement housing: micro-units or efficiency units housed in residential towers. Then there are the overlarge, over-priced houses crammed onto postage stamp-sized lots. And all of this housing is reliant on highly vulnerable, interdependent infrastructure. Why? Because consumers are no longer the final arbiter in assuring that our downtown and family-friendly housing needs for the 21st century are fully addressed.

This is partly because here in the United States we are trending toward a top-down society. There is a growing concentration of power at the top. This comes in the form of communications

monopolies (both in print and online media) that will weaponize disinformation as a means to further consolidate their power and influence. There is wealth inequality and the wealthy have disproportionate access to both power brokers and regulatory agencies, the kind of access which they use to their own advantage.

This is compounded by the fact that the public has become disengaged. The public acquiesces when they passively accept the diminution of a quality environment in return for guaranteed higher profit margins for the developer. The public has stopped paying attention to public policy decision-making as they are becoming increasingly absorbed in escapist pursuits. These include computer games, gambling, various forms of passive entertainment, and very soon virtual reality.

Perhaps more importantly, we have whole generations of people "missing in action". Group thinking and confirmation bias (i.e., the tendency to search for information in a way that confirms or supports one's prior beliefs) have both contributed to this disengagement. This is the elderly who are separated by age and segregated from society in self-contained retirement communities. Their "bias" may be that they don't trust or like people outside their own age group. This is the wealthy who are again isolated from society by class in self-contained gated communities. Their "bias" may be that they don't trust or like people outside their own socio-economic class. This is the underprivileged youth, the anarchists and nihilists who subscribe to the beliefs of the survivalists, the Oath Keepers, the Proud Boys, the neo-Nazis, and the white supremacists. Their bias may be that they don't trust information or facts that might contradict their own core beliefs. Then, some adhere to convenient stereotypes and false equivalencies such as "all politics is corrupt so why should I get involved". And finally, this includes those who feel powerless which leads them to the conclusion "why should I vote, my vote won't count anyway".



Figure 1: Cafe life in Paris. (courtesy of Zoetnet/<https://www.flickr.com/photos/13286453@N00/5145541834>)



Figure 2: Locals and tourists walking along La Rambla, Barcelona. (source: <https://www.andrewswalks.co.uk/barcelona.html>)

Figure 3: The successful San Luis Obispo's Farmers Market attract locals and tourists (source: Chris Jepsen, <https://www.flickr.com/photos/traderchris/5000627812/in/album-72157607193855027/>)



Our downtowns are also in trouble because of top-down decision-making. City government is becoming increasingly reliant on an ever-growing professional class of highly paid administrators. Almost all decision-making in our city halls is confined to a small cadre of professionals - planners, engineers, attorneys, and hired consultants. These professionals have turned our downtowns into money-making machines with an emphasis on increasing revenue from transitory occupancy taxes and sales taxes. It's no surprise that only the monied interests have their ear when they make decisions that affect the growth of our downtowns. As a result, and whether the residents want this or not, our downtowns have by default become high-revenue-generating entertainment centers oriented to such transient populations as college students and out-of-town visitors.

It doesn't have to be this way. Other cultures have long used their downtowns for other purposes besides being entertainment centers or venues for selling goods and services. Downtown Paris attracts a certain kind of cafe society primarily interested in people-watching and/or debating philosophy or current events. The Florentines gather quietly at dusk in the Piazza della Signoria to watch the last rays of sunlight bathe their architectural monuments. In downtown Barcelona, the natives arrive to promenade down their beloved Las Ramblas.

Our downtown can regain its appeal to residents (in addition to college students and tourists) by fulfilling its traditional role as an architectural and scenic showplace, a place of assembly, and a staging area for public art and cultural events. In a post-pandemic world (i.e., in a world where there will be an endless succession of pandemics) personalized, non-carbon producing, autonomous (i.e., self-driving) transportation will replace public transit. Public transit will be used solely for home deliveries. Non-essential travel will be discouraged. This will result in street "dieting" because the primary functions of streets will be reduced to accommodating pedestrians, bicycles, and autonomous delivery trucks. The remaining street space will be given over to retention ponds, urban forests, orchards, community gardens, and staging areas for other forms of community interaction (i.e., low-cost informal meeting centers).

Existing housing towers and tall office buildings will be emptied and converted into robotic manufacturing or storage warehouses where foodstuffs and medical supplies can be stockpiled. Corridors and elevators will no longer be introduced into new, low-rise buildings. Rather all circulation will be channeled through large lobbies or atriums to maintain social distancing. Existing nursing homes and dormitories will be converted into micro-hospitals or clinics.

Reevaluate the Downtowns for the 21st Century

Our downtowns suffer because of the following trends: 1) growth in large-format retail; 2) remaining downtown businesses that are often limited to restaurants, taverns, and salons; 3) loss of essential grocery, pharmacy, and hardware stores; 4) vacant real estate that is owned by absentee landlords; 5) new competition from an online market; and 6) changing consumer preferences coupled with decreasing spending power.

First, we need to loosen up the stranglehold that downtown property owners have on commercial rents. Commercial rent control, in exchange for urban subsidies (to make up for the lost rent) or rent assistance programs, will markedly open up our downtowns to a wider range of possible building uses that add life to the downtown while serving residents. These would include the necessity goods and services stores that could be especially useful to downtown residents: grocery stores, general stores, department stores, repair services, hardware stores, personal care services, stores that provide locally-sourced goods and services, and community gathering spaces that accommodate local meetings, events, and individual users.

Second, our city fathers should stop passively allowing free market forces to prevail when determining what our downtowns will become. Instead, there needs to be a proactive business development entity generously funded by the City that would attract the following types of businesses into our downtown: 1) retail businesses that do not compete directly with big-box chain stores; 2) businesses that combine various retail categories into one location and 3) businesses that often serve a larger geographic market beyond the local trade area. Incentives could include tax increment financing (TIF's are chiefly for blighted areas), facade grant programs, and the formation of business improvement districts (BID's are chiefly for landscaping improvements, promotions, business recruitment, ambassador programs, and advertising). Fee waivers and tax abatements will further assist in attracting, marketing, and promoting these more desirable types of downtown businesses. A marketing analysis could help planners answer such questions as: What retail and service businesses are we missing in our downtown? What businesses should we be recruiting? What types of downtown businesses that are in similarly sized communities do we not have? What do we have in our downtown that other downtowns do not have?

Third, we need to nurture local talent and skills by providing working spaces to incubate and hatch ideas into local businesses that will help regenerate the downtown economy. The goals are to both stimulate the entrepreneurial capacity of residents, attract talent from outside the community and



Figure 4: A parking structure in Wichita, KA partially repurposed to accommodate 44 1-bedroom apartments. (source: https://sheldenarchitecture.com/portfolio_item/broadway-parking-garage/)

Figure 5: A New York City street adapted for the future including for urban agriculture. From the project New York City (Steady) State by Terreform (see Andrea Johnson's Hearst Lecture in FOCUS 14, 2017).



address the lack of good, reliable, and qualified workers. These small business incubators offer mentorship programs. They also organize business training programs that provide hands-on instruction on topics of interest to members, such as web-based advertising and a business exchange program that allows downtown business owners to network and learn from each other.

Fourth, we need to bring down or even eliminate the cost of parking in our downtowns so that it is competitive with the free parking available in suburban shopping malls. Many

would argue that parking should be metered because this will discourage more people from using their cars in preference to walking, biking and/or mass transit. But this is delusional thinking because it assumes that out-of-town employees and out-of-town visitors can easily gain access to our downtowns via mostly non-existent mass transit (not to mention via the trusty, old bike!). And banning cars from our downtowns is predicated on the fact that cars will always be carbon-powered and green-house gas polluting (not true once most cars transition to electricity), that more greenhouse gas is created through cars idling in their search for a parking space (not true once most cars will be guided autonomously to and from their parking spaces) or that mass transit will always be a viable alternative to a car in a post-pandemic world (also not true).

Eliminating cars is also based on the assumption that if you build a bike path, bikers will use it (this is, based on current evidence, not true) or that if you substitute curbside parking spaces for al fresco dining parklets that this will be a viable year-round use of urban space (also not true in the case of most cities that experience an abundance of inclement weather). Another argument against free parking is that if meters are removed and free parking is implemented in our downtowns, the costs for maintenance and construction of on-street parking spaces will, most likely, be forced onto taxpayers and businesses through increased property or sales taxes. But both taxpayers and businesses will benefit much more from the increased revenue generated by the resultant increase in the number of visitors to our downtowns. Moreover, most of the funds generated by metered parking go to pay for parking enforcement, not the costs of maintenance and the costs of new parking. Another argument against free parking is that more business employees drive and take up parking for potential patrons and customers. This can be easily remedied by allocating employee parking to specific areas within the downtown core that will not likely be used by potential patrons and customers. Lastly, removing the option of parking one's car downtown places an undue hardship on the working poor who cannot afford a taxi, Uber or Lyft ride to work. Moreover, metered parking is effectively a regressive tax, because it disproportionately affects people with lower incomes. Spending on parking represents a larger percentage of their budget. Having to pay for parking might price some lower-income people out of their cars.

So what are some solutions? Some of the City revenue lost through the elimination of metered parking could be recovered in the form of higher penalties for staying in one spot longer than 2 hours. What has made downtown promenades successful like Pearl Street in Boulder and Third Street in Santa Monica has been the addition of parking garages on the periphery. But parking garages are expensive so how

will the construction of these parking garages be financed? With regards to a special assessment bond, those that benefit from the public parking garage, like local businesses, can be charged a special assessment to pay off the bonds. But more affordable free parking alternatives are surface lots located outside the Downtown core within a greenbelt or agricultural zone and connected to Downtown via public trolleys. The dependence on a trolley system could be reduced once self-parking autonomous cars become more readily available to the public. This surface parking lot should be covered with solar canopies so that it could produce energy while lowering the absorption of heat. In addition, it should be surfaced with a permeable material like porous asphalt and planted with trees in rows like a fruit-bearing orchard, so that it could sequester carbon and clean contaminated runoff. The revenue generated from these solar farms and orchards could be funneled back to the City to offset the construction and operating costs of these surface parking lots.

Fifth, we need to realize that local, independent family-owned businesses will have a much stronger commitment to the local community with objectives that complement, rather than compete with, the economic imperative of profit-making. Our downtowns should be attracting co-ops or consumer-owned cooperative businesses that are managed and controlled by the people who use them. Unlike a business owned by an individual, family, or corporation, profits from the store return to our owners and are used to help us better serve our community's needs. Shopping at a co-op is an act of community engagement. Because co-ops are democratically controlled, shopping at co-ops means supporting the ideals of the community. Plus, co-ops are without a doubt the best place to find local produce and local products.

Sixth, because of the accelerated growth in remote work, the increased reliance on electronic communications, and growing distrust and socio-political divisions within our society, there is an increasing need to incorporate into our downtowns a type of face-to-face communal space dubbed the Third Place, a concept coined in the early 1990s by sociologist Ray Oldenburg. It is essentially a space in which individuals meet to unwind and have discussions about things concerning themselves, their neighborhood, and the wider community. Their precedents include the English pub, the German beer garden, and the French sidewalk cafe. It has been argued that third places are essential for civic engagement, civil society, democracy, and establishing a sense of belonging. In essence, these spaces enable community development and help individuals to form and retain a sense of identity and cohesion. These "Third Places" should be inexpensive or free with access to food and drinks, should be comfortable and welcoming, and should be highly accessible. Escalating real estate prices

in most cities make low-cost informal meeting centers harder to maintain unless these centers are located on land freed up through the elimination of city-owned, on-street parking and city-owned, off-street surface parking lots.

Reevaluate Housing for the 21st Century

Today, housing developers maximize their profits through “value engineering” (i.e., an organized approach to providing necessary functions in a project at the lowest cost), densification, and economies of scale. Housing is seen as a commodity and/or investment dominated by out-of-town corporate investors. Housing has increased in size (i.e., an average of 1,000 square feet in 1972 compared to 2,687 square feet today) not because we are having larger families but because sales are predicated exclusively on square footage (i.e., on quantity vs. quality). And housing innovation - particularly the kind of innovation that will prepare us for cyber warfare, highly transmissible diseases, and extreme weather events - is stymied by unions attempting to preserve existing jobs in the construction industry.

But again, it doesn't have to be this way. Architects and planners should return to the tried and true approach of participatory design involving the end user even when building spec housing. To convey a sense of spaciousness within appropriately scaled-down housing units, we should return to designing from the “inside out” which will allow us to maximize borrowed space, transparency, and reflectivity. We should return to minimizing environmental impacts including the preservation of existing trees and natural habitats, exploring new green construction technologies, and building resiliency



Figure 6: A coffee kiosk in Praça Camões, Lisbon. An example of Oldenburg's concept of third space. (photo: V. del Rio)

Figure 7: Extending public pedestrian space through street redesign. Lancaster Boulevard before and after, City of Lancaster CA. (source: City of Lancaster / Project for Public Spaces; <https://www.pps.org/article/road-diet-reinvigorating-downtown-lancaster-one-lane-at-a-time>)



in anticipation of the adverse impacts of climate change. In a world rife with cyber warfare, highly transmissible diseases, and extreme weather events, we must build into each house a certain level of self sufficiency - in other words, we need to "get off the grid". For example, each housing unit should utilize its rooftops for affording kitchen gardens, waste digesters, rain cisterns, and solar panels.

Housing units located in flood plains should have their main living spaces elevated, putting kitchens and living rooms on the second floor. The first floor would contain nonessential amenities like recreation rooms and bicycle storage. Live-work housing will become the norm and will render office buildings nearly obsolete. Accessory dwelling units will accommodate aging parents or friends previously residing in transitional care facilities and nursing homes.

Each accessory dwelling unit will contain a medium acuity care room for paramedic or concierge doctor visits. These medium acuity care rooms will ideally keep patients out of hospitals by containing monitoring equipment, a ventilator, an infusion pump, and a crash cart.

Housing will be built out of sustainable, plywood-reinforced, non-combustible materials to survive extreme wind events and wildfires. Each housing unit will contain a subterranean "safe room" to protect from hurricanes, tornadoes, or fires. These "safe rooms" will also provide geothermal cooling for long-term storage of foodstuffs. Each housing unit will be equipped with remote sourcing of new products through 3-D printing. Mandatory features for housing units will include air filtration and air conditioning systems. The air filtration system will be equipped with HEPA filters. Built into the air conditioning system will be a slight excess of airflow which will create positive pressure. Surplus air will then be emitted from the housing unit to prevent outside air from coming in. Each housing unit will be equipped with large pantries and large combination foyers/trash/sterilization rooms to receive delivery of packaged goods and for trash pick up.

We acknowledge that there will be naysayers who will argue that the home buyer cannot possibly afford this type of housing without the help of significant government subsidies. Of course, 3D laser scanner construction will eventually bring down the cost of all housing. But in the near term, our government can clearly afford to underwrite these necessary add-ons to the cost of housing. All of these subsidies could and should be covered in the newly passed \$12 billion Infrastructure Investment and Jobs Act. It is important to note that this bill should also include the retrofit of our existing housing inventory.

Bear in mind that the United States has the largest economy in the world with a GDP of 20.5 trillion dollars and the highest per capita income in the world at \$62,000 per year. Bear in mind that by not addressing the horrific consequences of climate change, pandemics and cyber warfare our government will in the long run incur far greater lost opportunity costs. Economists estimate the COVID-19 pandemic alone will cost us \$7 trillion. Then combine this with projected costs (between 2020 and 2090) to the U.S. economy associated with climate change (drought, flooding, and crop failures) and this could come to \$224 billion annually. A Lloyd's Report recently stated that a cyberattack that shuts down parts of the United States power grid could cost over \$1 trillion.

In Conclusion

We can significantly enhance the quality of our built environment to meet the challenges of the 21st century by becoming engaged citizens. But increasing the public's engagement cannot happen without addressing the roots of poverty, homelessness, apathy, and crime. This would take time but it could take the form of requiring elementary school students to enroll in financial literacy classes that would teach students the basics of money management: budgeting, saving, debt, and investing. That knowledge lays a foundation for students to build strong money habits early on and avoid many of the mistakes that lead to lifelong money struggles. We should require high school students to enroll in a civics class so that they could at the very least understand the inner workings of city government, to require college students to engage in some form of community service so that they would grow to appreciate the value of true participatory democracy and by inviting our retired population to mentor our disenfranchised youth, to volunteer time toward addressing the needs of the disabled, the indigent and the elderly and/or become valuable community stakeholders through pro bono consulting work.

Most importantly, we should never again leave city planning and housing design to the city planners and the property developers. Why? Because we know that they will always have their own best interests at heart and that those interests may not necessarily be aligned with ours.

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Coding for Diversity: A Case Study in the United Kingdom

Ivor Samuels

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Building on work he previously published in FOCUS, in this article Ivor Samuels extends his preoccupation with the effectiveness and appropriateness of design codes, particularly vis-a-vis the enormous demand for affordable housing in the U.K. In this essay, he discusses the design code and the self-build initiative at the new community of Graven Hill, comparing the results to Victoria Road, an early 20th century development, both in Oxfordshire.

This essay extends the discussion on design codes contributed by this author to two earlier editions of Focus (Samuels, 2014 & 2020). Against the background of a housing shortage in Britain, a problem common to many countries, the government commissioned the Letwin Report which argued that the crisis was due to a lack of diversity in types and tenure and in particular the dominance of the housing market by a few large developers and, compared with other countries, a very low percentage of self-builders. One result of this report was the establishment of a large self-build scheme at Graven Hill and it is the nature of the results of the guidance for development in this project which throws an interesting light on the nature of design coding for diversity. This is followed by a short case study of an “ordinary” street which has evolved over a century in the absence of any special promotion or design coding but which has been subject to everyday planning regulations, to ascertain the degree to which it meets the requirements of diversity and good design.

A Critique of UK Design Codes

It has been suggested that design codes in general are overly concerned with controlling small-scale detail to the neglect of elements at a larger scale. For example, Scheer (2010) notes that regulatory systems seem to concentrate on those aspects of the built environment which are the most transitory such as building uses and facade details while they neglect the most long-lasting aspects such as street layouts and plot subdivision systems. While the discussion on Poundbury in Focus 17 where it is noted that even the most minor change to the appearance of houses, even the color of the front doors, needs the permission of the landowner would support that argument concerning

detail, it must be noted that the less transitory elements are equally rigorously controlled. It is rather a question of being less rigorous with detailed aspects of appearance especially since these are the medium through which the personalization of homes is achieved. In the words of Nicholas Falk: “What is needed is a menu from which good choices can be made, not a cookbook for every site” (Falk, 2011).

Poundbury was established in 1993 but the principles that underpin its attitude toward detailed design control are still very much admired and are being incorporated into contemporary projects. For example, Nansledan, an urban extension of the southwest coastal town of Newquay, also on Duchy of Cornwall land, and closely following the model of Poundbury in its concern with detail, was awarded the 2021 Urban Design Group annual prize for Frameworks and Large Masterplans (UDG, 2022). While the two examples quoted above are, undoubtedly, of high quality and have been designed with great care, their use of details based on traditional models has been extensively copied by large-scale housebuilders who are less concerned with quality and more with reducing costs. The result is many examples of small windows used as a pastiche of traditional forms because it is cheaper to build a solid wall than use larger windows to achieve the same thermal performance.

A further critique of the Poundbury approach is that the chosen types often do not meet the needs of their contemporary inhabitants since they often replicate the cheapest and socially most inferior traditional housing types. For example, a common type used is the row house with the front door opening directly off the street with no mediation between the public and private space. In a recent presentation, Michael Barke (2022) described how workers’ housing built by industrialists directly related to the workplace status of the occupier and the lowest category of workers were allocated this type of dwelling. One wonders

Note: Ivor Samuels was a visiting lecturer at the CAED, Cal Poly in Spring 2005 and Fall 2006. His articles appeared in several issues of FOCUS.

how many of the designers and promoters of this form of development would choose to live in this type of dwelling.

The Letwin Report

A report was commissioned in 2016 by the UK government from former minister Oliver Letwin to explain why housing completions were so far below forecast housing needs with a significant gap between housing completions and the amount of land allocated or given planning permission in areas of high housing demand (Letwin, 2018). The report found that the fundamental driver of slow build-out was the homogeneity of the new homes being offered for sale given the limited ability of local markets to absorb such homogenous products. Letwin, therefore, recommended legislation to ensure a diversity of both housing tenures and types to avoid the saturation of the local market by “highly uniform” properties. Among the recommendations of the report are the preparation of “master plans and design codes which will ensure both a high degree of diversity and good design” (Letwin, 2018, p. 6). Housing diversity “includes housing of differing types, size and style, design and tenure mix” (Letwin, 2018, p.13).

One metric of the lack of diversity in the new housing offer is the low level of self-build in the UK. Around 10% of new homes are self-built compared with over 60 % in other European countries. The obstacles to self-build are noted as the lack of land allocated for this purpose and the difficulties of obtaining finance for this type of development. As a response to this low percentage of self-build, an important project has been established at Graven Hill on the edge of the Oxfordshire town of Bicester. It offers an opportunity to examine the extent to which the promotion of self-build by a master developer has achieved the diversity and good design advocated by Letwin. This is followed by a short case study of a street that has evolved over a century in the absence of any special promotion or design coding but is subject to everyday planning regulations to ascertain the degree to which it meets the requirements of diversity and good design.

Design Coding for Self-Build at Graven Hill

Cherwell District Council, the local authority purchased Graven Hill a former Ministry of Defence ordinance depot in 2014 and set up the Graven Hill Village Development Company (GHVDC) to act as master developer. The site covers 188 hectares and includes a wooded hill and is surrounded by farmland. Self-builders purchase plots for which a plot passport is issued setting out the permitted area, the building envelope, the location on the plot, its height, and the layout of service connections adjacent to the street. The foundations are built by the GHVDC to the self-builder's plan.

The first plots were released for sale in 2016 in what is claimed to be the biggest self-build site in Britain. Initially, the relatively slow rate of self-build suggested that development would take too long so the early construction of local facilities (shops, schools, etc.) would not be viable. Therefore, in addition to self-build, there are plots allocated for custom building (where a dwelling is chosen from a range of different types and suppliers) and affordable housing and apartments for market sale.

With a planned capacity of 1900 homes for approximately 5,000 people, provision is being made for a school and local shops. In March 2022 it was reported that 400 homes had been completed (Jessel, 2022); of these, 164 were self-built and 140 custom-built. The development has attracted considerable media interest with a popular TV program dedicating four of five episodes to the project.

This project would seem to be an excellent opportunity to implement a design code that only controlled those long-lasting urban elements i.e. streets and plots while permitting considerable freedom of detail. A Master Plan for the site was produced in 2015 by Glen Howells architects with street and plot layouts and with design codes produced for 11 character areas with names such as Village Center, Tree Lined Boulevard and Rural Lanes. This last is an area of large plots for self-build looking onto the wooded hillside and other extensive green

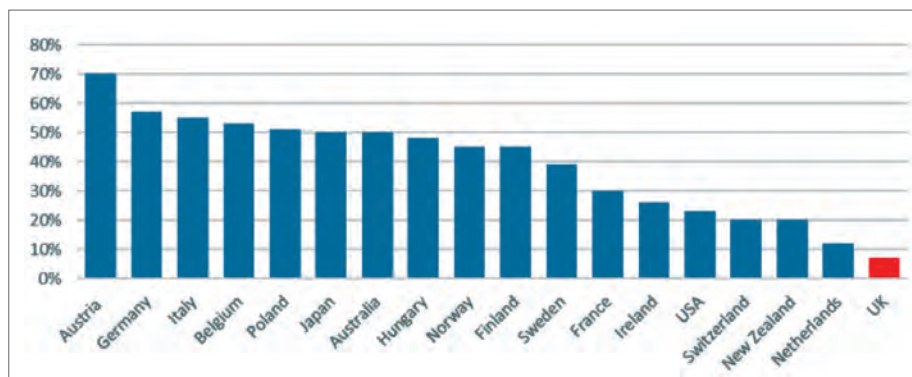


Figure 1: International comparison of self-build and custom housebuilding as a % of new homes in the Global North (source: <https://nacsba.org.uk>; National Custom and Self Build Association, 2016)



Figure 2: Phase 1 of Graven Hill master plan showing the the different types of development: self-build, custom-build, and affordable. (source: <https://www.gravenhill.co.uk/resources/maps/>)

open spaces and the plots in this area are the most expensive. It is therefore the most interesting area to examine from the point of view of coding for diversity. In addition to the plot and street layout, materials and colors palettes are proposed for the village center and the rural lanes. The palettes are very extensive and would seem to impose very little constraint on the self-builder. For each character area model case studies are illustrated and for the Rural Lanes, a bucolic ideal of traditional rural development is shown.

In striking contrast o the design code image, the results to date show that there is a clear predilection for versions of modernism with very few following a traditional model as illustrated by the exemplary case study. A custom builder active at Graven Hill reports that “people like flat roofs(sic), big glazed areas, modern construction materials, and rendering and big aluminum windows” (Collinson, 2018). It should also be noted that there are some architects among the self-builders presumably because the project represents an opportunity for them to exhibit their professional skills.

Victoria Road, Oxford

This street, 0.32 miles long and 2 miles from the center of the City of Oxford, started to be built around a century ago.

Figure 3: Example of architecture indicated for Rural Lanes in the Graven Hill Design Code. (source: <https://www.gravenhill.co.uk>)





Figure 3: Street with self-built contemporary homes.

Figure 4: Two of the few self-built traditional-style houses.



Figure 5: Affordable housing in Graven Hill.



The suburbs of Oxford were mainly developed on large land holdings including those of the Colleges of the University. Plots of land of various sizes were leased to small builders who usually built speculatively according to their perception of the market. At a later date, the freeholds of these houses were then purchased from the Colleges by the house owners.

The early plans of Victoria Road show a variety of plot subdivisions ranging from those which could accommodate large detached houses to those suitable for row houses. Over a century, these original plots had been amalgamated and/or subdivided so as to accommodate a diversity of house types including detached, semi-detached, row houses and apartments. The building materials used are varied as are the styles although the majority are variations on traditional or modern facades with a preponderance of pitched roofs.

Victoria Road is notable for the trees and shrubs in the front gardens which are a prominent feature of the streetscape. These are possible because the front gardens are bigger than those at Graven Hill. Presumably, the relatively constricted gardens of that project are due to the need to obtain a rapid maximum return on the investment of the Local Authority.

This street is not in a Conservation Area where special controls would have been imposed. Changes to existing buildings and new buildings and house extensions will have been subject to planning controls which will have imposed a maximum height and established a maximum building line along the front of the buildings. The relatively long plots have allowed some houses to be set back further from the street but still retain a large rear garden. As can be observed from the aerial view no restriction on building style has been imposed.

Conclusion

The central question raised by Graven Hill is to what extent this unique self-build development project offers an opportunity to provide a diversity of housing types as a possible solution to the Letwin demand for a reduction in the homogeneity of new housing. Despite the design code, the appearance of the new houses has not been constrained, and the street plan and plot layout meet the criteria noted above of restricting controls to those urban elements which are most enduring.

There is no doubt that there is a remarkable range of designs of houses built by the self-builders. However, they are all versions of detached houses on basically the same size of the plot. Adopting a botanic definition of variety, they are all variations of the same species, the detached house. Again, referring to botanic definitions, there is a lack of diversity there since there are no other types (e.g. semi-detached, row houses, etc) within the allocated plots for self-build. This differs from those Dutch

self-build projects such as Almere which are often quoted as models of self-build settlements.

While the self-build houses illustrated here have been built to closely match their owners' private needs the impact of this variety on the public spaces is certainly questionable. One critic observes that: "Public spaces lack greenery such as trees and front gardens and the wealth of concrete car parks and roads create a place that feels cold and uninviting. A small number of trees positioned along the roads would help to frame and soften the streets and provide shade or shelter. The individual gardens have also been reduced to a minimum, with little or almost no planting visible at the front of the properties" (Leonaviciene, 2022).

The master developer seems to have abandoned any attempt to influence the quality of the public space system which is left exclusively to road regulations that are not noted for producing visual environments of any quality. If the excess of homogeneity criticized by Letwin can result in monotony, then

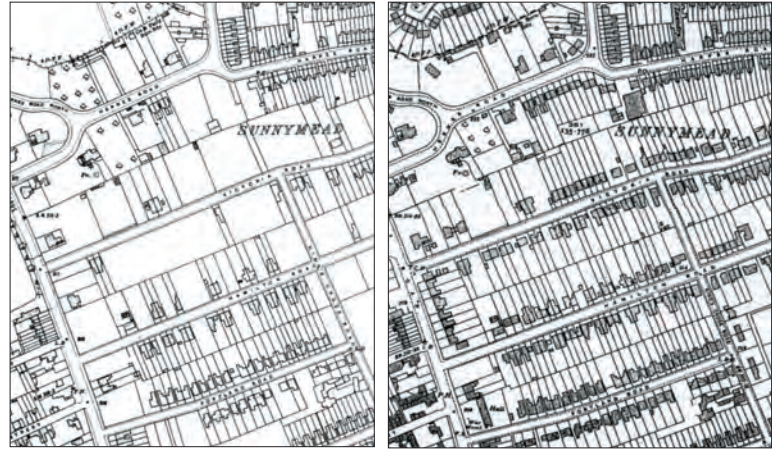


Figure 6: Ordnance Survey maps 1919 (left) 1937 (right) with Victoria Road at the center showing development on a range of plot widths. (After Kinchin 2006 21-23)

Figure 7: The central section of Victoria Road in 2022. (source: Landsat/Copernicus)



Figure 8: Victoria Road.



the question arises when does an excess of variety or diversity result in chaos? It seems that some of the streets at Graven Hill may have reached this point.

A further criticism of Graven Hill is that the terraces of small affordable homes are in contrast to the large detached self-builds which are on the most desirable sites next to the wooded hill and this produces a visible degree of socio-economic division in the community. Despite the criticisms of developments such as Poundbury, one positive aspect of their imposed homogeneity is that the appearance of the houses does not indicate tenure

Victoria Road demonstrates the importance of configuring a variety of plot subdivisions that can evolve over time. The significance of this has been noted by authors such as Love and Crawford (2011). Another notable factor is the quality of the public realm which has been neglected at Graven Hill. Although not consciously designed at Victoria Road, the planting of the private front gardens has resulted in a satisfactory quality of the public realm. Perhaps it is these two key factors that might enable a self-build project to both satisfy the whims of the builder and result in an acceptable public realm so that the qualities of diversity and quality that Letwin seeks can be achieved without a descent into chaos.

While mainstream urban design coding has learned a great deal from the inherited built environment, it is usually based on those relatively homogenous environments which are so highly regarded that they are awarded a special protected status such as being designated as Conservation Areas. The experience of Victoria Road suggests that more “ordinary” streets which are not recognized for their aesthetic or historic value can also teach us lessons about diversity.

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Using Challenge-Driven Innovation to Spearhead Sustainable Urban Development in Sub-Saharan Africa

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Drawing from her experience in running innovation challenges and in establishing the first United Nations Innovation Technology Accelerator for Cities in Hamburg, Germany, Isabel Wetzel discusses the opportunities that challenge-driven innovation can present to local governments in the context of Sub-Saharan Africa. She argues that understanding how to conduct innovation processes with diverse partners and stakeholders can significantly change the way cities work, and lead to deeper systemic transformations that benefit the city residents more directly.

Rapid urbanization is the largest transformation that the African continent will experience in this century. Currently, the continent is the least urbanized globally but will see the fastest transformation in its cities. Since 1990, the number of cities in Africa has doubled from 3,300 to 7,600, and their cumulative population has increased by 500 million people (OECD/UN ECA/AfDB, 2022). An additional 950 million inhabitants are projected to be added to African cities between now and 2050, much of which is taking place in small and medium-sized towns (OECD, 2020). This comes with tremendous challenges and opportunities. In addition to the growing social-economic disparities we are witnessing today, African cities face further challenges caused by the climate crisis.

This context demands for new models of city development: Our cities need solutions that are embedded in innovation, and that provide practical approaches for local governments and urban stakeholders to have a visible and sustainable impact that benefits people. Municipalities need to give room to pilot test new plans, models, methodologies, and solutions, and not fear the risks associated with unknowns. At the same time, it is important to ensure that new, innovative solutions developed in a challenge-driven innovation model are grounded in regulatory systems, on previous or indigenous knowledge, build on existing data and research, and include all population groups in a participatory and inclusive manner.

Given the multidimensional challenges of cities in the African continent, local governments, now more than ever, have the chance as well as the responsibility, to lead their cities away from unsustainable practices, whether it is in terms of planning, finance, or governance, or in terms of people, innovation, technology, and sustainability. Increasing the use and application

of innovative practices in city contexts is an effective means to reconsider the “business as usual” of cities, and adopt more future-oriented, sustainable, and transformative approaches that help cities reinvent themselves, improve socio-economic conditions for all, and attract more investment in the long-run.

Strategic and creative partnerships must be harnessed at the city level to support actions on the ground. Designing and running innovation challenges is an effective means to address issues related to urban service delivery, and can lead to positive outcomes in a wide range of sectors spanning public spaces, urban energy, mobility, planning, and digital technologies. By working with different stakeholders involved in the urban development process, innovation challenges have the potential to mainstream principles from national and local government bodies and agencies, the private sector, communities, and residents. They also enable startups, SMEs, and other companies to test technologies, prototypes, and solutions in real urban living labs, allowing for important research to be connected to practical testing on the ground.

The Unique Challenges of African Cities

Urban poverty levels in Sub-Saharan African cities are high, with about 23 percent of the urban population living below the poverty line and experiencing multi-dimensional poverty – numbers 11 times higher than in Latin America and the Caribbean (World Bank, 2022). The infrastructural gap is also very high, with many urban populations in Africa with sub-standard access to basic services. For instance, only 54 percent have access to safely managed water and only 23 percent have access to sanitation (United Nations, 2022). Likewise, approximately 645 million Africans have no access to electricity because the continent’s enormous renewable energy potential remains

About UN-Habitat

The United Nations Human Settlements Programme, UN-Habitat, is the United Nations (UN) Programme for sustainable towns and cities. Established in 1976 and working in all areas of sustainable urbanization, from urban planning and design to basic urban services and infrastructure, UN-Habitat is headquartered in Nairobi and has offices in around 95 countries worldwide, including regional and liaison offices in Rio de Janeiro, Mexico City, Cairo, Bangkok, Fukuoka, New York and Brussels.

UN-Habitat is mandated by the UN General Assembly to be the focal point for local authorities in the UN system. Over the last 40 years, UN-Habitat has implemented thousands of projects in direct collaboration with local authorities all around the world. Currently, UN-Habitat has 406 ongoing programmes in 53 countries, to a total value of USD 305 million. Notable programs include the Participatory Slum Upgrading Programme which has worked to improve slums in 160 cities in 35 countries, and the Safer Cities Programme, which has advised 77 cities in 24 countries on how to improve urban safety.

UN-Habitat's Innovation Unit was established in 2020 to respond to requests from national and local governments, as well as other partners, to support cities' transitions towards becoming smarter. This includes increasingly incorporating innovation tools and methods in urban policy-making and identifying pathways toward cities' digital and technological transformation through the right policy and planning instruments and mechanisms. The Innovation Unit is composed of a multi-disciplinary team of urban planners, technology and data experts, economists, and environmental specialists providing a holistic approach to sustainable urbanization. Currently, the team is implementing diverse projects in 15+ cities in Latin America, Africa, and Europe, which also materializes in the normative work of UN-Habitat. The Unit is responsible for UN-Habitat's Flagship Programme on People-Centred Smart Cities as well as implementing pilot projects through the newly established United Nations Innovation Technology Accelerator for Cities, located in Hamburg, Germany.

largely unexploited (UN-Habitat, 2018). The growth of informal settlements is also poignant, with roughly 230 million people living in slums across African cities. The forces driving the prevalence of slums are unplanned urbanization, ineffective planning, lack of affordable housing options for low-income households, dysfunctional urban policies, lack of housing financing options, and low incomes. All these factors must be addressed decisively and with the political will that they deserve if cities are to meet their housing needs going forward.

Climate change is negatively affecting vulnerable populations who have limited financial and other resources and is exacerbated by weak institutions and governance structures for disaster mitigation and preparedness. Though African cities contribute very little to global warming, they often feel the impact of climate change disproportionately, particularly those in hot climates or low-lying coastal areas. Extreme weather events such as heatwaves, flooding or cyclones worsen existing urban challenges and must be addressed at the local and national levels, in order to achieve Sustainable Development Goals (SDGs) related to poverty, health, water, or ecosystems.

While many African cities have started to tackle climate challenges in a strategic and forward-looking manner, much remains to be done. Growing concentrations of people, industries, and infrastructure, such as can be seen in cities on the African continent, are likely to exacerbate climate change impacts, with hundreds of millions of people, particularly the urban poor, that will be negatively affected. Many cities have

started pioneering efforts to invest in reducing carbon emissions through urban planning, public transport, energy efficiency, or low-carbon infrastructure. Bold action is required to accelerate the transition to sustainable urban energy systems. It will require coordinating policy on multiple fronts, forming new partnerships, and committing significant resources across the globe. It also requires an open, accountable and innovative approach to implementation.

At the same time, the African continent also has the largest youth population per capita that we have witnessed globally. A youth bulge can represent a potential opportunity to spur social and economic development if countries harness the power of age-structure transformation. Young people have the chance to bring vibrancy to how cities are managed, and if included correctly, can pave the way for people-centered approaches to urban governance and policy-making. This, however, requires strategic local investment in educational, employment training, and recreational and community facilities on the side of policymakers and their partners.

The Sustainable Development Goals

The SDGs are universal, interconnected, and exponential in nature. They present a roadmap for creating systemic financial, social and environmental value. Achieving the SDGs by 2030 has the potential to not only generate peace and shared prosperity on a healthy planet but also to open up tremendous market opportunities. Exponential goals require trans-

formational solutions that go beyond incremental innovation. Governments and innovators need to raise their sustainability ambitions and act firmly to adopt new mindsets, develop new innovative solutions to developmental challenges, and deploy disruptive technologies. The actions that we take now will have an impact on how businesses disrupt markets and pursue growth opportunities within a public ecosystem, while at the same time helping to reverse global warming and improving lives, which are the foremost issues outlined in the Agenda 2030 for Sustainable Development (United Nations, 2015).

The New Urban Agenda

The New Urban Agenda (United Nations, 2017) represents a shared vision for a better and more sustainable future in which all people have equal rights and access to the benefits and opportunities that cities can offer. It makes several commitments to the role of innovation in improving urban governance, policy-making, service delivery, and participatory outcomes. Its call to action includes a commitment to adopting a “smart-city approach that makes use of opportunities from digitalization and technologies, thus providing options for more environmentally friendly choices that boost sustainable economic growth and improve service delivery” (§66). Notable commitments in the context of challenge-driven innovation include:

§58: Promote an enabling environment based on principles of environmental sustainability and inclusive prosperity, promoting investments, innovations and entrepreneurship.

§58: Address challenges faced by local business communities by supporting MSMEs and cooperatives, particularly formal and informal businesses and enterprises in the social and solidarity economy.

§60: Support urban economies to transition progressively to higher productivity through high-value-added sectors, by promoting diversification, technological upgrading, research and innovation.

§94: Implement integrated planning solutions that balance short-term needs with longterm desired outcomes of a competitive economy... while making efforts to leverage innovations in technology and to produce a better living environment.

§126: The NUA requires an enabling environment, including access to science, technology and innovation and enhanced knowledge-sharing, as well as capacity development and resource mobilization, tapping into traditional and innovative sources at all governance levels, as well as enhanced multi-stakeholder partnerships based on universal human rights principles.

§133: Call on businesses to apply their creativity and innovation to solving sustainable urban development challenges,

acknowledging that business activity, investment and innovation are major drivers of productivity and inclusive growth.

§150: Underscore the need for enhanced cooperation and knowledge exchange on science, technology and innovation to benefit sustainable urban development.

§156: Promote the development of ICT policies and e-government strategies, as well as citizen-centric digital governance tools, tapping into technological innovations, including capacity-development programmes, in order to make ICT accessible to the public to enable them to broaden participation and increase efficiency.

§157: Support science, research and innovation, including a focus on social, technological, digital and nature-based innovation, robust science-policy interfaces in urban planning and policy and institutionalized mechanisms for sharing and exchanging information, knowledge and expertise.

Cities as Drivers for Equitable Sustainable Development

Globally, over two-thirds of the world's population will live in cities by 2050. While cities are the powerhouse of economic consumption and production, with around 80 percent of the global GDP generated in cities around the world, this comes at a price. Cities account for 37–49 percent of global greenhouse gas emissions, and as much as 71–76 percent of energy-related CO₂ emissions (International Resource Panel, 2018).

The African continent currently contributes to only 3 percent of total global greenhouse gas emissions, despite having 17 percent of the world's population (OECD/UN ECA/AfDB, 2022). Most African cities have per capita emissions that are below their fair share of the global carbon budget. However, this is projected to grow on the back of a booming population, increased urbanization, electrification, industrialization, and land-use change.

According to a flagship report by the UN (UNEP & UN-Habitat, 2021), urbanization is one of the key drivers of environmental change and calls for urgent action to achieve net-zero circular cities that are resilient, sustainable, inclusive, and just. Emphasizing the links between social and ecological calamities, it is paramount for cities to co-create pathways to overcome the main social-political lock-ins that perpetuate both inequality and climate change. No change of this scale can be addressed by one actor alone, and thus this path to a sustainable future poses an imperative for city leaders, urban planners, local communities, national institutions, scientists, the private sector, and civil society to come together to jointly solve this multidimensional challenge.

African cities continue to carry the brunt of climate-related challenges, along with the negative impacts of resource

depletion and socio-economic inequalities. Infrastructure, which is rapidly developing on the African continent, is a crucial factor in transforming cities, which can lock in environmental and social impacts for decades. These can include, for example, the carbon emitted from a poorly planned road system or the negative effects of a lack of green spaces on public health.

In order to achieve sustainable urban development, we require strong local leaders that reimagine new ways of decision-making at the city level. We also need to rethink the current urban planning scenarios that may perpetuate social inequities and high greenhouse gas emissions. And we must take advantage of new, progressive models of innovating in cities, such as through the use of new technologies or innovation methodologies, which will if implemented adequately, lead to truly transformative and sustainable change for cities and their residents.

Urban Innovation

If cities are where there are most acute socio-economic, environmental and technological problems, they also offer a “natural collaboration setting for solving societal challenges” (Kulkki, 2014). The concentration of people creates a critical mass of diversity, which in turn provides opportunities for innovation and new technology, services, and business models (NESTA, 2007). Cities connect to global markets and are hubs of entrepreneurial and innovative activity. Knowledge spreads faster in city environments than their rural counterparts and gives voice to a multitude of actors. Some of the open innovation models that were originally developed for the business world are already being applied in some cities around the world, allowing stakeholders outside the public sector to co-create tools in collaboration with citizens and tap into relevant global knowledge. A key challenge is how to spark innovation in a cost-effective and low-risk manner, so that even resource-constrained cities can benefit from the new innovation tools and methods to achieve their SDGs.

Cities are well placed to be living labs for experimentation and prototyping of innovative tools and technologies, with the active participation of citizens. These allow cities to tackle their many “wicked problems” such as greenhouse gas emissions

from buildings or transport, or water pollution, which are caused by complex dynamics involving people’s behaviors and institutions. While the problems are beyond the political sphere of one local government, it is evident that models leading to systemic transformation and change must be developed. There is no one-size-fits-all solution to engage citizens or co-design solutions together with a municipal government. There are, however, innovation models that have been defined that can spark new ways of looking at a problem, using experiential learning and other design thinking approaches, thus facilitating the development of new solutions that can be tested in a city context.

Technology can play a transformative role in shifting cities towards becoming more innovative, as it puts the end users – people – at the center of innovation processes. Technologies are already being used by many cities to deliver services, manage urbanization processes, and communicate with residents. If digital technology is applied with the right digital human rights principles, it has the potential to serve people in a truly inclusive way – but several risks have to be mitigated by local governments to ensure that people’s access to data and services, as well as their rights, are protected (UN-Habitat, 2022).

Designing a City Innovation Challenge

UN-Habitat has developed a bespoke methodology that uses challenge-driven and open innovation to help cities identify, test, and procure innovative solutions through crowdsourcing and bringing public and private stakeholders together to implement innovations that solve urban challenges. UN-Habitat takes local governments through a process of challenge definition, engagement of innovators, system demonstration, implementation, and investment. During an innovation challenge, technical support and resources are provided to develop local capacities in procuring and experimenting with innovation processes and system demonstrators. With its extensive expertise and experience in urban challenges, UN-Habitat can provide tailored support to cities, based on local needs, and ensures adequate participation of all stakeholders across different sectors, paying particular attention to urban residents.

In challenge-driven innovation, cities and local governments lead the challenge process and work with UN-Habitat to engage with key actors and partner organizations to deliver innovative solutions, often counting with the contributions of civil society. The challenge methodology contributes to strengthening the cities’ connections with existing and future partners. It identifies areas of opportunities to improve mechanisms of innovation and tools to achieve the SDGs at the local level.

Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology. (Chesbrough, 2003)

The customizable methodology offers cities and local governments the opportunity to experiment and test solutions to understand better the innovation ecosystem. Such practical experience enhances local capacities in different areas, including procurement and investment of solutions aimed at addressing social and environmental challenges. It incorporates public participation in the decision-making process and brings the private sector closer to the local government in its quest to innovate. The participation of women and youth is predominant in existing applications of the methodology and has shown solid positive results in sparking innovation. As part of a capacity-building component, cities and local governments are exposed to international best practices from partners, with examples that highlight the development of technology and innovative tools with a people-centered approach.

Improving Service Delivery for the People

The aim of designing and implementing innovation challenges is to improve the delivery of essential services in cities and their residents. For instance, an urban innovation challenge could address the lack of access to basic services such as public transport, public spaces, safe water, improved sanitation, or energy systems. It is important that when designing technological solutions, they must be embedded in an inclusive approach, respecting the digital and non-digital rights of all. The solutions must address a societal problem and must be needs-based, meaning that the city and relevant stakeholders must have defined a specific need first.

Through the application of innovative methods, more opportunities are created for people who struggle to have access to quality services. While an innovation challenge cannot address all underlying power dynamics and relations that make up a city's fabric, its primary purpose is to help improve people's lives and create equality.

There is an urgent need to upskill and empower the next generation of city and community leaders to accelerate the creation of data-driven planning and development tools and inclusive decision-making processes. Engaging innovators to co-design solutions with the city and residents gives the public a bigger say in the products and services that are developed. For instance, residents will be invited to test out new public engagement tools or influence the design of new zero-carbon housing based on their opinions. A challenge run in partnership with a city can empower the public—especially young people—to collaborate with city leaders and innovators from the beginning, to explore and use data in new ways, and to create ways to test and demonstrate new technologies in the public realm, with the input of residents and businesses.

The Process

UN-Habitat has designed a process to equip a city with a proven methodology to accelerate the adoption of innovative solutions to effectively address urban challenges. This one-stop methodology guarantees the sequencing of 'idea-to-solution-to-financing' and creates a maximum impact to improve the quality of life of urban residents sustainably and inclusively (Figure 1).

With this methodology, UN-Habitat provides a city with an innovative framework that helps them incorporate small and medium enterprises (SMEs) in the delivery of essential urban services and thereby fill existing gaps in sustainable service provision. In the first step of the process, a city outlines its most pressing challenges and is then invited by UN-Habitat to embark on targeted data collection on the city's innovation capacity and SDG compliance, coupled with a process to narrow down and prioritize key actions for the local government that will directly improve the quality of life of residents. This research and visioning phase is followed by a matchmaking process where the identified gaps are paired with practical solutions by SMEs and other urban innovators. After these gaps and matching solutions are identified, an incubation process is initiated where the innovative solutions developed by SMEs, and the local government will receive practical guidance through capacity-building activities to prepare the ground for the SMEs and innovators to thrive sustainably within the public sector, and for city officials to procure new services efficiently. The innovators are then invited to design prototypes for their solutions in a systems demonstration phase and to use this stage of the process to fundraise for additional financial resources and unlock investments for scaling the solution.

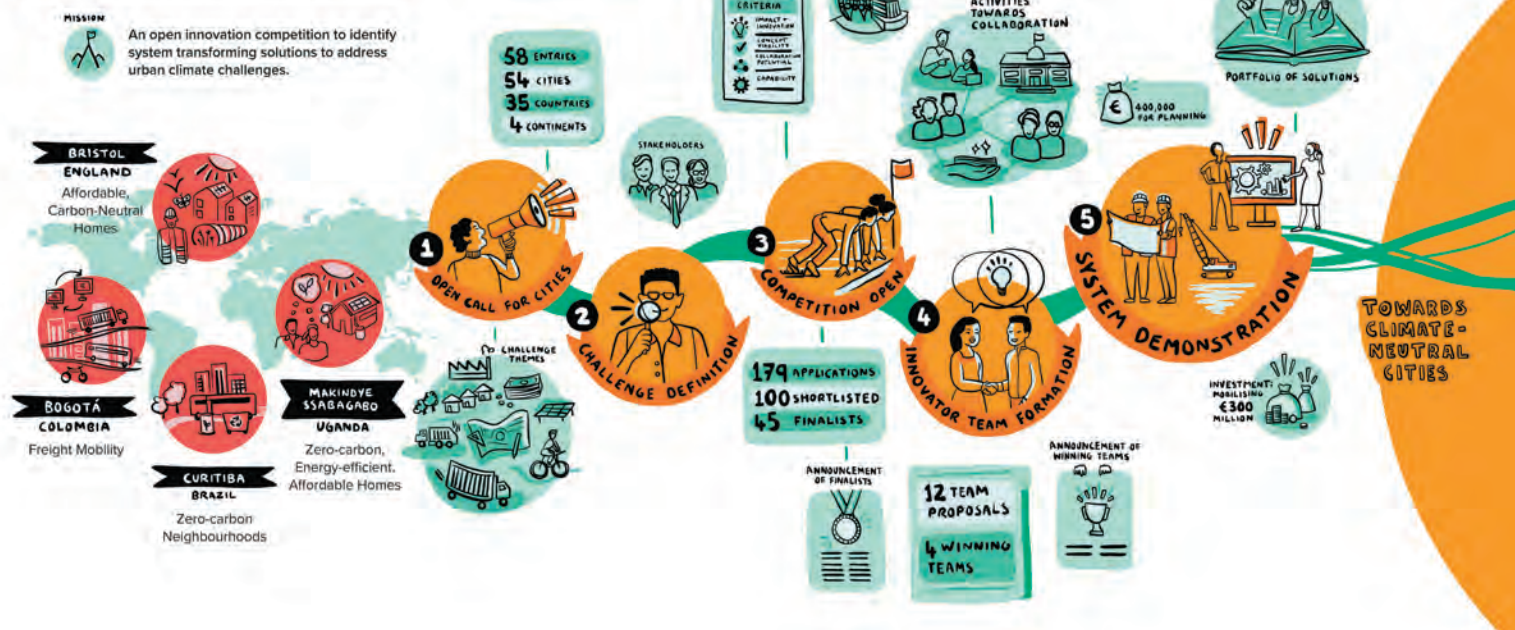
An innovation challenge process must be well documented, lessons learned captured, and knowledge disseminated, to strengthen the city's ability to innovate and support innovations for a sustainable urban future. This methodology, once applied to a city, will unlock essential knowledge on how cities can rethink their "business as usual" scenarios and come up with new ways of engaging innovators in their policy and planning processes. It is also a customizable methodology, allowing for flexibility and adjustments based on a city's needs. This process will significantly change the way that we manage cities, and how identified actions and solutions are developed and felt by those that matter most—the city's residents and innovators themselves.

Challenge Definition

City-based open innovation challenges are an increasingly popular way to help local communities solve problems. They

Climate Smart Cities Challenge

The Journey 2021 - 2023



draw on the philosophy that “good ideas can come from anywhere” and open up avenues of collaboration that are not typically found in local government procurement processes.

In this first stage, a city approaches a challenge owner—or example UN-Habitat or other partners—to jointly tackle an urban challenge that the city faces. The city must demonstrate its commitment to the cause, as this helps for continued engagement and ownership throughout the process – for instance through a letter of support from the highest possible office within the municipality. With this, the city can kick-start this crucial first step: to define the scope of the problem that they want to address through the challenge. This process is composed of five key steps, ensuring that an overall mission is achieved that is linked to a greater societal value:

Step 1: Setting the Stage

This is the first and preparatory step in the process. A dedicated city team is mobilized to carry out preliminary background information and data collection. It is crucial to collect as much granular information about the city, the neighborhoods, and residents as possible, and to utilize participatory engagement tools to include the wider community.

Expected results:

- All participants in the process understand key concepts related to the city challenge;

- Participants are familiar with and understand the logic of the process;
- A city task team is selected to guide all city stakeholders through the process.

Step 2: Discovery

A discovery workshop aims to conduct a systems analysis of the identified problem including the potential insights of stakeholders. Facilitators from UN-Habitat conduct a practical workshop with municipal staff and a select group of local stakeholders to interrogate the challenge from a systems perspective, and identify and explore stakeholders and their needs, using a design thinking methodology.

Expected results:

- A systems understanding of the challenge;
- Deepened understanding of local needs, history, communities, environments, and other key aspects that will influence the challenge definition;
- An initial mapping of the needs and interests of stakeholders—potentially reframing the challenge from different perspectives, if needed;
- Preparation of the stakeholder engagement step.

Step 3: Stakeholder Engagement

Collaboration with residents has a key function: to build trust among all stakeholders, especially those who the solutions are developed for. As innovators are designing solutions for the problems that have been defined in the challenge definition stage, it is crucial that challenge owners listen to the needs of the residents. This can happen through design thinking workshops, where participants put themselves in the shoes of all relevant stakeholders.

The objective of this third step is to deepen the understanding of the stakeholders connected to the challenge. The city can expand the user research and data collection to more groups that have been identified beforehand, and, if needed, increase the amount of data collected from one or more groups.

The cities will have time to coordinate participatory processes which must be inclusive and driven by the need to understand how the challenge impacts the community and other stakeholders. During this process, cities can brainstorm on the findings, and pursue more stakeholder information when relevant, e.g. conduct follow-up interviews.

Expected results:

- Data gathered that reflects the stakeholders affected by the challenge;
- The voices of marginalized populations and vulnerable groups, such as women, children and youth, elderly people, and differently-abled persons, are included;
- Cities have a clear assessment of the risks that may affect the community, concerning the challenge;
- Cities have prepared a brief overview of the stakeholder engagement process, by capturing relevant data for the challenge and brainstorming on key findings.

Step 4: Challenge Definition

The objective of organizing this workshop is to start defining the challenge in more detail. UN-Habitat will lead a practical workshop with a smaller number of city stakeholders to take the insights and findings from the previous steps, ideate, and translate them into a challenge brief.

Expected results:

- All participants are in agreement on the objectives of the challenge brief;
- Draft challenge brief and challenge statement.

Step 5: Writing and Validating the Challenge Brief

The objective of this process is to finalize the challenge brief

and validate it with key stakeholders and the community. This is an essential step in concluding the first segment of running an innovation challenge, which is to put in writing any findings, research, and data on the existing conditions of the city, and the challenge at hand in detail. This document is important as it will allow the innovators, who will apply to the challenge, to have a thorough understanding of which solution to build to which exact problem.

Expected results:

- Draft challenge brief to validate with stakeholders is produced;
- The final challenge brief is produced after final validation from stakeholders

Open Call and Engaging Innovators

After a Challenge Brief has been produced, the challenge owners are jointly organizing the next step of the challenge, which is to design an open call for innovators to apply to and match the best solutions with the identified challenge. This open call is publicly launched and shared on relevant platforms and through all networks of partners. It offers a reward to the team that comes up with the best solution.

Expected results:

- Get as much exposure to the city challenges as possible;
- Attract innovators by submitting their solutions to an identified problem;
- Generate interest among all stakeholders and raise the profile of the city and the funders.

Matchmaking and Team Formation

A matchmaking process is introduced, where the challenge owner and city officials invite the innovators to collaborate on possible joint solutions. They will then pitch their ideas to the challenge organizers, who will choose a so-called winning team that will implement their solution in the city. This process is unique to UN-Habitat's innovation challenge methodology, and particularly attractive, as the open and participatory nature of the challenge process allows stakeholders with different expertise—for instance in challenge definition, market access, solution design, technical ability, implementation capacity or project bankability—to come together to co-design a solution. Through this, the solution will be integrated into a wider system rather than remaining isolated from other developmental challenges a city may face.

Expected results:

- Allows innovators to co-design solutions in a team composed of the local government as well as other

stakeholders, and embed it in a wider system;

- Invite further stakeholders to help with consultations and information gathering;
- Collaboratively refining the solution through a systems lens.

System Demonstration

The system demonstration phase allows for the innovators to test solutions identified through the challenge process. The results of this pilot phase are used to design and influence procurement and implementation processes. This process may be the longest of all steps, as a team has to jointly design implementation steps, develop prototypes based on their individual expertise, work with the city to fit the solutions into the existing policy landscape, and identify an implementation and funding plan.

The final outputs are products and services that have been developed collaboratively and that respond to the needs and targets of municipalities and citizens. They are designed with the expertise of the private sector and are aligned with the economic goals of existing as well as potential investors. This step may also require further fundraising, which will be led by the innovators and facilitated by the city team and challenge hosts. This challenge-driven innovation process helps municipalities

innovate and test new solutions while bringing them closer to the implementation of the SDGs.

Expected results:

- Solutions are developed leading to a system transformation;
- Clear implementation pathways for the solution are developed into prototypes;
- The prototypes are built in a city testbed;
- Lessons learned will be drawn from this experience, to scale the solution and attract further funding

SWOT Analysis for Challenge-Driven Innovation in African Cities

In conducting a SWOT analysis, this paper attempts to understand and document the viability of designing and implementing innovation challenges or competitions in African cities (Table 1). It is evident that there are more strengths and opportunities than weaknesses and threats. Some of the threats and weaknesses also have the possibility of being incorporated into a challenge project design process, for instance through a stronger capacity-building component as part of the innovation challenge.

Table 1: Viability of Innovation in African Cities

Strengths	<ul style="list-style-type: none"> • Generally, a good enabling environment for entrepreneurship and innovation • Private sector has ample technical capacity • Willingness to accept service delivery through private sector is high due to low effectiveness of governmental delivery • Interest in multi-stakeholder partnerships is high • Expansion of ICT infrastructure and national integration is high
Weaknesses	<ul style="list-style-type: none"> • Capacity of local governments to lead a challenge may be low • Access to capital and investment is a challenge • Urban environmental sustainability is a lesser priority than other socio-economic challenges • Businesses have less experience working with the public sector • Pilot scale projects may work because of small businesses; difficult to manage large scales and replicability
Opportunities	<ul style="list-style-type: none"> • Alignments with global, regional, national and local-level commitments and priorities is possible • Innovation, both digital and non-digital, is becoming increasingly attractive • Public participation and access to information is growing, also through digital platforms and mobile phones • Pilot seed funding and business acceleration funding can kick-start urban innovation processes • Presence of UN-Habitat and other global urban stakeholders (e.g., C40) in many African countries and larger cities
Threats	<ul style="list-style-type: none"> • Rapidly changing political landscapes and higher levels of uncertainty • Blockades to implementation are political and not necessarily solved through funding • Disruptive technologies may provoke resistance and backlash • Profit-driven solutions may prevail over civic and sustainability solutions • Social resistance to structural changes in employment and economy

Innovation in Ugandan cities

The Ugandan technology and innovation sector is growing. While public sector entities are only slowly embracing transitions to promote innovation and the adoption of new technologies at scale, many private sector actors have developed a plethora of funding and partnership schemes designed to amplify local innovation, testing, and solution creation to make transformative shifts to the economy, society and ecological sustainability as a whole. Business incubators and start-up accelerators are many, and also have the potential to promote SMEs working with thematic areas of an urban sustainability innovation challenge. There is also a broad acceptance of the possibility for service delivery which might otherwise be performed by the state or municipality to be done through the private sector. Many years of perceived ineffectiveness or inability of the government to deliver some relatively basic services have fostered this attitude.

One of the main observations is that innovation-oriented companies often struggle to fit their products into a market or policy environment, despite having the necessary technical and knowledge capacity to succeed in building transformative solutions that could benefit all. For instance, if an innovator develops a new, revolutionary product in the renewable energy market, it is left unclear how regulatory mechanisms will truly support the new products, how legal compliance is ensured, and how implementation policies are consistently adhered to. The agencies which are intended to assist with innovative or entrepreneurial activities tend to operate in silos, with varying and sometimes contradicting criteria requiring applicants to commit substantial time to navigate them. Thus, many of these initiatives remain underutilized or cannot be brought to scale.

Much of the innovation required for sustainable urban development across Uganda relies on heavy financial support. Good technical ideas and solutions are there, but funding is still weak. Local governments often have fragmented support systems and mechanisms, because departments and entities and national and local levels are not always well coordinated among themselves. Yet, various international, public, and private entities are exploring new funding mechanisms, for instance working with large financial institutions, to unlock funding for innovative urban solutions. The Climate Smart Cities Challenge is one such opportunity.¹

Even if the funding becomes available through one of the public-sector support programs, many of them either leverage or require some form of partnership. Innovative and strong partnership and ownership models are required for success, and there continues to be a risk of failure especially when

multiple players enter the picture and collaboration modalities are not clear.

For digital innovations, the expanse of support mechanisms is considerably smaller. The lack of capital is often a major impediment. For some of the support mechanisms available, and for nearly all private investors, proof of concept needs to come first before funding will materialize. In the absence of a strong venture capital scene, initial start-up or seed funding is difficult which in turn creates a high-risk profile for innovations. Access to capital is considerably easier if a proven market already exists. Digital innovations have a huge potential to scale, also through an innovation challenge, and are often the source of innovation. Mobile phone penetration, as well as smartphone penetration, is growing, with 46 percent of Ugandans (or 19.8 million) using mobile internet. However, smartphone adoption is still low, with 16 percent of smartphone users in Uganda, compared to the Sub-Saharan African average of 30 percent (GSMA, 2019). Yet, many Ugandans rely on lower internet connectivity (61 percent of connections are relying on 2G internet).

As the country is expanding the availability of and access to ICT infrastructure at a nationwide scale, it is also on cities and municipal governments to recognize how digital innovations can unlock further opportunities for low-income residents and improve their livelihoods and access to services. The steady growth of mobile phone and smartphone connectivity will evolve at a fast pace, and public institutions at national and local levels will have to adjust towards increasing their innovation capacity to keep up with this rapid transformation.

The Climate Smart Cities Challenge in Makindye Ssabagabo, Uganda

Through the Climate Smart Cities Challenge, UN-Habitat and partners worked with the city of Makindye Ssabagabo in Uganda to attract innovators in developing scalable ways to build zero-carbon, energy-efficient, affordable homes (Figures 2 & 3). The city applied to participate in the innovation challenge and won their bid out of hundreds of cities, together with three others. They made a compelling pitch to the challenge owners, which resulted in a Challenge Brief being produced that outlines the status quo of the housing challenge (Figure 4).²

Next, an open call was issued in 2021 to invite solutions from innovators to solve the challenge of green and affordable homes. A financial incentive of approximately USD 100,000 was promised to the winning team. Nearly 50 applications were received from start-ups and organizations from around

¹ See <https://climatesmart.citieschallenge.org/>

² See https://climatesmart.citieschallenge.org/wp-content/uploads/sites/77/2021/11/ChallengeBrief_Makindye_FINAL.pdf



Figures 2 & 3: Views of the city of Makindye Ssabagabo, Uganda.

the world. In a rigorous selection process, the challenge owners narrowed the finalists down to a shortlist of 12.

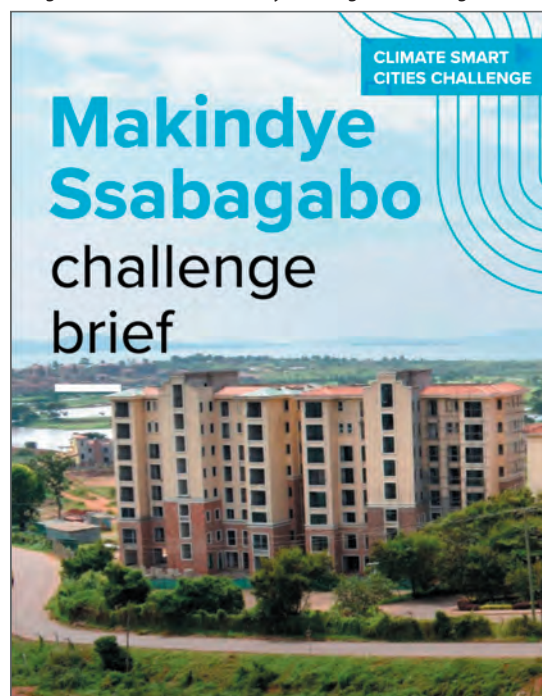
The 12 finalists were then asked to matchmake and develop so-called winning teams which were then invited to pitch their solutions to the city and challenge owners. Through this selection process, one winning team – Green Community Cities – was chosen, composed of the following organizations:

- Eco Brixx (UK), focused on providing sustainable building materials;
- Marula Proteen (Uganda), an insect-based biorefinery;
- Impact Building Solutions Foundation (Uganda), a housing developer;
- Impulser AB (Sweden), focused on wastewater solutions;
- Urban Planning Constellation (USA), an urban planning consortium;
- CLC Global-USA (USA), an urban planning consultancy.

Green Community Cities (GCC) is currently implementing this green and affordable homes pilot project, which has five primary work pages. In a first step, they are working together with UN-Habitat and the Municipal Council of Makindye Ssabagabo (MSMC) to develop the system demonstrator mission on the sustainable production and use of building materials, neighborhood services such as a public sewage network, waste disposal, and energy systems to drastically reduce GHG emissions. The team will also review how existing policies, legislation, regulations, and incentive structures relate to the system demonstrator. This will be put together into a greenhouse gas inventory and an action plan.

The team is also facilitating a process of building coalitions through stakeholder engagement and learning exchanges involving MSMC, national government stakeholders, Vinnova, private sector providers, civil society, academia, and residents to formulate a shared vision for a zero-carbon Makindye Ssabagabo. This work package builds on the previous activities, and will seek to build effective local and global coalitions to build knowledge and expertise on zero-carbon urban development, innovation, and system demonstration.

Figure 4: Cover of the Makindye Ssabagabo challenge brief.



As a third step, MSMC, private sector providers, and the coalition of stakeholders built in the previous step will implement the technologies and related solutions in real-world environments and specifically identified sites to demonstrate the potential impact on housing and climate challenges faced by the Greater Kampala Metropolitan Area.

The partners will then identify, engage with and respond to potential funding and investment opportunities to mobilize larger funding for the implementation and mainstreaming of the system demonstrator. Lastly, GCC will identify partnerships, and learning opportunities to strengthen the existing capacity of MSMC and the team, with a strong focus on knowledge exchange that will benefit Makindye Ssabagabo and other cities. All the system demonstration activities will also be thoroughly documented and promoted through the production of multiple communication materials.

Incorporating Lessons into an Improved Challenge Design

While the process of the Climate Smart Cities Challenge is still ongoing, there are already several important lessons learnt from the process. First, it is key that an innovation challenge is set up on in the most professional way. This involves highly effective partners that have experience running challenges and can implement a challenge through their contribution of necessary expertise. This challenge owner team will set the precedent for innovators and cities to co-design their solutions based on a well-structured process that involves incentives and clear guidance.

While the solutions a winning team is designing may end up being very complex, particularly when merging several solutions by individual innovators, the solutions mustn't be too convoluted and hard to achieve. For instance, a solution could be low-cost, low-tech, and only focus on strengthening sustainability, not trying to tackle all at the same time. However, the solutions should always aim to have the highest standard and should be multidisciplinary, to lead to a truly systemic change.

Next, the solutions that are developed should always have people at the center, particularly the most vulnerable, and should address societal problems through sustainable solutions. This means that the winning team must work with all relevant stakeholders in the ecosystem, even those outside of the challenge—for instance, the private sector, academia, community groups, and other government entities. The challenge process, therefore, creates additional value to a larger issue, helps strengthen dialogue, and amplifies solutions and additional opportunities.

The challenge team must identify how their solution will align with and fit within existing and planned municipal policies and plans. No solution can successfully be implemented in isolation, and therefore close coordination with the municipality throughout the whole challenge process is inevitable. The municipality will then help to connect the dots among the innovators, all relevant government departments or entities, and other important stakeholders.

Lastly, an innovation challenge must have a clear communication and outreach strategy. Given that challenge-driven innovation is still a novel concept for many, such a process must be broken down into easy-to-digest information pieces, news stories, and progress updates that can reach as many people as possible. The challenge process must be clear both for the internal teams as well as for the public, city officials, and other stakeholders. In the same manner, a thorough evaluation of a challenge, once completed, is crucial, as many important lessons will be drawn that can inform the updated design and implementation of future innovation challenges.

Conclusion

The African continent is undergoing a period of profound socio-economic, political, technological, and demographic change which is manifested most acutely in African cities and towns. Long-standing institutional norms based on an unequal political power equilibrium, strong vested interests, and other entrenched systems are no longer appropriate, and new dynamics are needed to define novel and innovative policies and strategies that can tackle the challenges faced by African cities.

New mechanisms are needed to build the innovation capacity of municipalities and urban residents, with the resources and trust to facilitate the transition to a more integrated, sustainable, and just urban African future. In this paper, I argue that challenge-driven innovation is such a new mechanism. More urban policymakers should take advantage of the documentation that is already available on running innovation challenges, and call upon organizations such as UN-Habitat to support the implementation of a challenge in their respective city.

Only a few African cities have to date applied a challenge-based innovation model to address one or several of their problems. There are enormous opportunities to expand the methodology to different cities across the continent, as it is a tailored approach that has room for flexibility and local adjustment. Yet, there are cross-cutting pre-conditions that must exist for an innovation challenge to be successful, which include:

- Clear support from the municipal government and strong stakeholder engagement;

- Openness to new ways of working, also with different partners;
- Ability to engage multiple stakeholders in problem-solving;
- Systemically unlocking city challenges, leading to system transformation.

What is evident is that we need more innovation challenges and competitions focused on the unique challenges of African cities. Cities have the ability to attract innovative funding if they partner with experienced challenge owners such as UN-Habitat, which in turn can unlock additional financing for solution testing and system demonstrators. African cities host a plethora of innovators, SMEs driving change in their respective sectors, as well as innovation hubs converging businesses, citizens, and governments. We must unlock new opportunities to test ideas and solutions developed by innovators, learn from them, and translate the lessons and data generated from these into new actionable outcomes – such as scaling and replicating solutions, as well as setting up new challenges tackling different sets of urban problems.

Emerging Research Questions

As has been discussed above, challenge-driven innovation processes are an impactful and sustainable way to engage cities and communities in new, innovative projects and initiatives. While they offer many new tools, partnerships, and processes for municipalities to take actions that positively impact their cities and residents, there are a few open-ended questions that will require further research and data collection. UN-Habitat has identified the following questions as a matter of priority, and is looking to academia as well as to the outcomes from successfully completed urban innovation challenges, to guide new knowledge on the topic:

- What is a tangible alternative to conducting challenge-driven innovation in a city context? What other problem-solving approaches exist that can address specific urban challenges?
- What urban or institutional sectors are most suited to innovation competitions? And how is this determined?
- What is a more effective way to conduct an innovation challenge: An internal challenge-driven process to build a municipal institution's capacity, or an innovation challenge to build successful collaborations between the public and private sectors?

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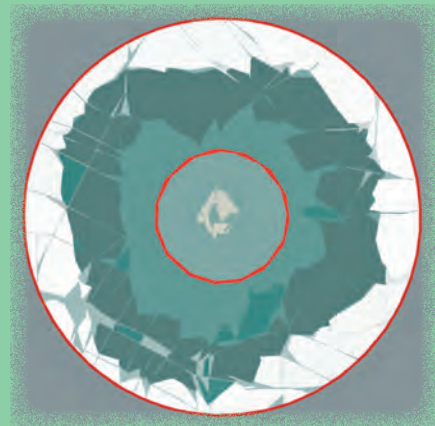
F.A.R. (floor area ratio) versus E.I.R. (environmental impact report)

by Blaze Skyra

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FOCUS 19

CRP Faculty and Student Work



A House with a Door: Sugao Village Women ask of Development

Hemalata C. Dandekar

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City and Regional Planning Department, Cal Poly.*

Claims to house, home, and secure shelter, and the vulnerability that results for village women when these are disrupted are discussed by professor Dandekar through thirty-five stories that identify how gender differences affect rural residents' access to the benefits of development planning. The stories and accompanying photographic records give voice to Indian village women, a constituency that is rarely heard from.

In 1979 I was revisiting a village I named Sugao (beautiful village) in Maharashtra State India.¹ I had spent a year and a half there in 1976-77 on a Fulbright Doctoral fellowship researching and writing a book on urban industrialization and rural linkages. In 1979, I was talking with people in Sugao to assess their reactions to central government efforts to encourage the production of methane gas at the household level as a source of energy. *Gobar* (dung) gas plants as they were called, were micro biogas production units designed for construction by individual rural households. They were being promoted as a "sustainable," local, source of energy that could be used in agricultural cultivation and in rural homes. Participation by both men and women in the adoption, maintenance, and use of *gobar* gas plants was going to be key to success.

Talking to Sugao people I was struck by the great differences in men's and women's reactions to potential household investment in these family-size biogas plants. Most were familiar with the multiple developmental benefits the Indian government was claiming would accrue. As reported in some detail in my article *Gobar Gas Plants: How Appropriate Are They?*² these potential benefits were perceived quite differently by men and women. Men were interested in using these bio-gas digesters

to enhance agriculture by producing soil conditioners; generating fuel to work pumps for irrigation; and, for their potential to reduce expenditures for energy with an alternative technology that operated on methane gas. Few men noted that the task of cooking itself could be made easier by investing in kitchen stoves that could use methane gas, a clean heat source easy to use. The gas stoves would be a stark, positive, contrast to the prevailing traditional stoves that burned wood and straw. The new gas stoves would leave cooking utensils cleaner and re-

Figure 1: A Sugao woman who does day-labor in the field coming to the door to get paid for the day's work. (photo by the author)



¹ I coined the name Sugao to protect identification of the exact village and the identity of the people featured in my book *Men to Bombay, Urban Influence on Village Life in Deccan Maharashtra, India, 1942-82* (Ann Arbor: Center for South and Southeast Asia Publications, University of Michigan, 1986). https://www.press.umich.edu/19469/men_to_bombay_women_at_home. Earlier surveys by the Gokhale Institute had provided me with baseline data and a survey I completed in 1977 allowed the delineation of major measurable parameters of change over 40 years in village life and economy as a result of industrialization.

² Published in *Economic and Political Weekly*, May 17, 1980, pp. 887-893. Available at https://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1042&context=crp_fac&httpsredir=1&referer=



Figure 2: Women collecting water in the morning at one of the common village water taps. (photo by the author)



Figure 3: Sugao woman sitting in kitchen in front of a traditional wood-burning clay stove using traditional cooking utensils. (photo by the author)

Figure 4: Harvesting millet; a staple in meals in Sugao is millet break or bhakari. (photo by the author)



duce the arduous scouring of utensils that women had to do after every meal. Women were quick to see that operating the bio-gas plants would mean more work for them; more fetching of water, and more time to prepare dung slurry, to clean up. They did not anticipate that priority would be given to purchasing the needed gas stoves for cooking resulting in few accrued benefits directly to them such as savings in their time and labor. These two perspectives were a tangible illustration of gender-based differences in, and reaction to, the differential impact of government-sponsored development programs and plans. It was an intriguing indication of differentiated preference along gender lines.

When I first began work on the village in 1976 I did not plan to write about women. I resisted doing so, consciously failing to acknowledge the constraints that I could see village society imposing upon the Sugao women I was getting to know. Perhaps my resistance stemmed from a belief that recognition would create an unwelcomed dilemma: confronting an age-old reality—the disadvantage of being a woman in Indian society. I thought that there were few remedies for changing the situation, particularly in the confines of a village. As a planner who aspired to help bring about positive change, I decided that addressing women's position was not a hopeful issue to engage with. I concentrated on documenting and describing those aspects of Sugao society and economy that I thought were amenable to intervention and change through a rational, planned development process.

This approach yielded publications including the book *Men to Bombay, Women at Home*, and numerous academic articles and chapters on various facets of village life. But doing the information collection for these left me with unforgettable vignettes about rural women's lives. Experiencing and participating in their daily routines and talking to women friends in Sugao had revealed the choices that were, or mostly were not, available to them. Although at the time women were not specifically identified as foci of planned development in Maharashtra, the forces set loose by development planning were aspiring to quite fundamentally change and improve all rural residents' lives. However, my observations at the ground level in Sugao concerning women were that they experienced little of that transformation.

In the mid-eighties, following the completion of my Ph.D., as a faculty member at the University of Michigan, I began to more systematically document Sugao women's lives and to ask them about their aspirations. Individual life stories interested me, and I thought they might be of interest to others, including planners, revealing as they did the dilemmas of implementing development planning programs that were perceived as improvements by village women. The belated, but recently

completed book *A House with a Door: Sugao Village Women ask of Development* is the long-postponed narration of those stories.³

The eight-five photographs and thirty-five chapters of the book document stories of Sugao women at a point when the village has experienced decades of planning interventions. They describe the life choices available to Sugao women and the changes achieved by efforts to bring about village development. They also reveal how and why, for some of its brightest women, these efforts fall short. Obtaining intimate and frank information about personal matters and opinions requires rapport, empathy, understanding, and respect. Consequently, the women in these stories were not chosen to obtain a representative sample of all Sugao women, but rather to feature those with whom I had such a relationship of mutual trust, from whom I was confident that I would get reliable information. Since so little is known, especially “in the fine grain” about Indian village women, the stories provide a voice to a few of them and yield a glimpse to the outsider of the constrained parameters of their world.

This documentation of the microcosm of that world, and the perceptions and attitudes of a handful of women in Sugao village—those in traditional roles and in new ones—include the photographs I took of Sugao women over the years. As an architect, the photographs were for me a compelling visual tapestry of the spatial aspects of women’s reality. They depict their daily world from the kitchen stove where they cook to the fields where they engage in agriculture-related tasks. Their stories reveal how simple lives can get dislocated and/or transformed by development. They outline the complex systemic adjustment that is set in motion through planned interventions and unanticipated change. Their stories are of lives that are within village-demarcated “norms” and accommodated to and acceptable in the emerging rural context, and others that are not, revealing critical fault lines in this change.

The stories were collected over some sixteen years from 1976-1992.⁴ Long, informal conversations with Sugao women friends

³ Available from Amazon.

⁴ Several stays in Sugao inform this work, most significantly a year and a half from 1976 to 77 to study the impact of development programs in the post-Independence period. Publications include: Dandekar, H. C., Brahme, Sulabha, “Role of Rural Industries in Rural Development” in R. Misra & K. Sundaram (Eds.), *Rural Area Development*, New Delhi: Sterling Publishers (1979); Dandekar, H. C., *Rural Development: Lessons from a Village in Deccan Maharashtra, India* (Ph.D. dissertation; University of California, Los Angeles, 1978); Dandekar, H. C., Brahme, V., Sulabha & Jagtap, M., *A Village in Transition, Study of “Sugao,” Satara District, Maharashtra State* (Gokhale Institute of Politics and Economics, 1978); Dandekar H.C., “Modernization of Agriculture, Monetization of a Village Economy,” in *South Asia Bulletin* vol. III # 2, 15- 30 , 1983; and Dandekar, H.C., *Men to Bombay, Urban Influence on Village Life in Deccan Maharashtra, India, 1942-82*; and my book *A House with a Door: Sugao Village Women ask of Development*.



Figure 6: Family grocery store in Sugao stays open long hours and sells small quantities of daily necessities to poorer families. (photo by the author)



Figure 5: Sabhindra in her fields with the smaller of her bullock carts. (photo by the author)

Figure 7: Scrubbing pots at the common village tap. Few houses had their own water connection. (photo by the author)



served to accentuate how different the lot of a village woman was from the range of choices open to me; a woman born in India who had had the benefit of an urban, liberal upbringing—the most valuable legacy women can receive from enlightened parents. What also became clear were the “inner-world” differences between these women, raised in a constrained rural ethos, and me, a woman raised in the more open, urban, one. Depicted in these stories are the importance of family and the claims it provides to house, home, and secure shelter, and the vulnerability that results when these claims are disrupted.

The literature on Indian women is often about urban, educated women from upper- and middle-class families. Stories about village women, their work, their families, their joys, and their despairs are hard to find. Conspicuously missing are village women's voices, articulating their perceptions and experience of their condition. In *A House with a Door: Sugao Village Women ask of Development*, the stories about women from Sugao village in Deccan Maharashtra provide, in a small way, this voice. They help to highlight the fact that planners need to look beyond the household as a unit of analysis when thinking about actions that seek to transform the daily parameters and available choices in rural people's lives. This book about Sugao women offers a glimpse back in time, into village women's world in the 70s to early 90s. It provides a baseline of how things were. One wonders, in the interim thirty-plus years that have passed, have Sugao women, and by extension village women in India, obtained greater control over that house and home? A return to the village to update these stories to the present day would provide a useful view for government planners and policymakers and for nonprofit organizations who seek to transform Indian rural women's lives and to expand their options. As Sugao women indicated to me some thirty years ago, a house with a door, a door that they can control at will, to close and be secure in, and to open and venture out from, is key to that transformation.

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A “First and Last-Mile” Assessment of California Rail Stations: A Sketch Planning Approach

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In this article, based on his senior project, Henry McKay presents a technical methodology for assessing the “first and last-mile” conditions with rail station accessibility in California. His spreadsheet-based sketch planning toolkit with background data enables users to assign weights to parameters of accessibility offering maximum user flexibility to test and compare alternative scenarios for improving access at the initial and the final portions of a trip by public transportation.

Pedestrian and Bicycle Accessibility is an ever more important area of transportation planning, especially as it pertains to rail stations. While a well-planned rail network can serve many people, travelers must get to and from rail stations on either end of their trips in order for the rail service to be of efficient use. The mode by which travelers make these trips varies depending on the station, but walking and biking are common, especially in urban areas. The nature of the built environment can play a large role in determining what modes are used to access rail stations. For example, dense urban areas with highly connected street networks and pedestrian and bicycle infrastructure encourage non-motorized station access. However, stations in less-dense areas lacking in street connectivity and pedestrian and bicycle infrastructure tend to encourage automobile access.

To the degree that these factors can be quantified, rail stations can be assessed on various accessibility factors, and problems can be identified. With this knowledge, planners can better address station area access issues. While this article provides background information on station access and describes some of the most important data in determining accessibility for bicyclists and pedestrians, it primarily discusses a technical methodology to quantify station area accessibility as well as a sketch planning toolkit to carry out the analysis. This toolkit is intended to assist practitioners who are already familiar with

accessibility issues in their areas of work, but who may lack the technical resources and or data to carry out a large-scale system analysis.

First & Last Mile Planning

This article broadly addresses issues related to “first and last-mile” planning. In transportation planning, “first and last-mile” refers to the portions of a public transportation trip where a traveler has to get from the origin to the transit facility or from the transit facility to the destination. In many cases, these legs of the trip are made using non-motorized modes of transportation such as walking or cycling (Los Angeles County Metropolitan Transportation Authority – Metro, Southern California Association of Governments, 2014). “First and last-mile” planning aims to increase the reach of transit service by strategically upgrading infrastructure around rail station areas to make them more accessible to travelers.

The recent resurgence in “first and last-mile” planning resulted in many transit agencies developing “first and last-mile” plans or access plans for specific stations or entire networks. This project is different in that it takes a much broader look at station area access but does so for the entire state of California. Furthermore, this project applies a consistent analytical methodology across all stations, enabling a wide variety of comparisons to be made.

Sketch Planning

The technical toolkit discussed in this article broadly falls under the category of sketch planning. In its simplest form, a sketch planning tool or process is a useful way to present a simplified version of an otherwise highly complex system (Crooks, 2008).

Note: This article is an excerpt from my capstone project to fulfill the requirements for the Bachelor of Science in City and Regional Planning degree at Cal Poly. I wish to thank Professor Cornelius Nuworsoo, my Senior Project Advisor, for sparking my interest in transportation planning. Before taking his courses, I had no idea which area of planning I wanted to work in. His hands-on, quantitative approach to teaching planning concepts heavily shaped me as a planner and I would not be where I am today without his guidance.

Sketch planning often involved the development of simple Spreadsheet or Geographic Information Systems (GIS)-based tools to quantify planning problems and to assess alternative scenarios without performing highly specific engineering analysis or costly demonstration projects. Though sketch planning tools often rely on default, highly generalized parameters, this toolkit allows users to input their own parameters and offers maximum user flexibility to test and compare alternative scenarios.

Data

The primary purpose of this toolkit is to enable planners and analysts to easily view, manipulate, and aggregate relevant station area data and create customized walkability and bikeability metrics. Table 1 shows the datasets used in the tool and their sources. The data was primarily sourced from publicly available sources, including Open Street Map (OSM), the American Community Survey (ACS), and the Longitudinal Employer-Household Dynamic (LEHD) survey. Data sources were specifically chosen that were (1) available at a granular geographic level (at least Census Tract) and (2) in a spatial or tabular format that could be easily read and manipulated by software such as ArcGIS or Python.

Using simple python scripting, data were aggregated around rail stations within ¼-, 1/2-, 1-, 2-, and 3-mile radii.¹ For use in the toolkit, the data were aggregated into a single measurement for each of the five radii. For example, accessibility isochrones were generated for each station area, showing the distance one could theoretically access via walking or biking given

the station's surrounding infrastructure. Figure 1 shows what these isochrones look like spatially around Union Station in downtown Los Angeles.

Table 2 shows the same isochrone data for Union Station but in tabulated form. In this case, the square mileage of each isochrone was measured. These isochrones were calculated for every station in the state and loaded into the spreadsheet tool for further analysis.

Toolkit

A spreadsheet-based tool was developed to aggregate the station area data in a useful and meaningful way and to enable users to easily generate station metrics and adjust parameters. The methodology developed to create pedestrian and bicycle accessibility metrics for rail station areas in California is quite simple and is based on several other fairly standard methodologies for performing similar types of analysis. Figure

Figure 1: Union Station Accessibility Isochrones.

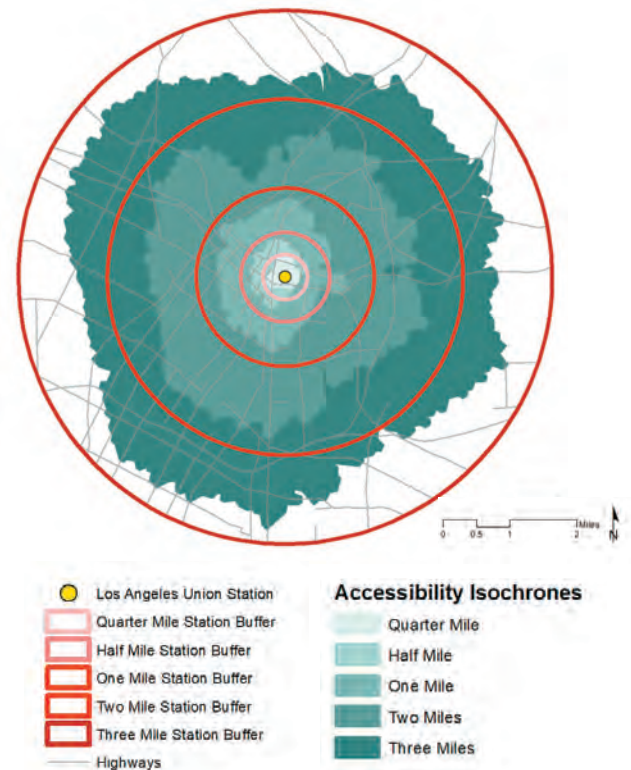


Table 1: Station Area Data.

Variable	Source
Service	Manual Inventory
Service Type	Manual Inventory and Classification
Bicycle Facility Mileage (Exclusive, Shared, All)	Open Street Map
Population Density	American Community Survey
Job Density	Longitudinal Employer-Household Dynamic
Environmental Justice (CalEnviroScreen Scores)	California Office of Environmental Health Hazard Assessment
Pedestrian and Bicyclist Safety	Statewide Integrated Traffic Records System
Commute Mode Split	American Community Survey
Intersection Density	Open Street Map
Accessibility Isochrones	Open Street Map, ESRI Network Analyst GIS Extension
Points of Interest	Open Street Map

¹ The python scripts and data used for this project can be downloaded from https://drive.google.com/file/d/1AhdwDL9lcRpsKffPbo3q_1-oqClz4O3/view

Table 2: Isochrone data for Union Station.

Accessibility Isochrone Area	Catchment Area				
	1/4 Mile	1/2 Mile	1 Mile	2 Miles	3 Miles
Square Miles	0.1	0.3	1.6	7.9	19.3

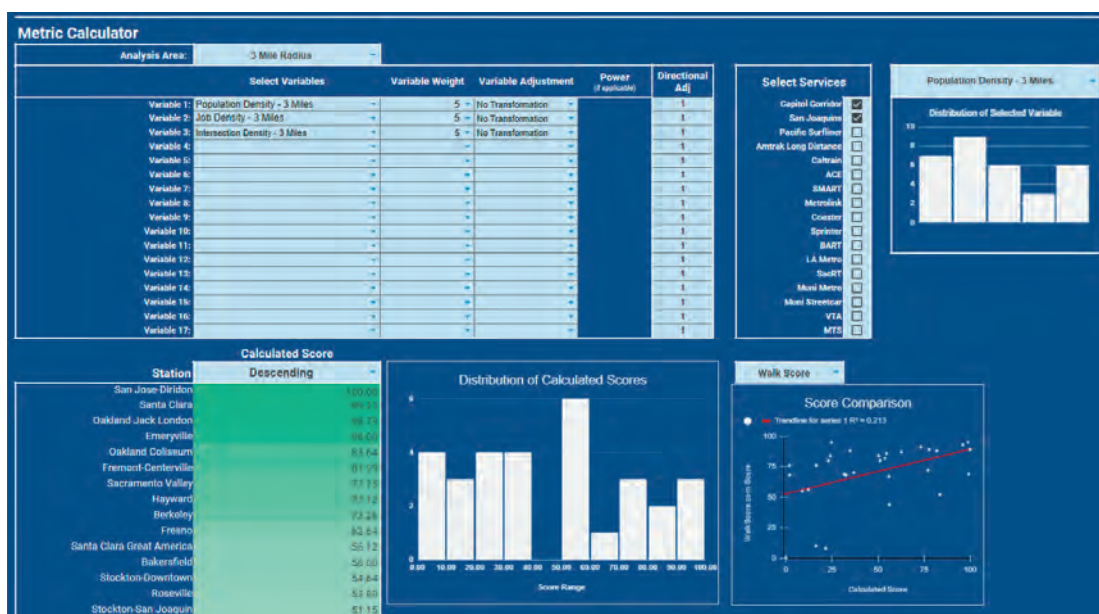


Figure 2: Spreadsheet Tool Interface.

2 shows the spreadsheet tool interface. To create these metrics, the methodology and tool utilize the following steps:

Input Data: The input data for the metric development methodology consists of tabular data, with a column for all five catchment area measurements for each variable and a row for each rail station.

Select Services: Though this step can be performed at any point in the process without affecting the final scores, it is important to select the rail services that will be included in the analysis. Doing so filters the data set to only include rail stations served by the selected services.

Select Area of Analysis: One of the primary assumptions of the methodology is that for a given analysis, all variables are measured within the same catchment area. Selecting an appropriate area of analysis filters the data set to only include measurements from the selected catchment area.

Add Variables: Variables are selected to be included in the metric itself. At a minimum, one variable must be chosen, but the metric can include as many variables as are available.

Select Variable Weight: Variable weights between one and five are selected for each included variable to determine how much influence the variable has over the final metric. This is done for each variable by taking a proportion of the variable weight to the sum of all variable weights in the metric.

Adjust Variable: Since the raw input data is often extremely

skewed, a metric distribution using only raw input data would also be very skewed. If this is the case, a percentile or a power adjustment can be used. A percentile adjustment simply creates a percentile value for each data point. For example, a percentile value of 0.8 would mean that the data point is greater than 80% of the data in its range. This is an ordinal measurement. A power adjustment raises the data point to the power of an inputted value between 0 and 1, effectively flattening the higher values in the range.

Directional Adjustment: In certain cases, it may be appropriate to subtract a variable's value from a score as opposed to adding to it. This could apply to safety data when a higher value of pedestrian deaths would theoretically work against a higher pedestrian accessibility score. If this directional adjustment is chosen, the value is simply made negative so that it subtracts from the final score instead of adding to it.

Sum Variables: Once all variables have been weighted and adjusted, the values are added together to create a sum.

Rescale: The range of final sums for each station is rescaled between 0 and 100 to create a consistent set of scores across the analyses. Furthermore, it is possible to create a negative score if highly weighted variables are given directional adjustments. Rescaling these values fixes this issue.

Final Scores: These rescaled values represent the final scores

² A copy of the spreadsheet tool can be downloaded from: https://docs.google.com/spreadsheets/d/1HwoMzF_gV8wKpQP47mQxdMuV7nXerDwmZ9gUx2Vh-Uo/copy?usp=sharing

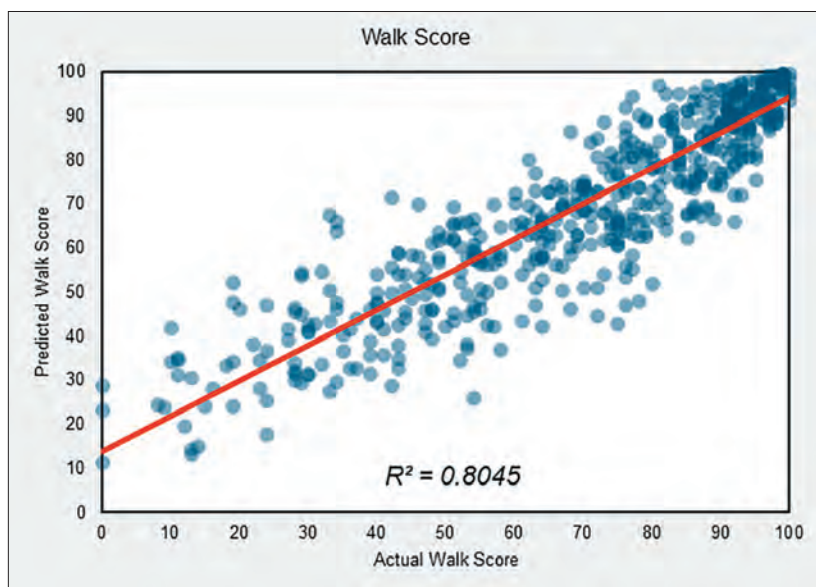


Figure 3: Calculated Walk Score Metric Vs. Walkscore.com Walk Score.

for each station. In every case, the scores range from 0 to 100, with a distribution highly dependent on the input data and adjustments chosen.²

Results

The spreadsheet tool was designed for maximal user flexibility and thus its resulting metrics vary widely and are highly dependent on how the tool parameters are set. To assess the tool's functionality and performance, stepwise regression methods were used to reverse-engineer walkability metrics from a popular real estate analytics firm, Walkscore.com, and recreate them with the spreadsheet tool and data. Including all rail stations in the state ($n = 633$), the tool data was able to explain 80% of the variation in Walkscore.com station walkability scores. Figure 3 shows a comparison between the calculated station walk scores and the Walkscore.com station walk scores.

Out of all the variables included in the tool, Points of Interest (POIs) had the strongest correlation to Walkscore.com's walkability metric. This makes intuitive sense as Walkscore.com's metrics are designed for the real estate market and are thus concerned with how many destinations can be reached on foot from a given location. While the spreadsheet tool is capable of producing similar metrics, its true utility is in its ability to modify these metrics to emphasize other variables—such as population density—and to help planners understand exactly what goes into a given metric.

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A Modified Methodology for Measuring Accessibility: A Case Study of Grocery Store Access in the Excelsior/Outer Mission Neighborhoods of San Francisco

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Usually, accessibility is measured by using only travel time via a gravity model or other spatial models. In this article, Alexandra Lee-Gardner and Cornelius Nuworsoo show the importance of combining physical proximity measurements with infrastructure information to provide a more complete picture of accessibility through a case study application to the Excelsior and Outer Mission districts of San Francisco.

Grocery stores are an important amenity in neighborhoods and access to grocery stores is important for health and well-being. While grocery store accessibility is a popular research topic, studies measuring access for pedestrians, bicyclists, and transit riders are extremely rare. Using the Excelsior/Outer Mission districts of San Francisco as a case study, this study sought to account for the user experience of walking, biking, or riding transit by creating a rating system to capture the availability and condition of infrastructure in addition to the more traditional measure of proximity with a gravity model.

Rather than measuring accessibility using only travel time via a gravity model or other spatial model, this study shows the importance of combining physical proximity measurements with infrastructure information to provide a more complete picture. Combining results into a composite accessibility score highlights how using only a gravity model to measure accessibility may conceal some of the nuances of accessibility as perceived by pedestrians, bicyclists, and transit riders.

Specifically in the Excelsior/Outer Mission neighborhood, with its rather low infrastructure scores, sensitivity analysis shows that infrastructure can have a large effect on overall accessibility. This is particularly important for those walking, biking, or riding transit where safety is an important consideration. This study provides one such way to include the unique considerations of pedestrians, bicyclists, and transit riders by including an infrastructure scoring system. Not only does this highlight the importance of including infrastructure measures, but it provides a framework for future infrastructure improvements around grocery stores.

Background

In April of 2021, a new H Mart grocery store opened just outside of the Excelsior/Outer Mission districts of San Francisco. The H Mart is located right off of a freeway exit, making access much more difficult for those without a car. Many of the grocery stores surrounding this area are difficult to reach without the use of a personal vehicle. The Excelsior/Outer Mission neighborhood has a shocking number of collisions (over 1,100 between 2015 and 2019), elevated levels of walking, biking, and transit ridership, and minimal safe infrastructure for these modes compared to other residential areas in San Francisco.

Accessibility refers to the ease of reaching a destination, such as a grocery store, most often measured in terms of time or distance and the number of opportunities to reach a store (Litman, 2022). However, most studies fail to incorporate other factors of accessibility that are important to transit riders, pedestrians, and bicyclists, such as the quality of infrastructure (Jiao & Azimian, 2021; Tenkanen et al., 2016). Stores should be accessible by modes other than personal vehicles. This can reduce car dependency and provide opportunities for those who do not own a personal vehicle. Given this metric of accessibility which incorporates safe infrastructure considerations and road conditions, this study aims to answer the following questions:

1. How accessible are grocery stores in the Excelsior/Outer Mission district for pedestrians, bicyclists, and transit riders?
2. What is the best way to measure accessibility for pedestrians, bicyclists, and transit riders?

Literature Review

Access to grocery stores is a popular focus of research; however, these studies focus primarily on distance and travel time for automobiles as deciding factors of accessibility. This stands contrary to other literature which finds that households often do not shop at the grocery store nearest to their residences regardless of income level (Litman, 2022; Jiao & Azimian, 2021; Tenkanen et al., 2016). Households regularly travel on average 4 miles to shop, despite living on average 1.2 miles from the nearest store (McGuirt, Jilcott Pitts & Gustafson, 2018). Three separate studies looking at grocery shopping behaviors found that food price was the highest-rated reason for store selection over location (McGuirt, Jilcott Pitts & Gustafson, 2018; Ploeg, 2015; Wilde, Steiner & Ver Ploeg, 2017). Although location was usually a prominent factor, it was largely not the major determinant for grocery shoppers (McGuirt, Jilcott Pitts & Gustafson, 2018; Ploeg, 2015; Wilde, Steiner & Ver Ploeg, 2017).

Although driving is often considered the default and primary mode of travel to the grocery store, that is not necessarily accurate for all populations, particularly as income decreases (Vojnovic, Ligmann-Zielinska & LeDoux, 2020). Low-income households are six to seven times less likely to own a car compared to other U.S. households (Nettles, 2012). When traveling to the grocery store, 20% to 50% of low-income individuals are likely to use non-motorized modes, such as walking and biking (Vojnovic, Ligmann-Zielinska & LeDoux, 2020). Households at or below the poverty threshold are less likely to drive their own vehicle (62%) to the store compared to households above the poverty line (84%-95%) (Ploeg, 2015). Instead, these households below the poverty threshold are found to use other modes such as walking, biking, or transit (Ploeg, 2015). The majority of households in the Study Area are low-income to very low-income.

This information about travel behavior coincides with research that concludes that distance or travel time alone is not an accurate indicator of accessibility, especially for those who do not use a personal vehicle (Niedzielski, 2021; Widener, 2017). Regardless, accessibility studies are commonly done using one of the following three methods of measuring spatial accessibility: distance-based, gravity-based, and radiation-based (Jiao & Azimian, 2021). Shimbil (1951) first introduced a distance-based method of accessibility that calculated distances using links which was later adjusted to include an impedance factor (Ingram, 1971). However, distance is not comparable across modes and may not adequately reflect grocery store travel behaviors (Niedzielski, 2021; Widener, 2017). Alternatively, the gravity model predicts travel times on the network, resulting in an index that represents the intensity of attraction (Jiao & Azimian, 2021; Niedzielski, 2021; Widener, 2017; Hansen, 1959). The most recently developed model is

the radiation model developed by Simini (2012). Radiation modeling uses a cost-decay function to determine the number of commuters to and from each zone (Jiao & Azimian, 2021). This model was proposed to allow more uniform calculations across larger geographic regions and time periods (Simini, González, Maritan & Barabási, 2012). As the Study Area and period of the study are relatively small, a simple gravity model is sufficient in measuring accessibility. Additionally, isochrones, or catchment areas, are drawn up to illustrate another measure of accessibility, the number of opportunities (Niedzielski, 2021; Widener, 2017; Chen, 2019).

Additionally, there are two common methods of measuring pedestrians' and bicyclists' comfort and safety: level of service analysis and level of stress analysis. The Highway Capacity Manual includes level of service (LOS) as a method of evaluating the capacity and functionality of pedestrian and bicycle facilities (Transportation Research Board, 2016). However, for pedestrians, this method focuses primarily on the capacity of the sidewalk and the volume of pedestrians. While capacity and sidewalk width is important to pedestrians, this method neglects to include many other infrastructure aspects that are vital to pedestrian comfort, such as the quality of crosswalks (Azad, Abdelqader, Taboada & Cherry, 2021; Lin, Ver Ploeg, Kasteridis & Yen, 2014.) LOS for bicyclists incorporates vehicle speed and the width of the bike lane, however, similar to pedestrian LOS, this method does not consider infrastructure, specifically the level of separation from vehicles as identified by the bicycle classification.

Level of stress, first developed by Mekuria et al. (2016), is another commonly used method of measuring comfort and safety. This method rates the level of stress pedestrians and bicyclists feel on the network. Unlike LOS, the level of stress considers network connectivity, the existence and quality of infrastructure, and other environmental factors that affect comfort. However, level of stress, although link based, is developed to be a "network evaluation tool (Mekuria, Furth & Nixon, 2012). Both pedestrian level of traffic stress (PLTS) and bicyclist level of traffic stress (BLTS) boil down the information to an assessment of the "potential feel" of the users and in so doing divert attention from the condition of the infrastructure itself. While both levels of service and of stress measure important contributors to accessibility for pedestrians and bicyclists, neither method focuses on the presence and quality of the infrastructure as its outcomes.

Study Purpose

The literature review shows that disparity in car access is widely accepted. Additionally, there are several behavioral studies and surveys which observe that a considerable proportion

of low-income households walk, bike, or ride transit to the grocery store. Yet, curiously, there is minimal research on store accessibility by modes other than a personal vehicle, particularly non-motorized modes.

Furthermore, studies do not typically incorporate other factors of accessibility that are important to transit riders, pedestrians, and bicyclists, such as the quality of infrastructure. This study aims to fill that gap in the literature by providing a methodology for considering overlooked aspects of accessibility such as infrastructure and by considering access by such alternative modes as walking, cycling, and transit. This study is therefore proposing to score the elements of the infrastructure that are gathered at the segment level (as, for instance, in the PLTS and BLTS analyses) to create aggregate scores on “availability and conditions of physical infrastructure,” which may be expressed as infrastructure quality.

Methods

Grocery stores are defined as stores where the primary goods are food related and must include a produce aisle. For this reason, liquor stores and corner stores were not included in this study. The accessibility of each store is first evaluated using a simplified gravity model that relies on travel time as a measurement of accessibility. Next, each store is evaluated to determine the level and quality of infrastructure around the store. The Excelsior/Outer Mission infrastructure scores for walking, biking, and transit are compared to scores in the Sunset neighborhood. The Sunset is a comparable neighborhood in terms of size and land use but has seen relatively more infrastructure improvements and safety treatments over the past few years than the case study area.

Proximity Based Scoring

Travel time calculations used network data from the City of San Francisco for February and April 2022. To measure the proximity between origins and destinations within the Study Area, the Excelsior/Outer Mission was divided into 67 Travel Analysis Zones (TAZs). Then, using travel network data and ArcGIS Network Analyst tools, travel times were calculated from the center (centroid) of each TAZ to each of the stores.

A gravity model was used to consolidate all the travel times from each centroid to each grocery store into one index for each store by mode. Gravity models balance the level of attraction of a destination with the impedance (travel time) of getting to that destination, revealing an index for accessibility (Geertman & Ritsema Van Eck, 1995; Hansen, 1959; Jiao & Azimian, 2021). The equation for a simplified gravity model is:

$$\text{Equation 1: } GI_i = \sum t_{ij}^{-1}$$

(GI = Gravity Index, t = travel time, i = destination, j = origin)

In the absence of travel diary data, it is assumed that gamma is a negative one. Because the gravity index is measuring attraction or access, a higher score reflects better travel time accessibility.

Infrastructure Based Scoring

In addition to the traditional method of measuring accessibility, this study also measured the quality of infrastructure around the stores using a system of rating adapted from LA Metro’s “Slow Speed Network Strategic Plan For the South Bay” (Metro & South Bay Cities Council of Governments, 2017). The high crash rates and fieldwork show that the area around stores may be unsafe and inaccessible to pedestrians, bicyclists, and transit riders despite short travel times. Therefore, an analysis of infrastructure provides a supplementary measure of accessibility. Each store is evaluated to determine whether the appropriate infrastructure exists on the streets surrounding the store. The scoring criteria differ based on the street type providing access to the store. Main streets with higher speed limits and heavy traffic have different requirements for separation and intersection treatments compared to local neighborhood streets with minimal vehicle traffic.

Figure 1 shows how stores on neighborhood streets are graded. A point is given for each existing element, and overall scores represent the ratio of elements that exist near a store over the total elements that make an ideal street for each street type. The scores range from one to five. Stores that have less than 20% of the recommended elements are given a score of one, stores with 21% to 40% of elements are graded as two, and so on. The scoring focuses largely on the street that the store is facing, however, the few blocks surrounding the store are also considered. Though the scoring is primarily based on a binary—one point if the element exists, zero points if it does not, there are some instances where half points are awarded. If only one side of the block has any given element, then only a half point (0.5) is counted. This was particularly common for high-visibility crosswalks, where one side of the block had them but not the other. On the other hand, a point and a half (1.5) are awarded for elements that are better than usual practice. For example, a point and a half are given when crosswalks are painted yellow or patterned to improve visibility or the street has painted bike lanes where only sharrows are required.

Scores are broken down into four categories: biking infrastructure, transit infrastructure, walking infrastructure, and infrastructure that ensures comfort and aesthetics. The biking infrastructure score counts the level of separation and protection from vehicles based on the street type. Other factors include bicycle amenities such as bike parking and wayfinding. Transit infrastructure focuses on proximity to stops, adequate shelters or stations, and whether the on- and

Neighborhood Main Street			Store		
Precedent Treatment Type		Precedent Elements	Existing	Percent of elements	Score
Neighborhood Main Street: high traffic of all modes, mid to high speeds, high collision rates, 1 lane per direction	Bike	Bike lane			
		Buffer			
		Bike parking	1		
		Green lanes		25%	1
	Transit	Safe loading and unloading zones/stations	1		
		Well located stops/stations	1		
		Bus shelter		67%	4
	Pedestrian	Curb extensions/bulbouts/painted safety zones	1		
		Chicanes, traffic calming			
		Wide sidewalks			
		Accessible pavement conditions	1		
		High visibility continental crosswalks	1		
		Improved corner sight distance (daylighting and stop bars)			
		Stop signs	0.5		
		Near slow street	1	56%	3
	Comfort and aesthetic	Parklets			
		Bioswales, landscaping			
		Street furniture	1		
		Tree coverage and sustainable landscaping	1	50%	3

Figure 1: Example of Infrastructure Scoring.

Scoring	
Score	Percent
1	1-20%
2	21-40%
3	41-60%
4	61-80%
5	81-100%

off-boarding is safe. The walking infrastructure score includes safety measures at intersections to ensure pedestrians are seen and allowed time to cross. The score also includes measures to slow down vehicle speeds where appropriate or increase pedestrian separation. The “accessible pavement conditions” score accounts for the width and quality of the sidewalk to ensure that pedestrians of all abilities can use the infrastructure. Lastly, the comfort and aesthetics category focuses on the user experience on the street. For example, there is a measure for street trees that can provide shade, making it more bearable to walk or bike in hot weather, and parklets that can improve the street life, bringing a sense of safety to those using the street or sidewalk (Azad, Abdelqader, Taboada & Cherry, 2021).

The Sunset District

The Sunset district of San Francisco is located slightly west of the Excelsior/Outer Mission. This area is a good representation of a

typical residential urban neighborhood in San Francisco and, as such, is a helpful baseline for accessibility measurements in the city. The Sunset is similar to the Excelsior/Outer Mission in geographic location, size, and land use. Therefore, comparing accessibility scores in the Excelsior/Outer Mission to the Sunset provides some context for the scores’ values.

Results

Proximity Based Scores

The gravity indices represent relative accessibility in terms of travel time where higher index values indicate greater accessibility. Table 1 ranks the stores by gravity index and mode. Stores located more centrally in the Study Area have greater gravity indices, meaning they are more accessible. For example, Safeway (store 2), located near the middle of the Study Area has the highest gravity score across all modes.

Table 1: Store Ranking by Gravity Index by Mode in Excelsior/Outer Mission.

Store Ranking by Gravity Indices								
Walking			Biking			Riding Transit (8am)		
Stores		Gravity Index	Stores		Gravity Index	Stores		Gravity Index
2	Safeway	4.1	2	Safeway	8.9	2	Safeway	5.4
3	Whole Foods Market	3.8	3	Whole Foods Market	8.4	5	Pacific Supermarket	4.4
5	Pacific Supermarket	3.7	5	Pacific Supermarket	7.4	3	Whole Foods Market	4.4
1	Manila Oriental Market	3.4	1	Manila Oriental Market	7.0	1	Manila Oriental Market	4.1
4	H Mart San Francisco	2.8	4	H Mart San Francisco	6.3	9	Safeway	3.3
9	Safeway	2.4	9	Safeway	5.3	4	H Mart San Francisco	3.2
7	Grocery Outlet	1.9	7	Grocery Outlet	4.1	7	Grocery Outlet	2.4
6	Alemany Farmer's Mark	1.8	6	Alemany Farmer's Mark	3.8	6	Alemany Farmer's Mark	2.1
8	Grocery Outlet of Visita	1.3	8	Grocery Outlet of Visita	2.7	8	Grocery Outlet of Visita	1.9

Gravity indices for the Sunset were also calculated for comparison in Table 2. Although there are some higher gravity scores in the Sunset compared to the Study Area, most scores are relatively comparable. However, the sheer number of stores (16) in the Sunset provides more opportunities to choose the store that best meets a shopper's needs. This increase in the opportunity itself indicates greater accessibility compared to the mere eight stores in the Excelsior/Outer Mission (Chen, 2019).

Infrastructure Based Scores

On average, scores for stores in the Excelsior/Outer Mission are low. The overall average score for stores in the Area is two out of five. Most notable is the extreme lack of bicycle infrastructure in this neighborhood, with an average infrastructure score of one. However, other scores are also low; the average score for transit infrastructure, pedestrian infrastructure, and comfort and aesthetics is three each. Table 3 shows all of the scores by mode and store. Comparable scores from the stores in the Sunset can provide context to help understand whether these scores are on par with the rest of the city or are unusually low.

Table 4 shows that the scores for the Sunset are relatively higher, with an average score of four out of five. While most stores in the Excelsior/Outer Mission have bike scores of one, nearly all of the bike scores in the Sunset are two or higher. Transit scores are generally remarkably high in the Sunset—mostly fives with a few fours, as most stores are on streets or near streets with bus or train access and proper stops and stations. Where there are only two stores in the Excelsior/Outer Mission that have pedestrian scores of four, in the Sunset ten out of the sixteen stores have a pedestrian score of four. In comparing scores with the Sunset, it is evident that the infrastructure scores of the Excelsior/Outer Mission are relatively lower.

Composite Scores

The composite scores combine proximity and infrastructure measurements into one score. First, gravity scores are rescaled to the highest score in the Sunset, which represents ideal conditions. The scores are then normalized on a zero to five range to match the infrastructure scores. Due to the wide range of gravity scores, the scores are normalized by mode.

Table 2: Store Ranking by Gravity Index by Mode in Sunset District.

Store Ranking by Gravity Indices					
Walking		Biking		Riding Transit (8am)	
Stores	Gravity Index	Stores	Gravity Index	Stores	Gravity Index
11 SM Supermarket	10.1	11 SM Supermarket	22.6	7 Boss Supermarke	5.9
7 Boss Supermarket	5.4	7 Boss Supermarke	12.1	11 SM Supermarket	5.9
8 Noriega Food Mar	4.9	8 Noriega Food Ma	10.9	2 S&B Supermarket	5.6
10 Safeway	4.8	10 Safeway	10.8	8 Noriega Food Ma	5.4
9 Superb Garden Gr	4.5	9 Superb Garden G	10.0	3 22nd and Irving I	5.4
6 Gus's Community	4.2	6 Gus's Community	9.5	10 Safeway	5.3
2 S&B Supermarket	4.1	2 S&B Supermarket	9.1	9 Superb Garden G	5.1
5 Sunset Super	3.9	5 Other Avenues	8.8	4 Sunrise Irving Ma	5.1
1 Other Avenues	3.9	1 Sunset Super	8.8	1 Sunset Super	4.8
3 22nd and Irving I	3.7	3 22nd and Irving I	8.2	15 Safeway	4.8
15 Safeway	3.7	15 Safeway	8.1	5 Other Avenues	4.7
12 Lucky	3.6	4 Sunrise Irving Ma	7.7	6 Gus's Community	4.6
4 Whole Foods	3.5	12 Lucky	7.7	12 Lucky	4.3
16 Sunrise Irving Mar	2.6	16 Whole Foods	5.8	13 Whole Foods	3.5
14 Andronico's	1.8	14 Andronico's	4.0	14 Trader Joe's	3.5
13 Trader Joe's	1.8	13 Trader Joe's	3.9	16 Andronico's	3.2

Table 3: Infrastructure Scores for Stores in the Excelsior/Outer Mission.

Store	Bike score	Transit score	Pedestrian score	Comfort and aesthetic score	Average score
1 Manila Oriental Market	0	4	2	0	2
2 Safeway	0	3	3	3	2
3 Whole Foods Market	1	3	4	5	3
4 H Mart San Francisco	1	1	3	5	3
5 Pacific Supermarket	0	2	3	1	2
6 Alemany Farmer's Market	4	3	3	1	3
7 Grocery Outlet	1	4	3	3	3
8 Grocery Outlet of Visitation Va	1	4	3	3	3
9 Safeway	1	2	4	3	3
Average score	1	3	3	3	2

Store	Bike score	Transit score	Pedestrian score	Comfort and aesthetic score	Average score
1 Sunset Super	2	5	3	4	3
2 S&B Supermarket	1	4	5	3	3
3 22nd and Irving Market	2	5	5	4	4
4 Sunrise Irving Market	3	5	5	4	4
5 Other Avenues	2	5	3	5	4
6 Gus's Community Market	2	5	4	4	4
7 Boss Supermarket	0	4	4	3	3
8 Noriega Food Market Inc.	2	4	4	4	4
9 Superb Garden Grocery	2	4	4	4	4
10 Safeway	2	4	4	3	3
11 SM Supermarket	5	5	4	4	5
12 Lucky*	3	4	3	4	4
13 Whole Foods	1	4	4	3	3
14 Trader Joe's	2	5	4	4	4
15 Safeway	0	4	3	3	3
16 Andronico's	2	5	3	3	3
Average score	2	5	4	4	4

Table 4: Infrastructure Scores for Stores in the Sunset.

The formula for normalizing gravity indices is as follows:

$$\text{Equation 2: } GI_{normalized} = \left(\frac{GI_{original}}{\max \text{Sunset } GI} \right) * 5$$

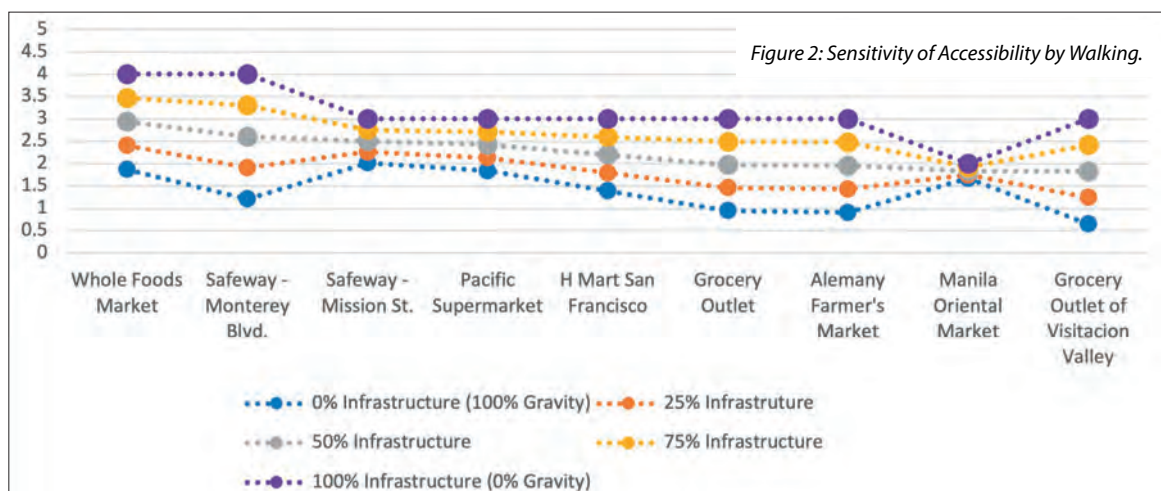
Once normalized, the two scores can be combined. Figures 2 through 4 graphically show the composite scores at different weights by mode. The blue line represents accessibility scores where 100% of the weight is on the gravity indices, the orange line shows accessibility scores where infrastructure is weighted at 25%, the gray line weights gravity indices and infrastructure at 50% equally, the yellow line puts more weight (75%) on infrastructure, and the purple line shows accessibility scores where 100% of the weight is on the infrastructure scores.

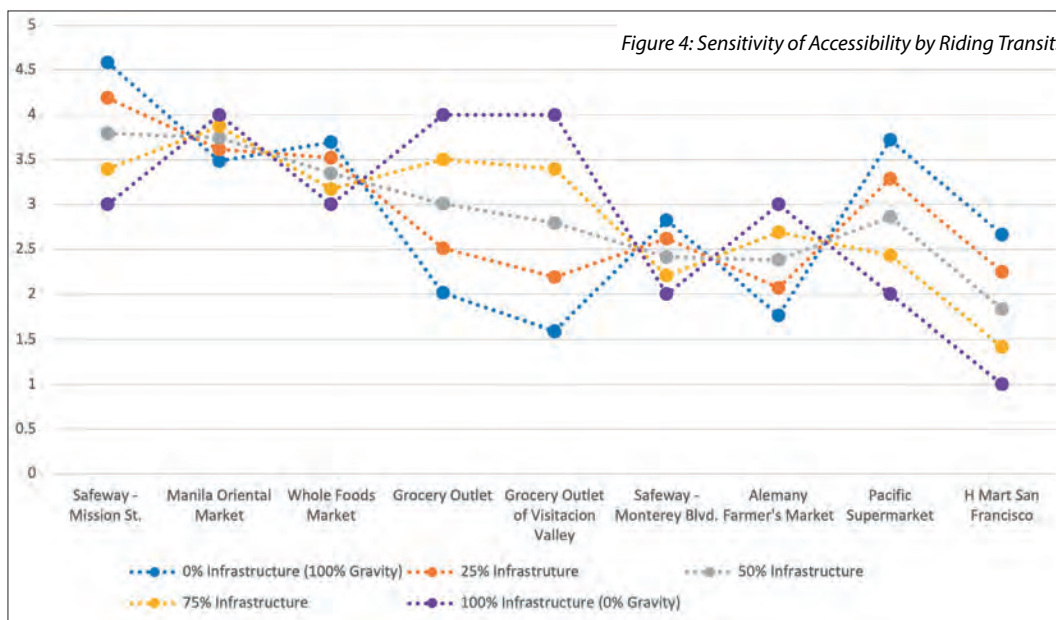
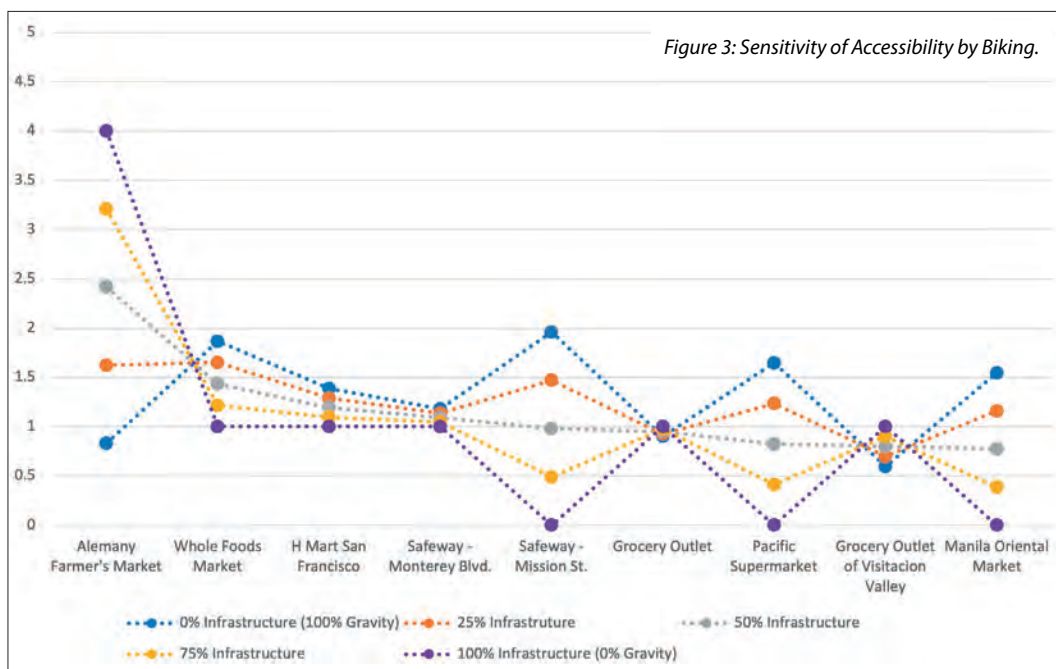
The stores are ranked by accessibility score weighted at 50% infrastructure with the highest scores on the left and lowest scores on the right in each graph. By weighting the scores

differently, these charts illustrate sensitivity to infrastructure and travel time.

For walking, the infrastructure scores are generally average, as the purple line shows. In terms of proximity, the scores are poor across the board. The other lines show that one way to counter the effect of poor proximity is to improve infrastructure conditions.

Looking at Figure 3, which represents the composite scores for biking, it is apparent that proximity by bike is low while the condition of the biking infrastructure is extremely poor. Therefore, putting more weight on infrastructure reduces accessibility. However, improving the bike infrastructure scores and combining that with proximity can improve accessibility. Alemany Farmers' Market illustrates how quality infrastructure can improve accessibility. There is a protected bike lane and





other amenities here that give the store a high infrastructure score but it is so far east that it has a low proximity score.

There is a large variation in the composite scores for transit, making them even more sensitive to shifts in weights. For example, the Pacific Supermarket is well located in the Study Area but is not close to quality transit stops. The Grocery Outlet, on the other hand, has a bus stop right in front of the store, but it is further outside of the Study Area hence the low proximity score. While it appears from gravity indices that

stores in the Excelsior/Outer Mission are only slightly less accessible, infrastructure scores indicate significantly lower levels of accessibility.

Discussion

The composite accessibility scores and associated sensitivity analyses further underline the importance of combining the two components of proximity and infrastructure in measuring accessibility. The sensitivity analysis shows that infrastructure

can have a large effect on overall accessibility. Specifically in the Excelsior/Outer Mission neighborhood, with its rather low infrastructure scores, the higher the weight attributed to the importance of infrastructure the lower is composite accessibility. Not only does this highlight the importance of including infrastructure measures, but it provides a framework for future infrastructure improvements. Stores with large disparities between gravity and infrastructure scores should be prioritized for improvements as there is potential for these locations to become highly accessible.

Rather than measuring accessibility using only travel time via a gravity model or other spatial model, this study shows the importance of combining the location proximity factor and infrastructure information to provide a more complete picture. This is particularly important for those walking, biking, or riding transit where safety is a great consideration. Given the context of high collision rates and high walking, biking, and transit ridership levels in the Study Area, it is important that the definition of accessibility includes infrastructure to represent how people walking, biking, and riding transit navigate the network to reach their destinations (City of San Francisco, 2015; San Francisco Planning Department, 2020). This study provides one such way to include the unique considerations of pedestrians, bicyclists, and transit riders by adding an infrastructure scoring system. Together, the two components of physical proximity and availability of infrastructure highlight areas of priority for improving access.

Conclusions

The results of this study, particularly the ranking of gravity indices the ranking of conditions the infrastructure scoring system depicts, and sensitivity analysis, provide a framework for how to enhance the measurement of accessibility. They can also help to prioritize improvements to infrastructure.

While the scope of this study is somewhat narrow, implications about measuring accessibility can extend beyond grocery store access. The procedure presented in this study is applicable to the study of accessibility to health centers, public facilities, parks, education centers, and so on. The assessment of accessibility to these other amenities and facilities could similarly include infrastructure considerations for pedestrians, bicyclists, and transit riders. Additionally, while this study is within an urban setting, the methods used can apply to suburban areas as well. Gravity-based modeling is already under extensive use in suburban areas. Additionally, the infrastructure methodology is adaptable to other areas with a few adjustments to the infrastructure scoring criteria to include appropriate street types for the area. In terms of future research, this study takes a simple approach by just evaluating the area around the stores, however,

future research could incorporate other measures, like the level of stress on links leading to the stores as a component in the infrastructure scoring system to better understand the grocery shoppers' perceptions of safety and further incorporate network connectivity considerations. Additionally, the infrastructure scoring system can be improved by adding an overall walkability component to the transit category, as walking is included in almost all transit trips. Although walking was considered in the gravity model for transit, walking was not explicitly integrated into the transit infrastructure scoring system in this study. However, incorporating this concept in future research could provide additional enhancements to the methodology.

Supplemental research on understanding how the quality of infrastructure affects travel behavior and perceptions of accessibility would further bolster this area of analysis. In this study, the proposed modification to measuring accessibility includes scoring of proximity and scoring of infrastructure quality. A third potential component could be scoring of operating conditions (e.g., by taking inspiration from PLTS and BLTS methodology) for inclusion in a further refinement of how to measure "accessibility". Lastly, future researchers should collect travel diary data to calibrate the gravity model and add weighting to the infrastructure scoring system to enable a more refined means of scoring the components.

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An Analysis of Autonomous Vehicle Pilot Projects in the United States

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In this essay, Amir Hajrasouliha and a group of his students discuss their assessment of 23 AV pilot programs in the United States. They study the diversity of projects, the commonality of approaches, priorities and goals, and their relationship with policy documents. They hope to be providing a framework for future projects and contribute to the implementation of autonomous vehicle technology.

Autonomous vehicles (AV) are transportation modes that can sense their surroundings to execute some control aspects, including steering and braking, without human operation. As AVs conduct increasingly complex operations and technology continues to advance, cities have become AV testing grounds using roadways to assess how the technology can be used for purposes from personal automobiles to public transportation.

AV pilot programs vary depending on the project's main goals, the type of AVs, and the project's location. Some cities are responding to the proliferation of AVs on public roads by partnering with private industry to better plan and manage the coming changes in the transportation infrastructure, travel behavior, and housing and economic development. Private companies, from Auto to AI, compete to capture the growing market and possess the capital and technology capabilities to conduct pilot projects. Partnering with local governments who own public roads provides the "real-world" context to refine their technology and expand the marketability of their product. Therefore, we have witnessed a growing number of public-private partnerships (PPP) for AV pilot programs in various cities, such as Gainesville, FL, Pittsburgh, PA, and Houston, TX. In other cities, state and local governments permit private companies to test AVs on public roads but do not form partnerships with companies and are not as involved in the day-to-day operations compared to a PPP. Examples of cities with this implementation model include programs in Chandler, AZ, Miami, FL, and Reno, NV.

This paper discusses a research that investigated the different types of AV pilot programs enacted in the United States and

searches for thematic patterns from common goals to spatial context and program timeline. The literature review provides a broad overview of AV pilot programs, technology, and trends in the burgeoning industry. The published documents and the projects' websites collected information regarding the projects. Analyzing different AV pilot projects can produce a framework for local governments and private companies to adopt an appropriate model for future pilot projects.

Pilot Programs and AVs

Self-driving vehicles can alter travel demand, parking, and public transit supply (Alessandrini, Campagna, Delle Site, Filippi, and Persia, 2013). The proliferation of autonomous vehicles (AV) provides an opportunity to transform the transportation planning field into a technology-focused field that provides tangible modes of transportation that are both convenient and capable of attracting people away from single-occupancy vehicles. Conventional transportation modes must adapt as technology advances by integrating with autonomous transportation technologies. The changing transportation landscape diverges from existent modes by integrating door-to-door travel, akin to personal vehicles and paratransit services, with the ability to operate on expanded travel times due to the machine's ability to operate without a driver (Alessandrini, Campagna, Delle Site, Filippi, & Persia, 2013). Public facilities, including roads and parking, will need to adapt to autonomous cars with possible outcomes including reduced parking demand and higher vehicle miles traveled.

Higher VMTs might impact the physical quality of publicly

owned roadways if the AVs operate on expanded timetables (Greenblatt & Shaheen, 2015). Shared autonomous technology could allow people to choose flexible transit routes that are catered to individual needs while continuing to support trip chains for multiple users (Litman, 2019). Research to understand the demand for public transportation in operational multi-passenger autonomous vehicles indicates that AVs can lower the demand for buses and rail systems (Owczarak & Zak, 2015). Results from the study could be pivotal to understanding the long-term impact of self-driving vehicles if the technology is integrated with public transportation systems. The new technology could either negatively shift existing public transit modes by decreasing ridership or complement transportation systems by creating more flexible transport options (Salazar, Rossi, Schiffer, Onder, & Pavone, 2018). Transportation planners' notions of public transportation options, rideshare providers, and personal automobile demand might change if self-driving vehicles develop and become vital components of public transportation systems (Eden, Evequoz, Nanchen, & Ramseyer, 2017). Public institutions and private companies continue to develop AV technology that has the potential to change transportation systems by providing transportation modes that are more accessible than existing public transit modes.

Cities are responding to the proliferation of AVs by enacting pilot programs, where local governments with ownership of rights-of-ways within cities partner with private companies, who have the means to purchase, maintain and test AVs on public streets. In cities and public institutions, such as Gainesville, FL, and the California State University, Sacramento (Sacramento State), partnerships with technology companies allowed AVs to operate on public streets and passageways (Transportation for America, 2018). The public pilot program is an example of using emergent technology developed by private industry and including the public sector in decision-making. In addition, this partnership model allows the local government to access data collected from AVs, improving future decision-making, and giving cities an incentive to enter partnerships with technology companies (National League of Cities, 2018).

Methodology

To research common patterns and models of autonomous vehicle pilot projects across the United States, we compiled a list of cities that have implemented some form of autonomous vehicle pilot projects within the United States. First, a web search with an emphasis on key terms such as "automated," "driverless," "autonomous," "vehicle," and "pilot program" was conducted. Next, a review of local government planning documents of major US cities was used to identify more pilot projects.

Our research did not focus on test tracks nor not yet implemented

AV pilot projects. After identifying 34 pilot projects, the sample was narrowed down to 27 with adequate public information within our criteria (Appendix A). We created a general summary fact sheet describing the goals of the project, the scope of the project, the project timeline, the project type, community input, and the contact information of the project directors. Once we completed the content analysis of available documents related to the pilot projects, we began our outreach phase, contacting the directors of the pilot project and the private companies. This helped us clarify any information or discrepancies in our findings, ultimately leading to a more accurate analysis. We also conducted a cross-tabulation analysis between various projects' attributes, such as their goals, scope, and type of AVs, to show the relationship between these attributes.

We used the main goals of the pilot projects as a lens to conceptualize different models of AV pilot projects. For our research, we defined project goals to represent the main objectives and priorities each partner hopes to achieve during and after the start and end date of the pilot project. We narrowed this list to ten common goals/ outcomes shared in each pilot project. The ten goals are:

1. Enhance the technology of self-driving cars;
2. Make the urban environment AV-ready with appropriate digital and physical infrastructure;
3. Educate and engage public;
4. Marketing for the city, or university, including tourist attraction;
5. Marketing for the private company;
6. Adapt and test zoning and other local regulations to maximize the benefit of autonomous vehicles;
7. Design and implement safety strategies for protecting commuters and/or urban data;
8. Maximize the benefits of AVs to the public and expand mobility for underserved populations;
9. Make sure AVs reduce all possible forms of pollution, waste, and congestion;
10. Link AVs with active, public, and shared mobility.

Results

Location and AV type

The location of the identified projects is not necessarily concentrated in a specific region. We identified 14 states with pilot projects, with California having the highest number of projects at 23%, followed by Texas with 11.5%. We identified one or two projects in Nevada, Michigan, Georgia, Arizona, Florida, Rhode Island, Colorado, Ohio, Nebraska, Virginia, Massachusetts, and Oregon. The timeline of these projects ranged from two months to three years but usually had a period



Figure 1: A passenger boarding a Waymo robotaxi in Phoenix. (courtesy: Waymo; <http://waymo.com>)

Figure 2: A small AV shuttle. (courtesy: Waymo)



of about a year. The earliest project was initiated in March 2017, and the latest project was initiated in November 2019.

We identified six types of AVs in our sample of 27 projects: shuttles, commercial ride-sharing, private cars, private cars, small-scale delivery, and truck delivery. Shuttles, a high-volume transit service that runs along a predefined route autonomously, is the most common type, with 62% of the project. Commercial self-driving ride-sharing services partnered by companies such as Lyft, and Uber, are the second most common type, with 17% of cases. Private cars, test-driving cars without passengers, small-scale delivery, and truck delivery are less common in one to two cases in our study. Private cars are low-volume individual vehicles often seen as the end goal in autonomizing cars that can be found in level 5 of autonomy. Small-scale delivery projects have self-driving freight service that transports small-scale goods and services to local communities and neighborhoods. Truck delivery projects are self-driving freight service that transports large-scale goods and services to cities, counties, and states.

About half of the shuttles were bounded by a 1-mile or less route, illustrating that pilot projects with shuttles tend to follow a relatively smaller route. The distance varies for the other types of autonomous vehicles, and there was no clear relationship with the other attributes. About half of the shuttles traveled at a speed between 10-35 miles. And about half of the shuttles were located in an urban setting, while about another half were set in either campus or mixed settings.

Setting

Most of the pilot programs are in urban settings (44%). Campus and mixed-use settings are also prevalent among AV projects.



Figure 3: Self-driving shuttle run by the American Automobile Association in Las Vegas. (source: <http://www.aaahoponlasvegas.com/>)

There were five projects located in mixed-use development and five on campuses. An example is an EasyMile shuttle in Bishop Ranch, the office park with residential units for employees in businesses located on the property. Meanwhile, testing in suburban and rural areas is rare, possibly due to the large distance between origin and destination. Two AV projects didn't fit into the other categories of setting: Madras, Oregon, and Arlington, Texas. Oregon's truck delivery pilot project was tested on a highway (Lopez, 2019), while the Arlington shuttle was located on a military base.

Scope of Projects

In eleven projects, the information on the scope of the AV projects was unavailable. Amongst the 16 projects with information on the routes, pre-programmed routes between 1 to 5 miles are the most common with 7 cases, followed by preprogrammed routes 1 mile or less with 5 cases. There are unique projects with pre-programmed routes between 1 to 5 miles. For example, the San Antonio supermarket chain H-E-B's autonomous delivery service services residents within a five-mile radius delivery zone centered around the Olmos Park store location (H-E-B Newroom, 2019). Another project with an undefined route was located at Bishop Ranch in San Ramon, California. The Bishop Ranch AV shuttle aims to reduce the distance between the origin and destination by connecting residents of Bishop Ranch directly to their destination in the office park and transit systems (Alvero, 2018).

Speed

Thirteen of the projects didn't specify the set speed of the AVs tested. Out of the programs with specified speeds, the most common speed adopted by AV vehicles ranges from 20 to 35 miles per hour. This speed range is expected for AV since it is the typical speed range for vehicles using public roads. In contrast, a truck platooning project in Madras, Oregon has a set speed greater than 35 miles per mile (Edelstein, 2017), because it was tested on highways, which have a faster flow of traffic than public roads. Meanwhile, only two projects have a speed of fewer than 10 miles per hour: Sacramento, California, and Bryan, Texas. The route of the Bryan shuttle runs on a one-way street with angled parking. The AV's slower speed ensures pedestrians' safety in this suburban downtown and allows cars to safely back out without disturbing the AV.

Policy Document

About 71% of the projects are in cities or states that have adopted policies regulating AV. Most locations have created guidelines for testing AV and policies regulating public road testing. States like Texas and Massachusetts require AV testing on public roads to follow traffic laws. Senate Bill 2205

in Houston allowed testing on public roads but required the AV to comply with all traffic laws, be insured, and have video recording devices. The AV WaymoOne project in Phoenix was also required by Arizona law to follow regular traffic regulations; however, they weren't required to be transparent with their results. Only a few locations require projects to be transparent on testing. Some cities have application processes for tech companies to test on public roads. Las Vegas has the Autonomous Vehicle Testing Registry Application, while Boston provides guidelines for applications for potential partners on its official website.

Only a couple of cities integrated AV policies into their city planning. Sacramento was the first city to regulate AV and autonomous ride-sharing in its zoning codes. Meanwhile, San Jose included AV goals and policies as part of the Circulation and Streetscape section's subarea plan. Goal CS-9 in the plan encourages the implementation of AV systems only if they benefit the community.

Most pilot projects are not the outcome of a policy document. Only three projects were the results of policy documents: Boston, Providence, and Reno. The May Mobility project in Providence was made to support the Service Level Agreement based on a proposal approved by the Rhode Island Department of Transportation (RIDOT). The Service Level agreement outlined "how many vehicles should be on a route simultaneously, how often the AV should be arriving at each stop along the route, and how long the hours of operation were." Meanwhile, in Boston, the Massachusetts Department of Transportation (MassDOT) is constantly evolving its policies and programs based on problems encountered during testing.

Project goals

The projects' most common goals were: 1) link AVs with public and shared mobility (77% of cases), 2) educate and engage the public (60%), 3) maximize the benefits of AVs to the public and expand mobility for underserved population (55%), 4) enhance the technology of self-driving vehicles (40%). 5) design and implement safety strategies for protecting commuters and/or urban data (37%). Four other goals were shared among 25% to 30% of pilot projects: Make the urban environment AV-ready with appropriate digital and physical infrastructure; Marketing for the city, or university, including tourist attractions; Marketing for the private company; Adapt and test zoning and other regulations to maximize the benefit of autonomous vehicles. All goals were cross-tabulated with various factors to analyze the priorities of the automated vehicle pilot projects.

Goals and Types of AVs

An analysis of the main goals of the projects and the types of automated vehicles showed a relationship between the two. The types of AVs were reclassified into three groups to have enough samples in each class: shuttle; car-sharing, ride-hailing, and test cars without passengers; small-scale delivery, and truck delivery. On average, projects with shuttles and delivery vehicles have the same amount of goals. Still, they have more goals than projects with ride-sharing, ride-hailing, or test cars without passengers. Projects with shuttles tend to link AVs with public and shared mobility, educate and engage the public, maximize the benefits of AVs to the public, and expand mobility for an underserved population. Projects with car-sharing, ride-hailing, and test cars tend to focus on marketing for private companies, educating the public, and enhancing technology.

Goals, Scope, and Partners

Projects with preprogrammed routes typically have more goals. Although undefined routes were the most common across all five goals, certain goals are more associated with certain project scopes. For example, projects with preprogrammed routes with less than five miles routes tend to focus more on public engagement and education. At the same time, certain goals, such as enhancing the technology of AV, are equally spread across various project scopes. In general, projects with more goals had more partners than projects with fewer goals.

Goals and Setting

The settings of the projects were classified into five classes: urban, suburban, rural, campus, or mixed-use. Across all the goals, the greatest number of projects were in urban environments. For enhancing the technology of self-driving vehicles and educating and engaging the public, the projects with and without this goal had similar distribution across all the settings. However, two goals (safety strategies and benefiting underserved populations) were most common in an urban environment and not common in projects in a university campus setting. Linking automated vehicles with active, public, and shared mobility was a common goal in all settings, except with projects with university campus settings. Only one campus-based project had this particular goal. The University of Michigan partnered with Navya to mimic a transit route around its campus. The university hoped to implement automated vehicle shuttles on its campus and connect them to the city's transit network.

Goals and Speed

The speed of vehicles in the projects was categorized into five groups: less than 10 mph, between 10-20 mph, between 20-35 mph, more than 35 mph, and unknown. Due to unreleased data on the vehicles, most AVs in pilot projects have an unknown

speed. Projects with more than 35 mph tend to focus more on designing and implementing safety for protecting commuters than projects with lower speed limits. At the same time, goals, such as engaging the public, serving the underserved population, and connecting to public transportation, were less common in projects with more than a 35mph speed limit.

Partnerships

Public and private entities establish partnerships to launch an AV pilot project. In 92% of cases, a leading AV tech company partnered with public entities, such as state (37%) and/or local governments (60%), universities (22%), and/or other tech companies (74%).

Besides establishing operation and safety laws, state governments may fund pilot projects prioritizing public transportation and disadvantaged communities. Typical state laws include requiring a safety driver to take control in emergencies, determining the issue of vehicle insurance, using built-in recording vehicle devices, and regulating the designated location for the operation.). Complying with speed limits established by the transportation department and local greenhouse gas emission regulations are other laws to be considered.

Local governments are interested in launching pilot projects for various reasons. The most common reasons that we observed in our sample were:

- Improve accessibility for the aging population because it allows seniors to get to places faster without driving or taking public transit;
- Allow people to get to popular destinations and transit centers;
- Reduction of traffic accidents because they would eliminate human error;
- AVs are electric; therefore, there would be zero carbon emissions;
- Reduction of individual car use and traffic congestion.

Six pilot projects out of a total of 27 projects have collaborated with universities. Five cases at the university used shuttles, and one used a ride-sharing system. Universities are interested in the pilot projects mainly for two reasons:

- Becoming a testing ground for other communities to encourage other communities to adopt the same technology;
- Enhancing the AV technology, integrating the AV research into their academic scholarship, and creating a foundation for sharing data on AI developments needed for any AV project.

Companies such as Easy Mile, Local Motors' Oli, May Mobility, and NAVYA establish partnerships with local governments to launch their partnership. Most of them specialized in building AV shuttles with 8 to 12 passengers. Universities also would prefer to invest in shuttles on their campus with such companies. In most cases, multiple private companies are involved in the pilot projects, from the car industry to the AI component of AVs and transportation planning and engineering companies. For example, this process can start with car companies providing a fleet of cars and the AV company simply installing their AI program. This, in turn, helps the car company to test their vehicles and the AV company to test their technology and software. It is also important to note that many AV companies have partnered with ride-sharing systems. Ride-sharing companies partnered with AV companies because it would diversify what types of vehicles riders can choose from.

Project Assessment

The availability of the project assessment is highly dependent on the leading entity of the project. Many projects are not transparent in their testing results or progress. AV pilot projects led by private entities tend to have fewer published testing results. The supermarket H-E-B in San Antonio only announced the start of their autonomous delivery system (H-E-B Newsroom, 2019), but didn't explicitly provide additional information on the success of their testing or if they will continue the project. AV companies testing to improve their technology also provide limited information on their results. The extent of transparency for the public also depends on the local government's resources. Larger cities, like Las Vegas and Boston, have websites and teams to manage the AV program. Since the success of an AV pilot project was based on the completion of goals, extraneous factors such as funding cuts that lead to the project's failure aren't measured.

Some AV projects that have achieved their goals were evaluated by the safety of the public tests, the number of ridership, and/ or the miles traveled. Since the public was highly concerned with safety after the crash in Las Vegas, there is more emphasis on safety and boosting public opinion AV, and collaborations between local and state authorities. To increase public trust and positive feedback, Boston created an extensive web page that is extremely transparent about company involvement, partnership, phasing, and test results (City of Boston, 2017). According to the AAA AV team, the AV project in Las Vegas was a success based on customer reviews and 1,515 operating hours with 32,877 riders. The customer review showed a 27% improved rider perception of AV technologies, and 98% would recommend the experience to others.

Successful ongoing projects are typically evaluated based on checkpoints set by the leading entity. For example, Phase 1 in the Houston pilot project was assessed as a success when 7900 safe rides were provided to riders. Since Phase 1 was completed, AV testing moved toward Phase 2, where the route was extended to the purple line and the Texas Medical Center research campus (Cook, 2019). The ongoing AV shuttle project at the University of Michigan also uses the number of safe trips provided to assess their research progress before moving on to the next phase. The AV pilot project successfully started after conducting 16,000 safe trips and receiving about 500 user feedback. One of the contributing factors to the success at the University of Michigan was how NAVYA could control the setting of their pre-programmed route and avoid areas with less-than-perfect testing conditions. However, the general student opinion on the University shuttle was that the operational design domain was too small. The next phase of the shuttle project would address this problem by increasing testing on various environments.

Final Discussion

Shuttles are the most utilized form of autonomous vehicles in pilot projects because of their large capacity to move people and the marketability of the "product" for private companies. All the shuttles in the pilot projects we analyzed can transport at least 6 passengers with an attendant and a maximum of 15 passengers. This is especially good for first and last-mile solutions which means the shuttle can either begin the passenger's trip (to reach a public transport network, for instance) and again reach their destination (NAVYA, 2020). Moreover, shuttles are incredibly reliable and almost guarantee smooth-running, continuous and safe passenger sailing. For example, Easymile EZ 10 is the most deployed driverless shuttle in the world and boasts a proven track record of over 200 deployments and more than 600,000 km driven in autonomous mode (Easymile, 2020). This is due to the harsh testing standards these shuttles underwent to be approved by officials to test on city roads.

Shuttles can follow a preprogrammed route to test the shuttle capabilities in different environmental conditions. This allows the leading entity to consider the effect of the local weather and infrastructure when expanding the shuttle's capabilities to travel through different terrains. Officials can also strategically choose a path to test out the impact of implementing AV into their public transportation system on:

- Serving as a viable alternative to independent car ownership;
- Reducing traffic congestion;
- Attracting visitors to downtown areas;
- Improving walkability;

- Increasing safety of all road users.

The partnership model of AV pilots requires the local government to fund the pilot program to an extent, but the cost to operate a pilot program varies depending on the details unique to the city and technology company. Partnerships may also involve their respective state department of transportation offices and state-level legislatures by providing funding, operation regulation, or both.

Another implementation method includes a city allowing technology companies to operate AVs within their jurisdiction. This method was used in Mountain View (CA), San Francisco (CA), and in Phoenix (AZ) metro area cities of Gilbert (AZ), Tempe (AZ), Chandler (AZ), and Mesa (AZ). The form of AV tends to be commercially available vehicles with an extensive array of sensors situated on the roof of the vehicles to assist the on-board computer in understanding the spatial characteristics of their surroundings (Litman, 2019).

For example, Waymo, a subsidiary of Google's parent company, Alphabet, uses public streets to test their AV vehicles extensively in Phoenix. The company has cultivated supportive partnerships with the local governments and the State of Arizona Department of Motor Vehicles. In 2015, the State of Arizona welcomed AV companies into the state with minimal regulation, in comparison to other states where AVs are required to be registered in a different method than typical consumer-purchased automobiles and a business-first environment (Stern, 2018). Interaction with human-operated drivers on the public streets of different cities is the ultimate goal of leading AV companies (McCormick, 2019). However, despite advancements in the AV industry, there have been documented issues of human-controlled vehicle drivers harassing AVs and AV operators, which is one of the challenges in front of AV pilot projects (Randazzo, 2018).

Aside from the interaction issues (and the tragedy of a pedestrian death in Tempe by an Uber-operated AV), the AV pilot projects have other challenges, such as uncertainty of their financial sustainability. Some companies like Waymo are exploring new economic ventures in various cities to minimize financial risks (Wiggers, 2019). For the same reason, AV companies are interested in various pilot project implementation methods, either the public-private partnership or laissez-faire. Municipalities have adopted both methods, but we were not able to assess which method resulted in more success rate and possibly became the common method in the future.

One of the main limitations of this research was our dependency on publicly available reports and information. We acknowl-

edge that most of these documents tend to be published with a marking tone without objectively assessing the projects. As the pilot programs mature, more information will be accessible for future analysis. As a future study, we recommend approaching both public and private partners of AV projects with a structured survey to better assess the projects' main objectives and the factors that contribute to the project's success.

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FOCUS 19

International



Walk to Plan, Plan to Walk: 3rd International Urban Design Workshop in Lisbon - Summer 2022

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In the Summer of 2022, the authors resumed the successful series of urban design summer workshops in Lisbon, Portugal where the CRP Department has a long-established relationship with the Urbanism program at the Universidade Lusófona. This was the workshop's third iteration and had 21 participating students (19 from Cal Poly and 2 from Lisbon). The following lines is a brief description of the workshop's two intensive weeks.

After two years of suspension due to the COVID-19 pandemic and the shutdown of international traveling, this past summer we were able to resume the International Urban Design Workshops series at the Universidade Lusófona (UL) in Lisbon.¹ This third iteration of this two-week workshop happened from Monday, June 20 to Friday, July 1, 2022, including 21 students: 19 were juniors and seniors from Cal Poly (18 from City and Regional Planning and from Landscape Architecture), and 2 were master students from the UL. Coordinated and taught by professors Vicente del Rio (Cal Poly) and Diogo Mateus (UF), the group was assisted by Walber Angeline, an architect from Brazil studying towards his Ph.D. in Urbanism at the UL. Having self-organized in small groups, the students stayed in short-term rentals within walking distance or a short subway ride from campus.

On the first day, after the customary welcome by the workshop coordinators and the university rector, architect urbanist Mario Moutinho, the class was presented with their challenge: coming up with visions for how to expand the campus towards an adjacent area that would almost double its size, creating an opportunity to build new facilities and serve better its current 13,000 students (Figure 1 & 2). Having suffered from planning blight and the uncertainties caused by transportation plans, the area contains dirt parking lots (some rented by the university), vacant lots, and derelict buildings. Ideas from the workshop could potentially kick-start the development of a much-needed Plano de Pormenor—the Portuguese equivalent of a Specific Plan—and help solve a real need of the university.

Following the welcoming session, the students were guided on a walk through the campus and the project site for their first impressions. After lunch at one of the campus restaurants, the class enjoyed a visit to the Museum of the City of Lisbon where

Mr. Paulo Fernandes, one of the museum's curators, showed us several historical artifacts from the city's several layers of history since pre-Roman times and talked about its evolution by a room-sized model of Lisbon before its destruction by the 1755 earthquake and tsunami (Figure 3). The museum also had very instructive computer-generated videos depicting the city transformations.

Next, in a visit to CIU, the city's center for urban information and research run by Dr. Ana Marçal, the students enjoyed seeing their current exhibits and a large-size model of present-day Lisbon. They were also given a presentation on the city's planning efforts until recent days by Mr. Vasco Melo, one of the planners responsible for the district where the university campus and the project site are located. The first day ended with the students enjoying Lisbon's wide variety of food and nightlife options.

Repeating the success of the two preceding workshops, in 2022 we focused on exploratory walking as a fundamental method to study the city and understanding what makes places special, and on using those studies as a base for planning and design goals. As a foundation for this exploration, the class studied a text about urbanity, the flâneur as a method of analysis, and the importance of visual qualities in urban design.² The method was inspired by Walter Benjamin's concept of the flâneur as he/she who wanders and experiences the city, immersed in the anonymity of its crowds and spaces, as a method of analysis of the urban condition. For the next three days and divided into small teams for the rest of the workshop,

¹ Details about the workshops at <https://www.ud-workshop-lisbon.net/>

² del Rio, V. (2015). Urbanity, the Flâneur, and the Visual Qualities of Urban Design. *FOCUS 12*, pp. 66-72.



Figure 1 & 2: Above, the main university building. Left, the university campus (U) with the project site (S).



the students were guided on walks throughout Lisbon in areas representing different historical periods and planning/design paradigms (Figure 4). The teams were able to spend a couple of hours in each to wander around, observe, sketch, and analyze their urban design qualities. Students looked into and reported on seven urban design qualities: complexity and surprise, vitality and robustness, enclosure and linkages, transparency and vistas, legibility and coherence, architectural richness, and personalization and community values. At one of Lisbon's many picturesque sites, Filipa Antunes, a architect and teacher at UL, conducted an urban sketching session (Figures 4 & 5).

On Friday of the first week and for the rest of the workshop the teams carried on with a design charrette that included: a) a brief inventory and SWOT analysis of the project site and its context, b) development visions and goals, site plan diagrams, and design concepts (see the accompanying figures for selected examples of the teams' ideas). The teams based the development of their visions and ideas on their walking

Figure 3: The class at the City of Lisbon Museum looking at the model of the city before the 1755 earthquake and tsunami.





Figure 4: The students, Filipa, and Vicente showing their sketches at Calçada do Duque, overlooking the Castelo Sao Jorge in Lisbon.

studies and a preliminary program including functions (office, classroom, student, parking needs, etc) and their approximate square footage previously developed by Vicente del Rio and UL rector Mario Moutinho. On Saturday the students were taken by Vicente del Rio on an optional trip to Sintra to visit the city's quaint medieval downtown, the Moorish Castle (early 11th century, and the Sintra (12th century) and Pena (late 19th century) national palaces.

The workshop culminated with each team presenting a Powerpoint and a poster with their ideas and proposals to the workshop coordinators and a panel of guests, including rector Mario Moutinho, planner Vasco Melo, architect José Lobato Osório, anthropologist Marlucci Medeiros, and architect and faculty Pedro Ressano Garcia who is presently in charge of redesigning the current campus. One month later, the teams presented full reports including the results of the walking analysis, project development, and final ideas (Figures 7 to 10).

Notwithstanding the quick pace of the workshop and the design charette, the student proposals included interesting and sound design ideas, envisioning feasible possibilities for the expansion of the UL campus. Having Lisbon as a learning laboratory with its multitude of fascinating, walkable, and lively places, together with a unique planning/design challenge, energized the students immensely, presented them with a myriad of learning opportunities, and resulted in a successful academic experience that will certainly mark every participant's life. The International Urban Design Workshops series at Lisbon's Universidade Lusófona (UL) will continue in 2023 with a new design challenge and, hopefully, with another great group of Cal Poly and international students.



Figure 5: Sketch of view from Calçada do Duque, by Cal Poly Landscape Architecture student Thomas Vernet.

Figure 6: During one of the study walks, the students posed in front of a street car at Elevador da Bica, connecting the Chiado to the riverfront.





Figure 6: Student teams presenting their final proposals (powerpoints and posters) to a panel of guests including the university rector.

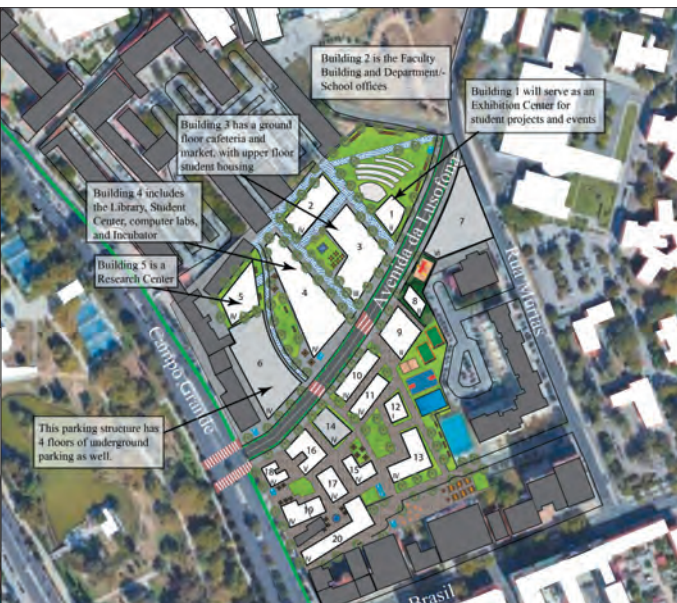


Figure 8: Illustrative site plan for the campus expansion. By E. Rosner, A. Cazares & E. Fatuda.



Figure 9: Illustrative site plan for the campus expansion. By W. Daniels, E. Krantz & M. Borges.

Figure 10: Proposal for enhancing the connectivity between the campus and Campo Grande park through a new street design. By A. Weizer, E. LaDue & S. Toner.



Leaving the Opera Theatre in Paris, Year 2000

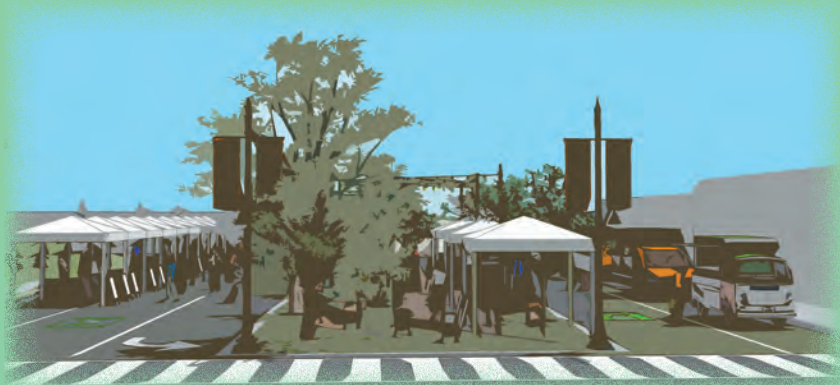
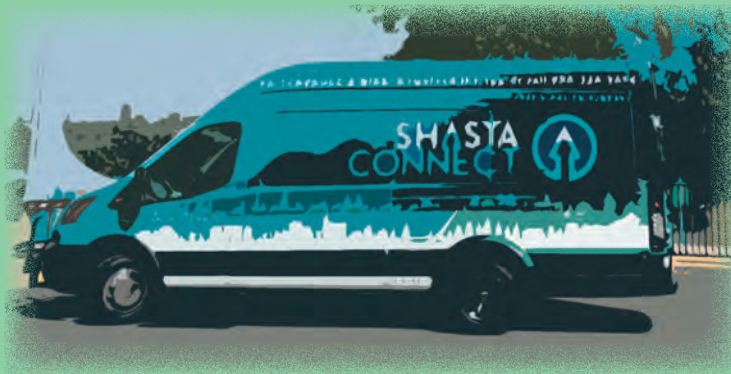
by Albert Robida

Robida was a visionary French illustrator and novelist known for his futuristic work. His masterpiece trilogy is a set of novels in which he shows his futuristic and almost prophetic visions of the mechanized society of the 20th century. These include the novels "Le Vingtième Siècle" (1883), "La Guerre au Vingtième Siècle" (1887) and "Le Vingtième Siècle, La Vie Electrique" (1890). Although he has been compared to Jules Verne, his proposed inventions integrated into everyday life and the social developments arising from them.



FOCUS 19

Spotlight



CiRPAC

City and Regional Planning Advisory Council, Cal Poly

The City and Regional Planning Advisory Council (CiRPAC) was formed in 2015 with a three-prong mission: to advise the department on the needs of industry and the profession so that future graduates are prepared to enter the workforce and be successful; assist the department in meeting its advancement goals; and to serve as a voice for promoting the interests and activities of alumni.



Ginger Anderson
Land Use Planner
Stantec



Geoff Bradley
Principal
M-Group



David Carbone
Airport Planning
Consultant



Michael Codron
Community Planning
Director, City of
San Luis Obispo



John Donahoe
Director of Planning
and Entitlement
Sanford University



Paulo Hernandez
Principal Owner
JPH Consulting



Pam Johns
Community Development
Director
City of Folsom



Lesley Lowe
Transportation & Environ-
mental Planning Manager,
Sanford University



Steve Lynch (chair)
Director of Planning
and Entitlement
Sand Hill Property Co.



Martin Magaña
Director of Transportation
Coachella Valley Associa-
tion of Governments



Martha Miller
Principal and Owner
Miller Planning Associates



Lisa Ring
LOR Planning & Environ-
mental Consulting, LLC



Richard Rojas
Deputy City Manager
City of Norwalk



Leeanne Singleton
Environmental Analyst
City of Hermosa Beach



Delvin Washington
Manager, South West
Division, City of San
Francisco

Conversations with Alumni

Juan Alberto Bonilla

LEED AP ND; Bachelor of Science in City and Regional Planning, Cal Poly, 2015.

I developed a passion for urban design and planning early in life. I remember being eight years old and wondering why some areas of my city had more people than others. I soon learned that neighborhoods and entire cities could be shaped based on the activities that take place there. I grew up in Tijuana, right on the U.S.-Mexico border. This allowed me to move freely between two different countries – in essence, two different worlds. Thanks to this exposure, I learned how urban planning varies depending on the location and I knew I wanted to take part.

I initially pursued architecture because I found the creative process challenging but enriching at the same time. Architecture allowed me to explore multiple answers to one problem before arriving at the best solution. This reaffirmed my passion for design, but it also made me realize that I wanted to look at the broader picture. At this point, I decided to transfer to Cal Poly to study city and regional planning while maintaining my strong interest in design. Here, I was exposed to the various elements of urban planning.

Cal Poly's planning curriculum is unique because it exposes students to the various components of urban planning, including urban design studios. Through these studios, I learned to use design and physical planning as placemaking tools to create destinations that people will use and enjoy. I acquired an understanding of the qualities, principles, and elements that shape the built environment: the surroundings created for us, by us, and to be used for our activities.

It was also through these studios that I discovered the importance of good urban planning for cities. After all, planning is all around us and it shapes our communities and lives through buildings and other spaces. Good planning takes difficult and complex issues and comes up with solutions that are sensitive to people's needs. Good planners can fully understand these needs



and use them to come up with solutions to make communities happy and healthy.

I remember fondly all my planning studios, especially the fall 2013 urban design studio with professors Vicente del Rio and Hemalata Dandekar where we got to work with the City of Milpitas in the Bay Area. This project was so unique and interesting to me because not only was it my first time reimagining a large, underutilized site, but it was also my first time engaging with a real city. The purpose of this project was to analyze this site and come up with an urban design vision to revitalize it and create a vibrant neighborhood in what

was then an old office park.

During this studio I learned how to come up with a sensitive and balanced mix of land uses that promotes quality of life and accommodates the needs of all people – something I do until this day! My team and I developed a plan to transform the site into a vibrant activity center by promoting a mix of uses that included residential, commercial, and public uses, as well as amenities such as green spaces, an amphitheater, an entertainment venue, and a cultural center (Figure 1). In the end, I got to present this vision to the Planning Commission, which was exciting and nerve-racking since I had never done this before. To top it all off, this studio received multiple awards, including two APA section awards, the 2014 APA California Chapter Award of Merit, and the 2015 National AICP Honor Award, which made this whole experience even more rewarding.

It was also during this time that I did an internship with the City of San Luis Obispo, which allowed me to see what planning in the public sector is like for the first time. While I knew early on that a career in the public sector was not for me, this experience allowed me to understand some of the city processes and nuances that go behind the scenes.

After Cal Poly, I moved back to the San Diego-Tijuana area where I started working at KTUA, a local landscape architecture, and planning firm, as an urban planner and designer. During my time there, I was able to develop my design skills even further

Editor's note: While at Cal Poly, Juan Alberto participated in the 3rd-year urban design studio that received local and state top awards from the APA for their work for Milpitas CA (2014). It was also the first undergraduate class to receive a national award from the AICP (2015).

since my responsibilities ranged from drawing and rendering conceptual site plans and diagrams to 3D modeling, graphic design, project branding, and design and production of documents. I also inadvertently became an active transportation planner, something that I never thought I would do during my Cal Poly days, which is one of the firm's main focuses.

However, the whole mobility planning process was fascinating. I soon found myself actively analyzing how the shape and design of cities and buildings affect the way people move through them to come up with ideas and solutions to improve these flows. I also worked on parks and placemaking projects, including one of my favorite projects to date, a corridor revitalization design inspired by Barcelona's Ramblas in Atascadero. Here, I got to propose a design for El Camino Real that incorporated a 23-foot wide treelined flexible median enhanced by outdoor furniture, permeable pavers, and landscaping (Figure 2). The flexible space provides both diagonal parking spaces for the surrounding businesses and an open linear promenade that can be used during events, such as farmers' markets, festivals, and concerts.

This is also when I started playing an active role in community engagement, something that I do until this day. I have always felt that we as planners can have a direct impact on people's lives so listening to them is crucial. Most of the projects that I am involved with have an important community outreach component. Thanks to these outreach events, I discovered how disproportionately disadvantaged some of these communities are. Minorities, primarily Latinos in my case, are the ones that have the most barriers when it comes to education, health, transportation, etc. Many of the people I have met lack access to services, such as community and recreation centers, and a lot of them live in areas where insecurity and gang violence are major issues. I think that as a Latino in this field, I have the advantage of speaking the language and understanding the culture. Many of the Latinos attending these events are generally not comfortable speaking up or raising concerns. Fortunately, I have always been able to connect with them and get to understand their needs and concerns, which a lot of times revolve around safety.

Now I work as a lead urban planner at WSP, one of the largest engineering and design firms in the world. Going from a small local firm to a giant company requires some adapting, but the potential to work on a great variety of interesting projects makes up for it. Here I get to work with other planners, engineers, and designers from all over the country and I can confidently say that no two days are alike. One day I could be doing research for a General Plan update for a local city, collaborating with an urban designer from Portland and a traffic engineer from Saint Louis on corridor a revitalization project in Kentucky, working with Esri on a 3D model for Orange County, creating maps for a project in Utah, facilitating a workshop in Los Angeles, or performing fieldwork



Figure 1: Illustrative site plan for Milpitas, CA. Undergraduate project, CRP-CalPoly.



Figures 2 & 3: Proposed flexible median at El Camino Real in Atascadero. (Source: KTUA)



Figure 4: Proposed improvements for a major intersection in Los Alamitos. (Source: KTUA)



at the U.S.-Mexico border. My responsibilities are also quite varied and as time goes by, I am starting to get more project management-related tasks, including interacting with clients and subconsultants, managing budgets, leading meetings, and presenting at workshops and working sessions.

Planning is broad and diverse making it such an interesting but challenging field, especially for students and recent graduates. I remember struggling to find my place in the profession as I was starting my career, which is why I would like to encourage aspiring planners to not be afraid to try different things. During my professional life, I have been fortunate enough to have been able to work on so many different projects and to experience working for both the public and private sectors.

All these opportunities taught me something new and, in most cases, I acquired or refined skills that I still use until this day. This also changes the way you see things – I am now super aware of pedestrian and bicycle infrastructure and ADA accessibility wherever I go, and I try to actively incorporate this into my work even if my projects are not mobility-focused.

There is one last thing that I would like to encourage everyone to do: travel. Experiencing new cultures and seeing what else is out there are also very important! As planners, we get to shape other people's communities, and sometimes the best solutions are already somewhere else.

I have been able to travel to other great cities across the globe and this has truly given me a broader, global perspective. For example, a couple of years I went to Amsterdam and for the first time, I felt like I got to experience what a complete street should be. There, many of the streets are designed with cyclists and pedestrians in mind, making them not only safe but truly enjoyable to travel. It was fascinating to see how one city can prioritize other modes of transportation over cars, something



Figure 5: Community engagement for the Santa Ana Active Transportation Plan (above) and the plan's cover image (below). (Source: KTUA)



that you usually do not see on this side of the world. On another adventure, I walked along the Cheonggyecheon, a river flowing through the center of Seoul restored as a linear park in 2005 as part of a major urban renewal and beautification project. This was one of the first projects that sparked my interest in urban design and planning and I remember how excited I was to finally see it and experience firsthand a successful revitalization of a downtown area.

My travels have also allowed me to become more creative and innovative as an urban planner to create better places for people to live, work, and thrive. You also do not have to go to the opposite side of the world for inspiration. Visiting other cities within your state or even going to the different communities within your city can be an enlightening experience.

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Figure 6: Juan at the Cheonggyecheon River Park in Seoul.



Conversations with Alumni

Donald S. Nielsen

*Bachelor of Science in City and Regional Planning, Cal Poly, 2010.
Master of Urban Planning and Policy, University of Illinois, Chicago, 2012.*

Make no little plans. They have no magic to stir men's blood and probably will not themselves be realized. Make big plans, aim high in hope and work, remembering that a noble, logical diagram once recorded will never die...." These words from Daniel Burnham still ring true for me today ever since reading them as a high school student just getting interested in planning. I was always curious about planning while growing up even though I didn't know it was a profession yet. Ever since graduating from Cal Poly in 2010 I always brought that sense to the projects I worked on in both the private and public sectors. I would try and find ways to push the project boundaries while still ensuring the public realm was taken care of. This is and was not an easy task particularly when you have to convince NIMBYs, skeptical boards, and cost-adverse applicants.

While I attending Poly, I was fortunate enough to be able to have a summer job working for the City of Ventura, which was not easy given that it was the height of the Great Recession. However, after I graduated most municipalities were not hiring due to continued budget cuts and the private sector was contracting because of a lack of development and funding availability. This however allowed me to explore another facet of planning, hazard planning, by obtaining a degree in Fire Technology. This allowed me to look at planning through another lens and modify plans to better anticipate the needs of emergency services. It allowed me to look back and critique my previous projects and helped future planning ideas.

While the world was still recovering from the Great Recession, I took the opportunity to look beyond California and seized on the dream to move to the home of Daniel Burnham – Chicago. After speaking with some professionals in California, I decided to also get my master's since that was becoming the new normal requirement. My girlfriend, now wife, agreed to move with me after she wrapped up her job in California. When I left, I lived in a hostel for about a month until I found a place to live



in the South Loop area, in a building called River City. I had read about this particular building in planning books because it was designed by Bertrand Goldberg (best known for his Marina City towers on the Chicago River, better known as the "corn cobs") and it was a radical architectural and planning design at the time, but I never thought I would get to live there. While going to school I was also able to get a job as a Graduate Assistant with the University of Illinois Chicago Office of Sustainability working on their bicycle plan. My first task was to create the background report which required identifying all of the bicycle racks in and around the campus... which just happened to be embed-

ded within the existing fabric of the city and split in two by a historic community. I will say this, trying to find bicycle racks under a few feet of snow or take bicycle counts when it is in the teens or single digits is a whole other side of planning I never thought about. While this may have seemed like a mundane task, these background reports are vital for the creation of the actual plan, which I later found out was much larger than I initially thought. After finishing the background report, we were able to create a bicycle plan for the university, propose bicycle hub designs, and new routes through and between the campuses, and present it to the University Board. This was all leading up to the much larger project though, that I was just learning about from my boss – a multimodal transportation plan for the university and medical district.

After my term was up at the University, I was able to continue working on the project by receiving a job with the Chicago Metropolitan Agency for Planning, or CMAP. This was the dream job at the time because we had a major project, with a tight timetable, all the major players in the city were involved, and we were able to make recommendations about land use changes. The experience I received from this was invaluable because it helped teach me the realities of massive outreach campaigns, public input and discussion, economic development, gentrification, and historic and current racism practices.

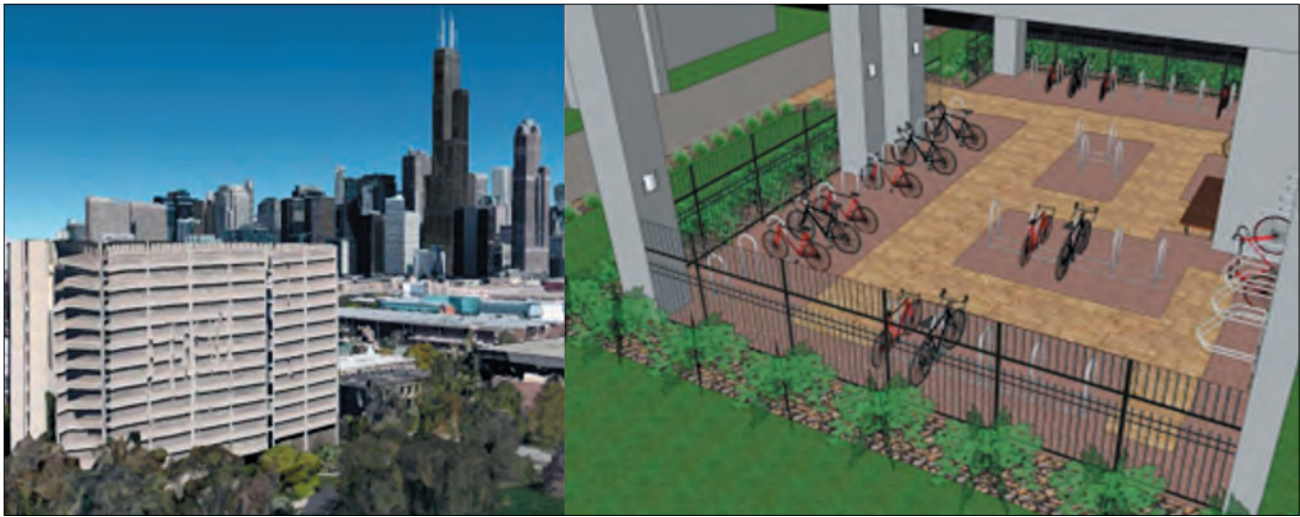


Figure 1: Proposed bicycle hub design at the base of the Science and Engineering Offices Building.

One of the most memorable and shocking events of this project was when we were taken on a tour of an old warehouse that was filled with items from the 50s and 60s... which people had to abandon because the bulldozers were coming. A wall of pristine coats and furs from a dry cleaner. A bin of hats. A baby carriage with a doll. While I learned and experienced a lot at Poly, nothing we did could have prepared me for this reality. It drove home that this plan needed to ensure it did not repeat the past, and that it was created for everyone while also allowing better transportation and access, and housing options for the university and surrounding residents; we were really not making a little plan.

After graduating in 2014 I received a job offer from Rincon Consultants that allowed us to move back to California much to my then fiancé's relief. This allowed me to further expand my planning knowledge by working on environmental documents and acting as a consultant planner for different jurisdictions. While this job and company were great, it made me realize that my heart truly rested in the public sector. That is when I took the opportunity to work for the City of Ventura again in a full-time capacity. I worked primarily on large mixed-use, multifamily projects downtown and in historic preservation. While frustrating at times it was one of the most rewarding positions I had because of the variety of projects, the complexity of the regulatory system, the different public personalities, and the history of everything. This position allowed me to dive deep into a project and work with the applicant to help mold the project into something that accomplishes what they want but also maximizes the public gain.

In 2019, I had the opportunity to switch careers to the City of Thousand Oaks due in part to significant management shifts in Ventura that caused a culture change. While I liked my cowork-

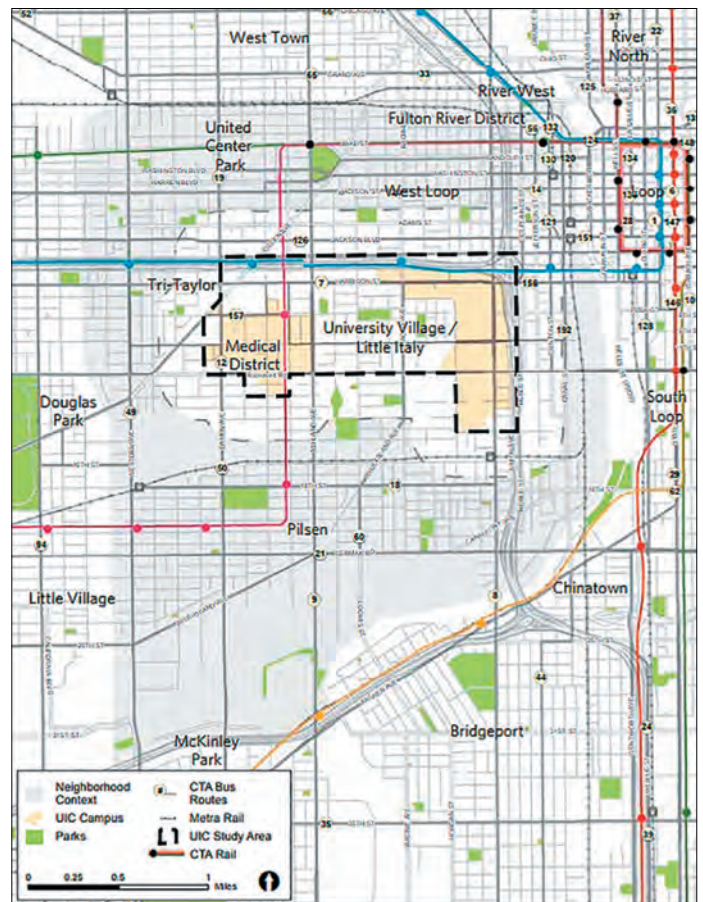


Figure 2: University of Illinois Chicago Multimodal Transportation Plan. Worked on this project while at CMAP.

ers this proved to be a major shift for me and I figured out that I could not acclimate to the culture, both in the organization and the city as a whole. I realized that I would have to compromise more of my planning values or set aside my big ideas for exciting projects. It was not until 2021 that I realized I needed to change jurisdictions, and that it would be ok for me to do so. After coming to this realization, I was then able to take a position with the County of Ventura in 2021, but this time in their Long-Range Division. Right, when I started I felt better about making the switch and regained the sense that these big ideas I had would be welcomed. I am currently working on two ordinance amendments and an Area Plan update among many other last-minute surprises we get that may result in a Planning Commission Hearing.

Now, if you have gotten this far, you may be asking if my time at Poly was well spent, and I would answer in the affirmative. The program helped set me up to jump into most positions because I was knowledgeable on a variety of different topics and had some experience working with the public. However, I will say that I wish we had learned a little more about the California Environmental Quality Act (CEQA) and the day-to-day life of a planner. We do a lot of reading, writing, and analyzing in both the private and public sectors, particularly the latter. In my current position, I have had to read through and analyze state laws regarding housing, CEQA, energy generation, and land use, and then report to my supervisors and director. This in turn is being used to modify policy and change long-term project priorities.

So my advice to all you future planners is to always dream and plan big because you never know if you can get everything or if you will need to scale things back. My advice is to:

1. Travel. Some of the best planning ideas I have taken back to work have been after I have traveled to

other states or countries. Not only are you exposing yourself to other ideas and cultures, but you are also learning that planning takes so many different forms. Just remember to have fun and either turn off the planning brain or put it on observation mode only... not everyone is as passionate about planning as you.

2. Be flexible. Sometimes life and your job are thrown curveballs and you just need to be able to take events as they come. The pandemic drove this home because it forced everyone to figure out how to run while running. I have been in the middle of a project before and was recommending denial when the state passed a law that was going to take effect just before my hearing, so I had to completely change my report and resolution to support and recommend approval.
3. Don't be afraid to switch jobs. Sometimes you take a job because it sounds awesome and/or the pay is great, but once you have been at it for a little while, you realize that it doesn't suit you. I made that mistake and stayed at a job too long because I thought I owed it to them. Your health is more important and you should be doing what you love in a place that makes you feel good.

Planning is not the easiest profession, but it is fun. You work to help plan for the future, trying to right wrongs of the past and ensure that our environment reflects our shared values. Between climate change, sea level rise, civil and political unease, and the ongoing emergence from a historic pandemic life seems daunting and our job impossible, but you have to remember that every little step helps. You can do it!

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Figure 3: Presenting to the Ventura County Planning Commission.



Conversations with Alumni

Sean Tiedgen

AICP; Bachelor of Science in City and Regional Planning, Cal Poly, 2010.

FOCUS: When and why did you decide to become a planner and why Cal Poly SLO?

Well, I can definitely say that I did not grow up with the notion of becoming a planner. Though looking back, I realize I had a good foundation to build from. As a kid, I grew up fascinated with Legos, spending many hours with my brother building cities and towns, creating various vehicles (some physically impossible), and recreating the things we saw in our own city. That led to my fascination with buildings and architecture, and I thought I would become an architect.



In high school, I took every hand and computer-aided drafting class I could. While taking classes in junior college, my drafting skills allowed me to land a job at a local engineering and land development firm where I was introduced to the California Map Act, zoning codes, landscaping, land development, and urban planning. From there I was hooked and wanted to pursue a career in city and regional planning.

Cal Poly was the desired choice for me as I had heard about the polytechnic (i.e., academic learning applied in hands-on experiences) approach to education from my drafting teacher, who was a Cal Poly architecture engineering graduate. I appreciated that at Cal Poly SLO you don't just learn in the classroom, but that your knowledge is tested and refined, to a small degree, through applied learning in real-world situations. I believe that this approach helps individuals retain more of the things they learn for their career path and creates a foundation for facing real-world planning situations that we all face very quickly once we graduate.

FOCUS: Can you tell us about your professional path after graduation? What employment opportunities did you have? What were your roles and favorite projects?

Well, I'm not what some called the "typical" millennial (i.e., job hopping for the next best job), having worked at the same agency for the last twelve-plus years – which I feel fortunate to have experienced. I ended up getting a job back home where

I grew up one month after graduating from Cal Poly. I began working as an assistant transportation planner at the Shasta Regional Transportation Agency (www.srta.ca.gov), a small metropolitan planning organization, where I interned. Since then, I have worked my way up through several planner roles and worked on some non-traditional projects.

As an assistant planner, I worked for a brief time assisting engineers through the federal and state environmental processes which we call the National Environmental Policy Act (NEPA) and California Environmental

Quality Act (CEQA). I had the unique opportunity to assist the executive director in creating a website and logo for a 16-county consortium of MPOs and regional transportation planning agencies that we call the North State Super Region. This group is focused on working together to address regional transportation issues and challenges that we share in common or are broader than just one region.

During my time as an associate planner, I was tasked with leading the development of the agency's first activity-based travel demand model. Depending on who you talk with it's also called an agent-based travel model. What was great about this project was that I had the opportunity to participate in discussions across California, and other states, with some very smart planners and engineers on how to utilize United States Census data and other information in innovative ways to estimate the future impacts that land use development and transportation projects may have on our travel behavior. It was part science, part data, and part of what I call "planner's intuition" based on real-world observations. During that time, our agency became a fully independent organization, and I was tasked with overseeing two remodeling projects for the building the agency had acquired. That introduced me to a completely different field of work managing public works projects and overseeing building construction activities.

As a senior planner, I had the opportunity to work on several unique planning efforts. I spent several years working with local and regional partners on preparing for alternative fuel

transportation. This involved several studies to identify how the Shasta County region and neighboring counties could prepare for battery-electric and hydrogen-fuel cell vehicles. This involved learning a lot of new automobile technology terms and having to think in terms of “energy” and not just vehicle miles traveled. Those efforts provided the groundwork to support DC fast charge stations coming to the region and led to a successful joint grant application for the region’s first all-electric transit bus.

One of the most challenging projects was collaborating with regional partners on providing the region’s first technology-enabled on-demand public transit service. An annual effort at our agency is to conduct outreach and solicit input from our communities on ongoing public transportation needs for

the region, which we call the Unmet Transit Needs Process. Because of the rural nature of our region, some public transit services have been challenging to try to implement. For several years we had a growing number of requests for public transit on Sundays. Due to new technologies emerging because of transportation network companies (e.g., Uber, Lyft, etc.) arriving and new transit funding sources in California we saw the potential to meet this need. What started as a conference room discussion led to two studies, a business plan, several grant applications, and extensive community outreach asking for input on how an on-demand transit service could meet community needs over a couple of years to eventually what we called ShastaConnect Sunday On-Demand (www.shastaconnect.org) in 2019.

FOCUS: What is your current job? What is your title and position in the organization? What are your primary responsibilities, and what type of work do you get involved with?

Well, I was recently hired in April 2022 to be the Executive Director of the Shasta Regional Transportation Agency. So that has been a real adjustment moving from being a project planner to being responsible for every aspect of the agency. Currently, I juggle my time between completing a couple of prior projects I was working on as a senior planner, providing overall leadership and guidance at the agency, identifying and encouraging training opportunities for staff, poring over many pages of federal and state regulations, networking with regional, state, and federal partners across California, and looking ahead for opportunities in addressing future regional transportation needs. It’s a lot of work, sometimes incredibly stressful, but also rewarding.

FOCUS: What are the most exciting projects you have been working on recently?

Well, now that I’m in the director role I rely primarily on the staff at our agency to carry out our projects. However, there are a couple of unique projects I’ll share briefly that was working on.

One is that we’re partnering with our local Caltrans District 2 office and other regional partners to address freight challenges and needs on Interstate 5. Our region is at a geographic crossroads in the North State of California. The highway system connects west to Eureka, north to Oregon and Washington states, east toward Reno, Nevada, and south to Sacramento and San Francisco, California. This intersection of highway systems means we experience quite a bit of freight traffic which creates some safety and efficiency challenges, including more frequent highway closures due to increased extreme weather events. To tackle these challenges we want to introduce the first-ever “truck-only” lanes on what we call the “number 1” lane (i.e., many of us call this the “fast lane.”) through a portion of our



Figures 1 & 2: Sean (second from the left) with the Shasta Regional Transportation Agency Board of Directors members and staff, launching the new ShastaConnect Sunday On-Demand Transit service (above), and the service picking up and dropping off riders at the Sundial Bridge in Redding (below).



urbanized area, right next to the other traffic lanes. This has three primary benefits: 1) We're able to ensure freight movement can get through our region more efficiently; 2) we're able to address safety issues for all facility users, especially where on/off-ramp conflicts happen; and 3) we would be able to manage traffic better during closure events by managing all lanes, directing users what lanes to use, and keeping freight and other vehicles from blocking emergency responders and local traffic from getting on and off our highway facilities. What's unique is that we're not building a separate facility.

Secondly, we're working with a variety of partners on preparing for an alternative fuels transportation future (e.g., battery electric and hydrogen fuel cell vehicles), whenever that may arrive. We're working with partners on converting our region's public transportation, government agency, and private fleets to alternative fuels and exploring opportunities to bring hydrogen fuel cell stations into the region and create a hydrogen fuel economy. We are also working on a project with many partners to bring online an alternative fuel-powered intercity bus service from Redding to Sacramento. The goal is for the service to be zero-emission via hydrogen fuel cell coach buses. We're working with a variety of public agency, non-

profit, and private industry partners on this and time will tell how successful and soon these efforts will be realized.

FOCUS: How is your education reflected in your work? Do you feel that the classes and skills from the BCRP program support your professional practice?

The skills learned and classwork in Cal Poly's City and Regional Planning program supported my planning career. I don't often do much design work today, but I do use the map/plan reading skills learned to collaborate with engineers, planners, and others on figuring out the best designs for transportation corridors or trying to interpret traffic flow/patterns. I'm consistently applying research skills, using tools to collaborate with others, preparing reports, and making presentations.

FOCUS: From your perspective, which are the critical knowledge areas for planners entering the field? (e.g., land use law, research methods, zoning, housing finance, CEQA, etc.)

Wow, that is not a simple question. Knowing what I do now, I think this depends on what area of planning someone wants to go into. For example, someone looking at going into urban design or local city/county planning is going to need to have

Figure 2: Example of ShastaSIM activity-based model mapping for roadway networks in Shasta County by facility type.

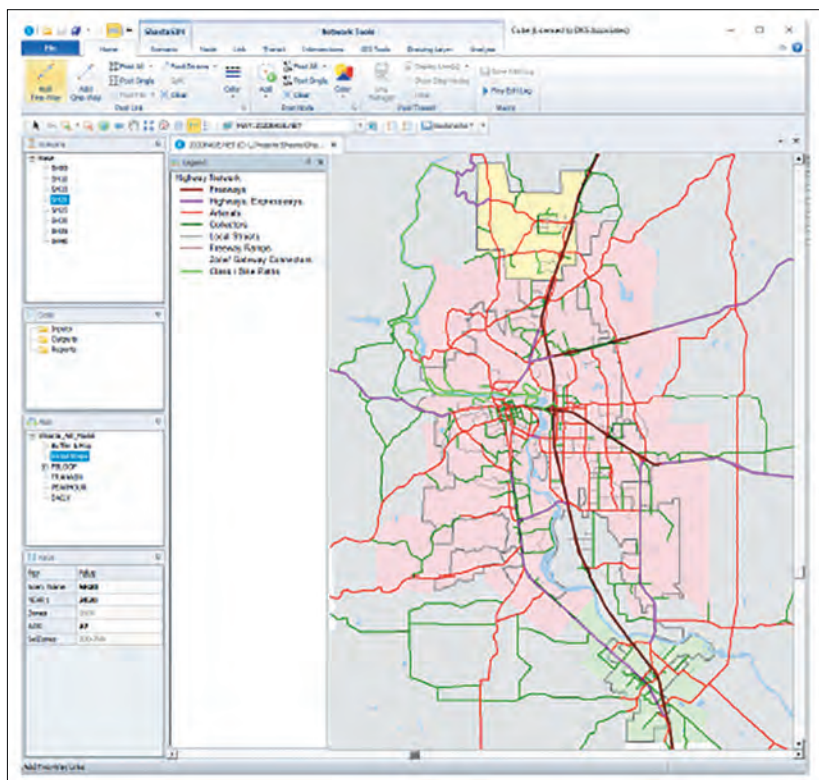




Figure 3: The first battery-electric bus for the Shasta Region. Acquired through a joint effort by SRTA and RABA applying for Federal Transit Administration Low-No grant funds. (photo courtesy of RABA)

a basic understanding of a broad number of topics. Whereas someone going into mostly environmental, or transportation planning may need more in-depth knowledge of those fields and might not need to know about housing finance.

For someone just entering the planning field, you can't go wrong with having a broad understanding of planning areas at first. Some knowledge areas that I think crossover anywhere includes: 1) Having a good understanding of both the National Environmental Policy Act (NEPA) process and the California Environmental Quality Act (CEQA) process. I believe there are now sixteen or seventeen other states that use some form of the CEQA so that may be helpful if you work outside California; 2) Understand what zoning is and how it works; 3) Know how to access and use US Census data; 4) Be good at using different research and surveying methods. You'll find yourself doing lots of research or developing ways to solicit feedback from community members; 5) Understand how the legislative process works.

Much of what we do as planners is a result of laws and regulations passed at the federal, state, or local level. We need to understand how this works and how to read and interpret legislation to do our jobs; 6) Understand both state, regional, and local planning processes. Today, I see regional and local planners needing to work together all the time to accomplish the planning goals for our communities.

FOCUS: Which are the critical skills/tools for planners entering the field? (e.g., GIS, computer-based design, statistics, surveying, presentation, writing, etc.)

Similarly to your last question, I would say this is going to vary in the field of planning someone is looking to make a career out of – probably more significantly. Three skills/tools I think planners need to enter the planning profession include:

- Written, verbal, and graphical communication – I'm grouping these because they often go together. You will find yourself writing, a lot, and it will vary. Whether it's an application to secure grant funding for a project, preparing a technical report and summarizing data on a dashboard, writing a staff report on a project for a board of elected officials, or making a presentation. Learn to adapt to who your audience is for each communication need. Be cognizant of how you may vary the communication based on whether it's written, verbal, or graphical (or all three!). Take time to figure out your communication style, be honest with your strengths and weaknesses, look for training opportunities to hone your skills, and find one or two peers who can give you feedback.
- Technology savvy – Know how to use the tools at your disposal efficiently, at least at a basic level. Whether it's Word, Excel, GIS, or other tools. Understand how to use social media from a business or government perspective, not like how you may use your personal social media page. Learn to use social media to tell a story, solicit positive discussion or participation, encourage participation in a service, or share information concisely.
- Emotional Intelligence – This was a surprising one for me in planning, and I share it with hopes it makes someone's path a little easier because I don't think we talk about or teach this enough. In short, it means having the ability to understand and manage our own emotions while recognizing and being able to influence the emotions of others. We interact with so many people as planners: our colleagues and bosses, elected officials, the public, consultants, family... everyone really. Learn how to observe people; how to motivate yourself and others; recognize when to say "no;" be a good listener; be honest and apologize when wrong. Having a high "EI" will do you well.

FOCUS: What was the most challenging aspect of transitioning from the BCRP program into professional practice?

Dealing with and navigating various types of politics. Whether it's between colleagues, various parties in a community, neighboring cities and their boards, or local and state/federal agencies, there are diverse types of competing politics. Being able to understand and recognize these has and continues to be a challenge, especially because they can be ever-changing.



Figure 4: SuperRegion logo designed for the 16-county North State Super Region group and associated website.

vantage of opportunities when they present themselves. Think “global,” act local (Thank you Professor Paul Wack for this lesson). Learn to say “yes,” but also when to say “no.” Travel and experience different places. Try things new and challenging. Be ok with being uncomfortable. Think “outside the box” and don’t always go with the “status quo.” Be honest, have integrity, and be faithful. Remember no one is perfect so, have empathy for others. Be willing to apologize when wrong and forgive others. Own up your mistakes, learn from them, and move on. Learn to network. If you can, find a good mentor and know what you want someone to mentor you on, they can be invaluable. Always be a student – we can never know too much. Try to have a work-life balance. Have fun! Be a conduit for positive change in your community.

FOCUS: What do you think are the biggest challenges for planners in the near future?

Well, I don’t know if they are the “biggest,” since that can be very subjective, but here are two challenges I see:

- Stewardship – History shows us that climates change over time. There are indications of ice ages and periods of heat and drought. While it can be tempting to assume the end is near if we don’t do “x, y, or z” that seems too simplistic. Do we have an impact on our communities? You bet! Should we be good stewards of the resources, land, water, animals, etc., around us? Yes! The challenge is finding the balance. Doing too much of one thing or the other may have a negative impact we didn’t realize. As planners, we need to try to balance these conflicting needs as we plan our communities.
- Alternative energy – In many areas of our lives alternative energy is being explored, from ways to power our buildings to how we use transportation. These alternative energy sources present opportunities and challenges. We need to be able to be educated on alternative energy sources and understand how they work. We should be prepared to allow for early adopters to test them before applying rules, regulations, or designs carte blanche in our communities. We need to find ways to allow for a gradual transition in our communities and understand where alternative energy may not work well, and traditional energy sources may still be necessary. We need to understand the impact of alternative energy on energy storage needs, which may affect how much land and infrastructure are needed.

FOCUS: Any final words of advice for the young planners?

There are many things I can think of to share. Some will seem obvious or cliché, but here are some thoughts that come to mind: Treat others like you would want to be treated. Take ad-

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Learning from California: Highlights from CRP Studios 2021/2022 AY

Planning and design studios are fundamental for the CRP department mission and both the undergraduate and graduate curriculae. As the best vehicle for Cal Poly's learn-by-doing pedagogy, the studio experience allows students to engage in quasi-real projects and work with real cities and their officials, stakeholders and communities, helping them to become better prepared for professional life.

Undergraduate (Sophomore year):

CRP 203 Urban Design Studio II (Spring 2021)

Instructors: Amir Hajrasouliha and Beate Von Bishopink

Missing Middle Housing, San Luis Obispo CA.

This studio worked on a 3.3-acre site in the tourist district of the City of San Luis Obispo. Situated along Monterey Street, this location has excellent potential to be redeveloped as a mixed-use residential and commercial district. Students addressed the city's housing needs by providing "missing middle housing" options in an area zoned for tourist uses. Students proposed creative proposals by combining uses and activities that support hospitality and tourist uses with residential units. Students in teams of three start their project with a site assessment and studying the existing zoning regulations. Next, the teams used lessons learned from their case studies to develop their conceptual designs. The teams' design ideas came to life with development plans, including site plans, sections, elevations, and perspectives. Deliveries were completed using a mix of hand and technical drawing, AutoCAD, SketchUp, and Photoshop.

Undergraduate (Junior Year):

CRP 341 Urban Design Studio III (Spring 2021)

Instructors Amir Hajrasouliha & Beate Von Bishopink

Client: City of Campbell Planning Department

Concepts for the Winchester Light Rail Station Area, Campbell CA.

Recognizing several housing opportunity sites as identified in the City of Campbell's Plan for Housing (2023-2031) this studio contributed to the City's long-range planning efforts, the Valley Transit Authority (VTA), and the County Office of Supportive Housing (OSH) through the development of urban design concepts for the area around the Winchester light rail station.

The studio's eight student teams came up with alternative long-range visions featuring conceptual development scenarios for both public and private lands that included land uses, building envelopes, public facilities, circulation, and open spaces. The work was conducted in three major phases: a) assessment of community needs, the area's potential, and current policies and initiatives; b) visioning; and c) development of urban design concept proposals. Although the students prepared their

CRP 203: Site plan and section drawings from the project by Madeline Hines, Jenny Nguyen and Yvonne Huynh.





CRP 341: Site plan and partial view of one of the proposals for Campbell's Winchester Light Rail Station Area. Student team: Aidan Clark, Eric Wang, Peyton Victoria, and Sharon Ng.

proposals following the city's land use regulations and existing guidelines, they also suggested alternatives for parking standards along TOD development principles in order to create multimodal, pedestrian-friendly projects. Students presented their final proposals to the planning commission in a public session.

The CRP 341 Studio is indebted to Brian Leventhal (Campbell's City Manager), Rob Eastwood (Community Development Director), Stephen Rose (Senior Planner and Housing Coordinator), Daniel Fama (Senior Planner), and Larissa Lomen (Assistant Planner), for generously making time to arrange the field trip and responding to the student work. Josselyn Hazen, Transit-Oriented Development Project Manager at VTA, and Jessie O'Malley Solis, TOD Manager at VTA, attended a virtual session with the student teams to comment on their concepts. During the class site visit, Council member Liz Gibbons and Susan Blake, chair of the Campbell historic preservation committee, explained the most significant challenges and opportunities in Campbell and for our site. Council member Susan M. Landry provided the students with valuable written comments.

Undergraduate (Senior Year):

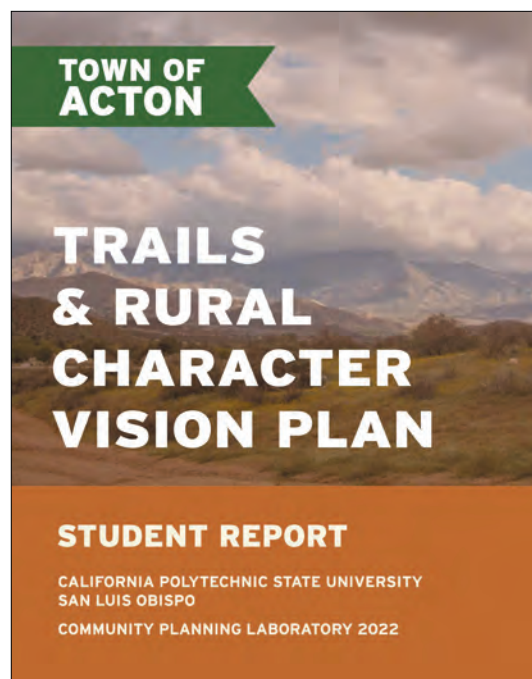
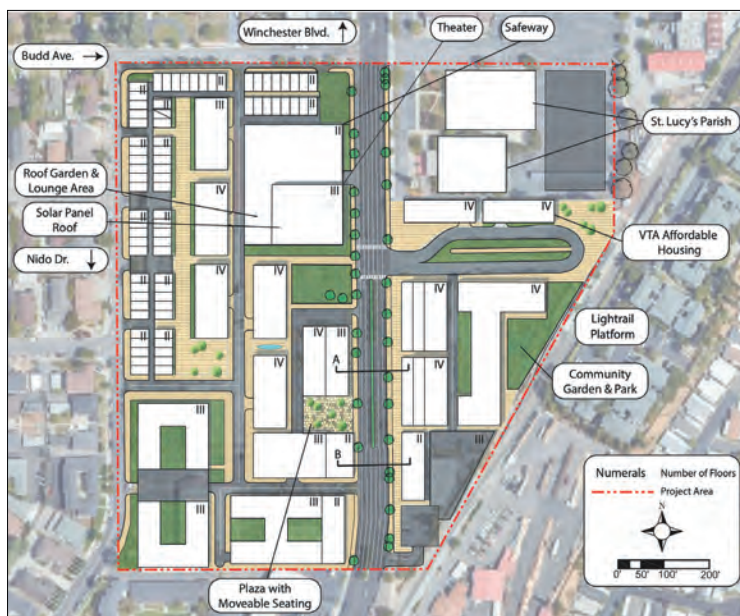
CRP 410/411 Community Planning Lab (Fall 2020 & Winter 2021)

Instructor Dave Amos

Client: County of Los Angeles

Trails and Rural Character Vision Plan, Town of Acton

Involving 22 CRP senior students, this was a comprehensive planning studio in cooperation with the County of Los Angeles. The focus was the unincorporated community of Acton, located in the Antelope Valley, between Palmdale and Santa Clarita. With only 7,500 residents in a rural setting, the community was not interested in increasing density or adding urban infrastructure but hoped the students could help them communicate to the County their preference for preserving their rural character.



CRP410/411: Cover page of Acton's Trails and Rural Character Vision Plan.

The class completed a *Trails and Rural Character Vision Plan*, including a detailed Existing Conditions Report and policies for the preservation of the rural character. As many residents own horses and equestrian recreation is popular, the students held a community workshop for a collaborative mapping exercise identifying key equestrian trails. Many of these trails were informal and residents prioritized them to get the County to own and

maintain them. The class also recommended that Acton lobby the County for additional policy changes to preserve their rural lifestyle. For instance, as residents opposed urban infrastructure such like streetlights, a Night Sky Ordinance restricting the amount and kind of outdoor lighting was proposed to preserve views of the night sky. Other policy recommendations included design guidelines for new development, involving Acton's Town Council earlier in the project review process, and reducing cut-through traffic from commuters traveling to and from

Undergraduate (Senior Year):

CRP 410/411 Community Planning Lab
(Fall 2020 & Winter 2022)
Instructor Cornelius Nuworsoo
Client: Tulare County

Springville Community Plan

This studio included 19 undergraduate working on a comprehensive draft update to the Springville Community Plan in Tulare County. The greater Springville Planning Area is a sprawling, rural residential community spread across 26 square miles in the Foothills of the Sierra Nevada Mountains and serves as an entry to the Sequoia National Park. The study area had a population of approximately 2,850 residents and 2,090 housing units in 2020. The usual field activities like a land use inventory and four community meetings took place in-person with participants in face coverings.

The 2040 Plan update sought to accommodate population increase and minimize negative impacts of growth by striking a balance between preserving agricultural lands while meeting other land-use needs, establishing a program for energy

conservation and efficiency, adopting green building and water conservation practices, and reducing greenhouse gas emissions. Like previous years, there was a formal agreement with Tulare County, the client, which required professional conduct from project participants while the students benefitted from the experiential learning opportunity in preparing a plan for a real community. Tulare County is looking to include the product of the work effort in its County General Plan.

Graduate (First Year):

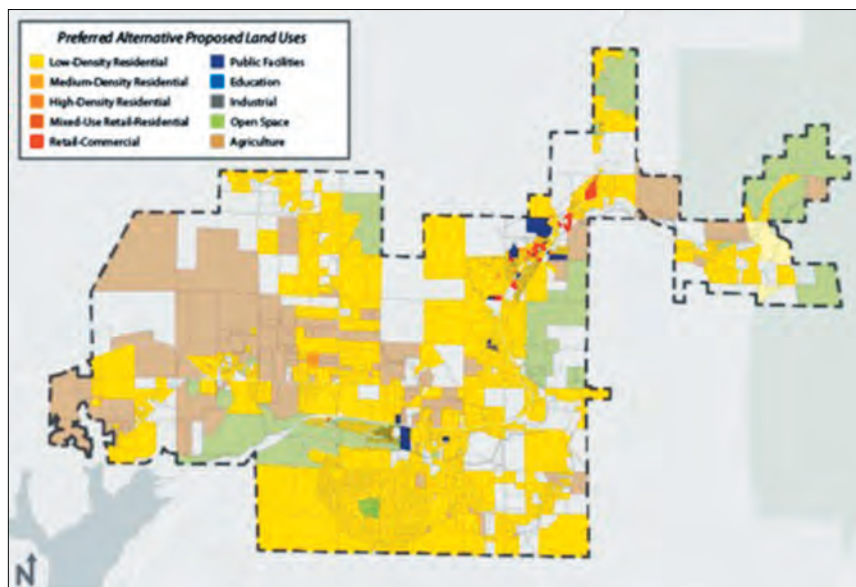
CRP 553 Project Planning Lab (Spring 2021)
Instructor: Hemalata Dandekar
Client: City of Campbell Planning Department

Downtown Campbell Vision Plan

The City of Campbell is noted for its attractive historic downtown which attracts residents and visitors to its many restaurants, bars and popular weekly Farmer's Market. Looking to the future, Campbell's planning department tasked students with: enhancing the connectivity of the light rail station to the historic downtown; envision strategic densification of mixed use, workforce and affordable housing development; enhance walkability with parklets, reimagined circulation and wayfinding. The studio developed the Downtown Campbell Vision Plan that included three zones:

1: The Civic Commons that create a distinctive core destination with a redesigned Civic Center and a Central Avenue promenade leading to the VTA station with public amenities and historic character

2: The Branching Out of the Downtown extending downtown east to the Community Center and west to the Pruneyard



CRP 410/411: Map with the preferred alternative proposed land uses; Springville Community Plan Update.

shopping complex, increasing density and adding a business-servicing public plaza, and garden.

3: The Orchard that prioritizes business diversity, affordable housing, outdoor spaces, public art, and a pedestrian-friendly linkage from the downtown to open recreation space fronting Los Gatos Creek.

Graduate (Second Year):

CRP 552/554 Planning Lab (Fall 2021 & Winter 2022)

Instructor Kelly Main

Client: Oceano Economic Development Council

Oceano Action Plan

Retained by Oceano's Economic Development Council (OEDC), the thirteen students in this graduate studio developed an Action Plan for this unincorporated community of approximately 7,000 in San Luis Obispo County. The OEDC is a local organization devoted to the revitalization of Oceano, while still preserving its cultural character and historic heritage. Nick Alter, Chair of the OEDC, along with a Project Advisory Committee created for the studio, provided support and guidance regarding community issues and concerns.

A key effort in developing the Oceano Action Plan were the community engagement efforts that maximized a culturally diverse community participation process and included a survey representative of residents' opinions. Outreach efforts included interviews, focus group meetings and a survey that included land-use preferences. Surveys and interviews were conducted online and in person (door-to-door and at public sites, such as grocery stores, shops, and restaurants), a challenging task given continuing concerns about COVID-19 and associated approaches to health and safety.

The focus of the community engagement process was the completion of a door-to-door survey, conducted in both English and Spanish. A sampling method of neighborhood blocks was utilized to ensure the survey results were representative of residents' opinions (95% confidence interval/six-point margin of error). The 275 surveys were gathered by the students and by seven Spanish-speaking Cal Poly students, four of whom also from CRP. The survey was made possible by a grant from the Errett Fisher Foundation. Survey results and a description of the methodology used by the studio are available from the Oceano Economic Development Council (<https://oceanoedc.org/>).

Subjects covered in the Oceano Action Plan address land use preferences, with a focus on several key areas such as Pier Avenue, circulation, public/park spaces, health, equity, sustainability (economic, environmental, social, and cultural), and safety. Funding sources for strategies/actions are also considered.



CRP 553: Concept for mixed-use development and wider sidewalks along East Campbell Avenue.

CRP 552/554: The class in front of the Oceano Train Depot.



Theses and Professional Projects: 2021/2022 AY

Master of City and Regional Planning
City and Regional Planning Department, Cal Poly San Luis Obispo

For fulfilment of the MCRP degree at Cal Poly's CRP department, the student may choose between developing an independent thesis or professional project, or to participate in a final studio (CRP 556) where they pursue a specific theme resulting from the capstone planning studio (CRP 552/554). The following abstracts are from master's theses and projects defended in the 2020/2021 AY. They are available upon request or from Cal Poly's Kennedy Library at <http://digitalcommons.calpoly.edu/theses>.

Studio Projects (CRP 556)

Sidewalks, Mobility, and Lighting Capital Improvements Plan Guidelines

David Thoresen

Improving the pedestrian realm for Oceano includes, but is not limited to, incorporating new sidewalks, crossings, and renovating and increasing streetlighting to provide adequate pedestrian infrastructure to support a walkable community that is safe for various forms of transportation. Sidewalks, mobility, and lighting improvements should be prioritized to help the community move forward in a sustainable fashion that is supportive of its social and economic capital.

Mixed Use and Business Incubator Development Proposal for Oceano's Downtown Revitalization

Alison MacCarly

The Mixed Use and Business Incubator Development Proposal provides a detailed analysis of a potential mixed use building in the downtown area of Oceano that integrates economic development and expands affordable housing opportunities in Oceano. The plan includes a site analysis, design, parking strategy, case studies, and implementation measures that can be used as inspiration for the development of this block by the Oceano Economic Development Council and with other community partners in San Luis Obispo.

Oceano Active Transportation Beach Access Plan

Alex Lopez

The Oceano Active Transportation Beach Access Plan applies concepts for active transportation options such as walking and biking infrastructure from the Central Market to the beach access of Pier Ave. It includes four concept areas with redesigned street configurations that incorporate the latest safety improvements such as a redesigned bike lanes, pedestrian friendly intersections, safe railway crossing, and walking infrastructure.

Oceano Cultural Public Park Implementation Plan and Design Guidelines

Riley Rodriguez

Overview of local park need in Oceano with a unique emphasis on the Latino population. The plan prepares a design guideline for parks within the community, as well as a park network system that incorporates bike and walking paths throughout Oceano. The goal is to establish an inclusive place within the community that actively represents its residents.

Public Lands Inventory and Oceano Airport Repurposing Plan

David Jaeger

The community of Oceano is lacking in necessary public amenities that are utilized and enjoyed by neighboring cities. One strategy for providing public services to Oceano residents is the repurposing of publicly owned land. This plan inventories multiple publicly owned properties within Oceano and determines the level at which the current use is the highest and best in regard to the public good. The result of this investigation points to Oceano Airport as the most in need for repurposing. In response, the plan outlines numerous supporting case studies and presents a potential concept that will benefit the local community.

Pier Avenue Revisited

Connor Hochleutner

Pier Avenue Revisited explores four potential future scenarios for the revitalization of Pier Avenue in the community of Oceano, California. Two overriding variables are combined in different ways to provide the community with options that can unlock trapped value that can improve Oceano both economically and environmentally. Plans include land use and land value analysis, four potential scenarios, and visions for the future.

**Guide for Creating a Community
Development Corporation for Oceano, CA***Michael O'Toole*

This guide serves as a resource to community members interested in starting a Community Development Corporation (CDC). In the guide are examples of existing successful CDCs within California, as well as recommended first steps for starting a new CDC and recommends specific programs for the CDC which would best serve the Oceano community based on existing conditions.

Oceano Elementary Neighborhood Concept Plan*Olivia Salter*

This project identifies important design considerations to promote walkability at the neighborhood scale. The purpose of the plan is to advance a conceptual framework for designs that promote pedestrian activity and connectivity across land uses. The Plan is not prescriptive in nature but rather serves as a toolkit for future development in Oceano, particularly in the neighborhood surrounding the Oceano Elementary School campus and the Oceano Community Center. Specific provisions outlined in the chapters below are consistent with County of San Luis Obispo Code and reflect, to some degree, previous planning efforts undertaken in the community.

Oceano Flood Control Implementation Plan*Nicole Zittel*

The Community of Oceano Flood Control Implementation plan provides recommendations for stormwater and flood control measures in a residential area of Oceano. Flooding is a longstanding issue in the community and many plans and projects have aimed to address this issue. The plan includes a history of flooding in the community, analysis of plans, projects, and responsible agencies, case studies, BMP recommendations, design, and implementation measures to improve flooding within a residential area adjacent to the Oceano County Airport.

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FOCUS is a professional-oriented yearly journal. It highlights the work promoted, discussed, and produced in the City and Regional Planning Department, Cal Poly San Luis Obispo.



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