# THE CITY OF DESIGN AND THE NEW URBAN REVOLUTION:
## Conceptualizing Catalytic, Sustainable Development in Mexico's Second Tier

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Submitted to the Department of Architecture and the Department of Urban Studies and Planning in partial fulfillment of the requirements for the degrees of

**MASTER OF SCIENCE IN ARCHITECTURE STUDIES and MASTER IN CITY PLANNING at the MASSACHUSETTS INSTITUTE OF TECHNOLOGY, June 2012**



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**ALLISON N. ALBERICCI** earned a professional M.Arch from the School of Architecture at Tulane University before working for several years as an urban designer for Skidmore, Owings and Merrill in San Francisco, and Eherenkrantz, Eckstut and Kuhn in New York City. An architect, registered in the State of California, and a LEED® Accredited Professional, Allison's work spans a multitude of scales and contexts. Yet her primary concentration has been on complex, large-scale, mixed-use, hybrid and transit-oriented design, in urban centers worldwide. A passionate proponent of sustainable urbanism, Allison's research at MIT has focused on the use of Urban Information-Communications Technology in facilitating sustainable development and social equity in the cities of Latin America.

# The City of Design and the New Urban Revolution:
## Conceptualizing Catalytic, Sustainable Development in Mexico's Second Tier

By: **ALLISON N. ALBERICCI**, RA, LEED® AP

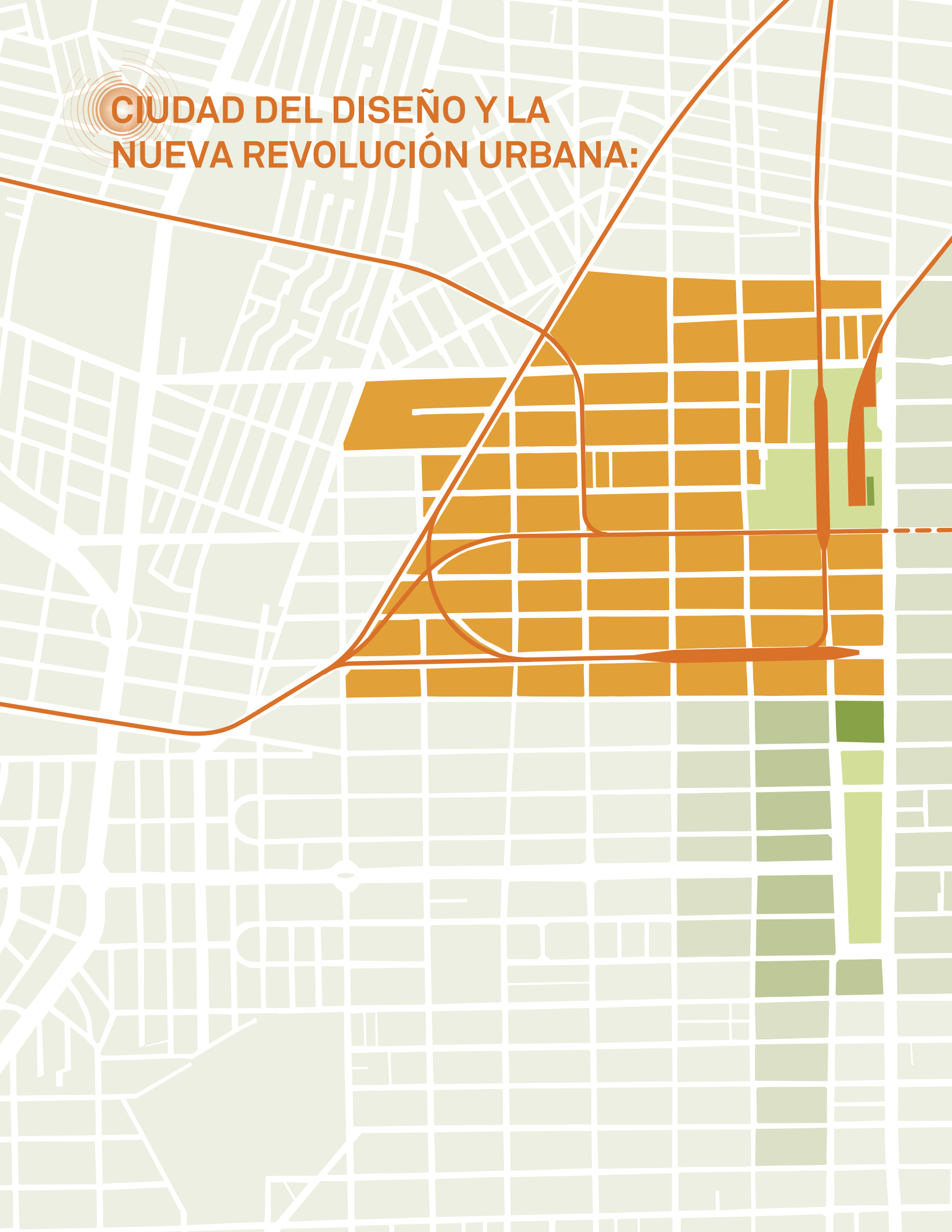
Submitted to the Department of Architecture and the Department of Urban Studies and Planning on 24 May 2012 in partial fulfillment of the requirements for the degrees of Master of Science in Architecture Studies and Master in City Planning.

## Abstract:

What is the present role of technical change – particularly change in integrated Information-Communication Technology (ICT) – in facilitating sustainable urbanism in the developing world? Technological advancements are altering consumer demand and behavior, transforming the products, services, entertainment and information consumed as well processes related to consumption. Technical change is further altering the production processes of goods, services, entertainment and information, and therefore the spaces of those processes, allowing industry to be reintroduced into the city. As the first two points suggest, technical change thus alters the use of urban space, eroding traditionally suitable adjacencies or separations, public/private distinctions, and the conventions of the public realm. Collectively, these and other trends are most apparent in 'New Century City' (NCC) Projects, where technological innovation as industry, as method, as place-maker and as way of life are being fused to create a new type of urban experience. This project surveys current discourses in sustainable urbanism and international development, using lessons learned from several NCC projects to derive a flexible model for advanced industry cluster development in second tier Mexican cities. This prototype is demonstrated via a projective proposal for *Ciudad del Diseño* (the City of Design), a development initiative recently launched by the city of Puebla. The objective of this study is to use design to develop and demonstrate principles for catalytic, sustainable development in the mid-sized cities of Mexico, and Latin America more broadly.

**THESIS SUPERVISORS:**
Dennis Frenchman, Norman B. and Muriel Leventhal Professor of Urban Design
Michael Dennis, Professor of Architecture

# CIUDAD DEL DISEÑO Y LA NUEVA REVOLUCIÓN URBANA:



# THE CITY OF DESIGN AND THE NEW URBAN REVOLUTION

## Conceptualizing Catalytic, Sustainable Development in Mexico's Second Tier

Graduate Thesis
Spring 2012

**Allison N. Albericci**
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▲ Figure 1: Photo of Iglesia de Guadalupe, Puebla, Mexico (by author).

# Acknowledgements:

I would like to thank the many people without whom this project would not have been realized.

First, thanks to my thesis committee, each of whom brought their considerable knowledge and experience to bear on my project. To my advisors, Dennis Frenchman and Michael Dennis, who have provided their counsel throughout my years here at MIT; and to my readers, John Fernandez and Dennis Pieperz whose expertise enriched this investigation in countless ways. Thanks as well to Brent Ryan, whose guidance during the preparatory stages of the study helped establish a solid foundation for my work.

Next, thanks to the city-building experts who provided their unique and fascinating insight to the New Century City Projects in which they have each played a key role. Mr. Kari Halinen, CEO of Art and Design City Helsinki, Ltd. provided background on Arabianranta. Sr. Jose Carlos Arnal Losilla, managing director of the Zaragoza City of Knowledge Foundation offered his experience on Milla Digital. Dr. Donyun Kim, Professor of Urban Design and Architecture at Sung Kyun Kwan University, and his associate, doctoral candidate Seungmin Song provided data on the Digital Media City in Seoul. And Mr. Jesús Ricardo Alvarez Felix, Coordinator of Innovation at ProMéxico, supplied information about the recently initiated Ciudad Creativa Digital in Guadalajara. These insights were invaluable in formulating analysis and lessons learned from the case studies.

Thanks to Tim Culvahouse, Ellen Lou, Patrick Daly, Jonathan Cohn, and all the mentors who fostered my professional development in the early years of my career, whose patience and encouragement helped guide me before I knew how to do much of anything useful.

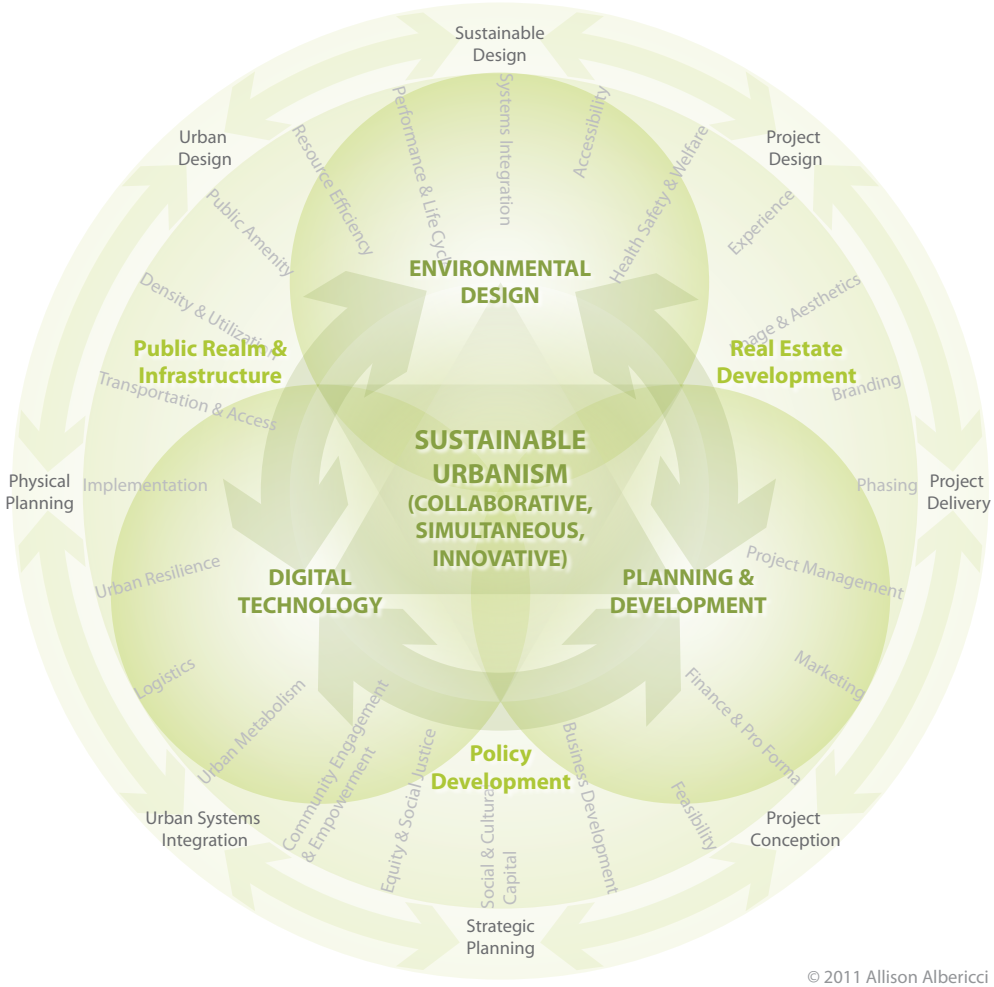
Thanks as well to the students in courses 4.240/11.328, 4.162, and 11.338 for their steady inspiration and especially for their constant support in the final few weeks of my thesis work.

A sincere thanks to my friends and family for encouraging my efforts over the years, particularly my parents Dean and Cheri Albericci, and to my confidants Adrianne Steichen and Tony Vanky who were always around to bend an ear, lend a hand, or share a beer.

Finally, thanks to my fiancé, Nathan Nagai, with whom I look forward to sharing a more normalized life... just as soon as I graduate.

▲ Figure 2: Concept rendering of the proposed Plaza de Cultura, the social heart of Ciudad del Diseño (image by author). See design proposal, chapter 5.

# Contents:






▲ Figure 3: Achieving Sustainable Urbanism requires the seamless integration of Development, Environmental Design and Digital Technology. The objective is to utilize urban information-communications technology to more closely connect people with each other and with their physical environment, for the purposes of: 1) maximizing development performance and resource efficiency, while 2) optimizing user experience (Individual and Social), thereby 3) creating a unique, appealing and globally competitive enterprise (by author).

# Preface:

## RESEARCH TOPIC:

What is the present role of techological change – particularly change in integrated Information Communication Technology (ICT) – in facilitating sustainable urbanism in the developing world?

This project proposes an exploration of recent trends and advancements in the integration of sustainable urban design and digital Information-Communication Technology – as evidenced in so-called "New Century Cities" generally, and particularly as envisioned for *Ciudad Creativa Digital* in Guadalajara, México – in order to discover to what extent, and how, such integration offers potential to foster the sustainable growth and development of México's second tier cities. In doing so, the objectives are:

1. to understand the contextual challenges to urban development in Mexico,
2. to understand current challenges to sustainable development,
3. to identify trends and in technology-enhanced sustainable urbanism that indicate a paradigm shift in global development practices,
4. to project the potential this paradigm shift offers to the future of the Mexican City, and
5. to extract transferable lessons for development in mid-sized Latin American cities more broadly.

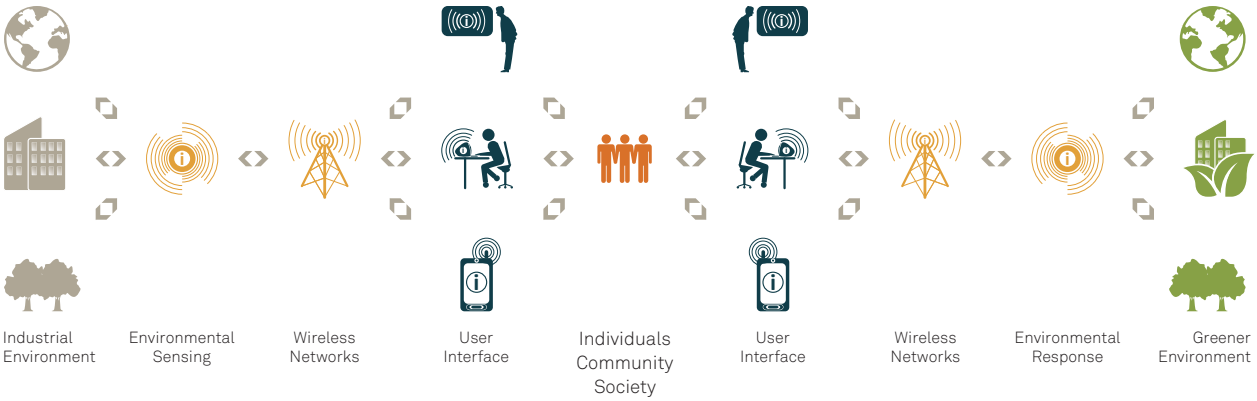
## A NEW PARADIGM FOR SECOND TIER CITIES:

Second tier cities (in Mexico, and generally) face a unique set of challenges. Cities with populations of one to four million – like Guadalajara, Monterrey, Puebla, Tijuana and Ciudad Juarez – have struggled to generate economic development and to attract the industry and investment resources available to the capital city. The challenges are economic, social and physical in nature, resulting in asymmetrical previsions of infrastructure, services, and opportunity. However, recent innovations in information-communication technology point to the rise of a new type of development; one which merges contemporary (post) industrial policy with urban design and a nascent digital urban nervous system yielding the potential for myriad quality of life improvements, infrastructure efficiency gains, and systems adaptations. This paradigm shift presents a once-in-a-generation opportunity for Latin America's rapidly developing second tier cities to grow more sustainably than their first-tier predecessors.

The potential is most-clearly perceptible in New Century City (NCC) projects: large-scale, urban developments of strategic national (and even international) importance, incorporating industry promoption with digital information-communication technology, in order to create a unique place for the clustering of complimentary commercial enterprises and associated support uses. Such projects present an enticing vision of the future, and a method of attaining that future – through economic development, resource efficiency gains, social capacity building and the ubiquitous equitable access to information.

However, as will be discussed, mega-projects of this scale are not without risk. They require massive commitment of land, resources and political will. They are characterised by a high degree of complexity and delicate stakeholder relationships which make such projects prone to delay. When built within an existing city, they can overwhelm or destroy historic fabrics; when built peripheral to existing

# Linking ICT to Urban Sustainability:




▲ Figure 4: Advancements in environmental sensing and integrated Information-Communication Technology (ICT) allows for the creation of an urban "nervous system," enabling increased resource efficiency, the celebration of sustainability in the design of the public realm, and the development of context-based experiences which facilitate a new "consciousness" of place. Integrated ICT also allows urban systems to be continuously monitored, providing feedback loops and the opportunity for adaptation over time. In short, applying integrated ICT to urban systems enables more sustainable development (by author).

"Elements such as wireless networks, copper wires, fiber optic cables, sensors, radio frequency identification tags (RFID), digital kiosks and handheld electronic devices provide a nervous system for the public realm in New Century City projects. As in many cities around the world, this system is used to manage traffic, utilities, energy, security and other functions of modern life. This system also provides the channel for the flow of information and communication that is the lifeblood of modern organizations and personal life."

- Joroff, Frenchman and Rojas, 2009; 10

cities, they draw populations and resources out of the core, The question, then, is whether large scale industrial projects of this type have evolved. Do New Century Cities represent a clear evolutionary advancement beyond their Technopole predecessors, and can technology be employed in further adapting the typology more sensitively to the complexities of existing contexts?

## PROTOTYPE FOR A NEW URBAN REVOLUTION?:

A test case for the next generation of New Century Cities is in the initial planning stages in Mexico. Spearheaded by ProMéxico – in collaboration with a number of federal agencies, the city of Guadalajara, and a consultant team (led by Professors Dennis Frenchman and Carlo Ratti, with carlo ratti associati, the MIT Senseable City Lab, as well as Accenture and Studio FM Milano) – the Strategic Plan has recently been completed, and (as of this writing) the bidding process for the Master Plan is proceeding. The first project of its kind, *Ciudad Creativa Digital* (CCD, or the Digital Creative City) represents a major post-industrial development undertaking that has the potential to become a critical precedent for technologically-enhanced sustainable development in Mexico, and Latin America more broadly. A comparative analysis tracking the evolution of several such projects allows 1) the identification of trends in global development paradigms, and 2) the projection of the implication of these trends onto a number of previously identified vacant sites in second tier Mexican Cities. The approaches taken, development processes, design proposals, and guidelines are all sources for inspiration that allow us to visualize the future of the Mexican city.

## RESEARCH QUESTIONS:

1. To what extent is Ciudad Creativa Digital similar to or different from previous Technopoles and New Century Cities? Do these characteristics presage achievement of the successes and avoidance of the pitfalls of prior NCC projects?

2. How and to what extent does Ciudad Creativa Digital represent a transferable development prototype? What approaches are replicable? What are the limits of transference?

## HYPOTHESIS:

Since their conception in the early 1990s, New Century Cities have evolved (albeit asymmetrically) to become more place-based and context-sensitive. Using the "light touch" of technology to adapt to complex and diverse settings, projects now have the potential to combine industrial policy with urban redevelopment in manners increasingly suited to restoring and catalyzing growth in existing urban centers.

In particular, three aspects of Ciudad Creativa Digital represent a significant leap forward in the evolution of NCC projects, away from *carte blanche* international style real estate development and toward the contextually responsive expansion of the urban core:

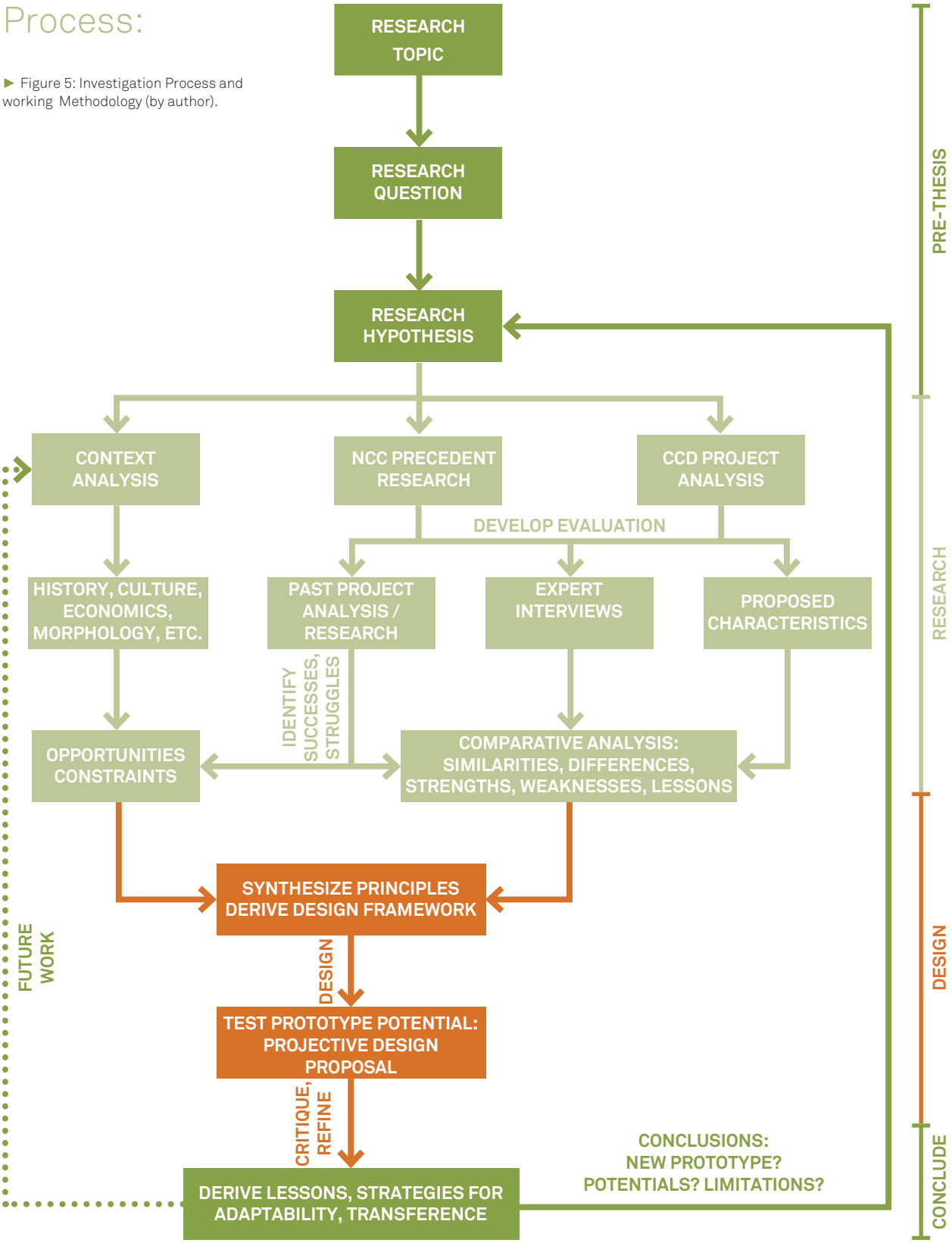
1. an emphasis on supporting the needs of the existing urban center,

2. the use of contextually sensitive interventions adapting an historic vernacular building type, and

3. the strategic and incremental ("acupunctural") infill of a non-contiguous development zone.

# Process:

► Figure 5: Investigation Process and working Methodology (by author).



This more-advanced permutation of the New Century City has potential to become a critical prototype for the technologically-enhanced sustainable revitalization of second-tier cities in Mexico, and Latin America more broadly.

# Methodology:

## PROPOSED PROCESS:

The study details a comparative analysis tracking the evolution of several New Century City projects with the proposal for Ciudad Creativa Digital allowing 1) the identification of trends in global development paradigms concerning ICT, and 2) the projection of these trends (via design) into a similar development context. The project vision, design framework, and development guidelines – as well as the approaches taken and processes employed – are all sources for inspiration that allow us to visualize a digitally augmented, sustainable future for the Mexican city. The study incorporates:

1. Historical and contextual analyses of urban development in Mexico, as well as a review of attitudes toward the role of technical change in urban design and planning.

2. Analysis of a set of 5 recent New Century City projects, and a comparative evaluation of the projects' strengths and weaknesses. This includes insight from experts in the City Building Professions who have been involved with the projects examined.

3. Comparison of Ciudad Creativa Digital to the relevant similarities and differences of other New Century City projects and evaluation relative to the strengths and weaknesses of these precedents (including insight from representatives working on CCD).

4. Extraction of transferable principles for the integration of technology with sustainable urban design.

5. A test illustration of these principles via projective design proposal for a central site in a comparable second tier Mexican city - in this case, the City of Puebla.

6. Synthesis of lessons learned, including the applicability of framework elements to similar contexts and the appropriate limits of transference.

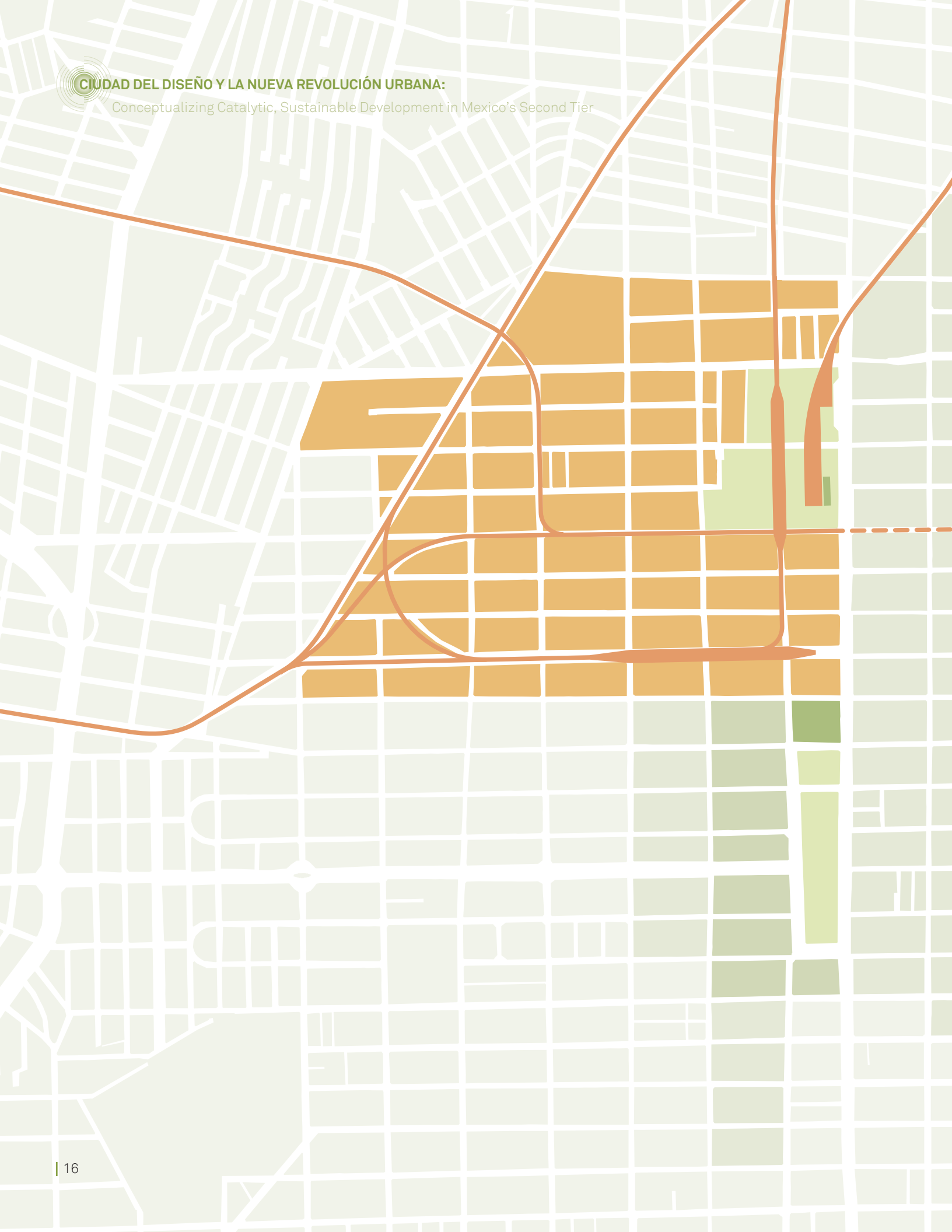
## EXPERT INTERVIEWS:

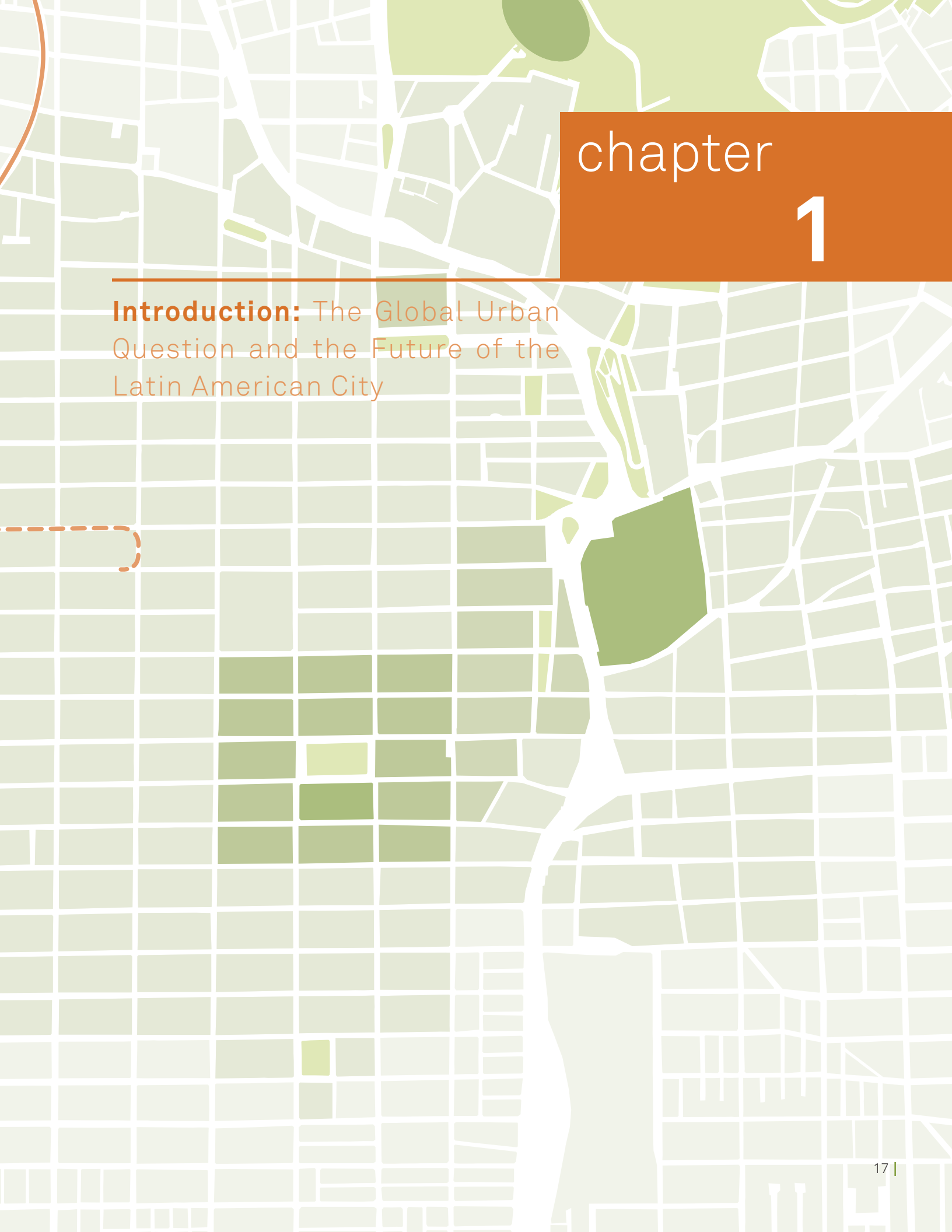
As noted in components 2 and 3 (left), the investigation included interviews with six city building experts who have been instrumental in the development of New Century City projects. The expert participants are:

- Dr. Donyun Kim, Professor of Urban Design and Architecture, Sung Kyun Kwan University,
- Mr. Jesús Ricardo Alvarez Felix, Coordinator of Innovation, ProMéxico
- Dr. Daniel M. Dias, Lab Director, IBM Research Brazil
- Sr. Jose Carlos Arnal Losilla, managing director, Zaragoza City of Knowledge Foundation
- Mr. Kari Halinen, CEO of Art and Design City Helsinki, Ltd.

## RESEARCH IMPLICATIONS:

This project presents a transferable approach for the meaningful integration of large scale development with digital technology towards the creation of more contextually responsive, environmentally, socially and economically sustainable cities in Mexico (and Latin America, more broadly).



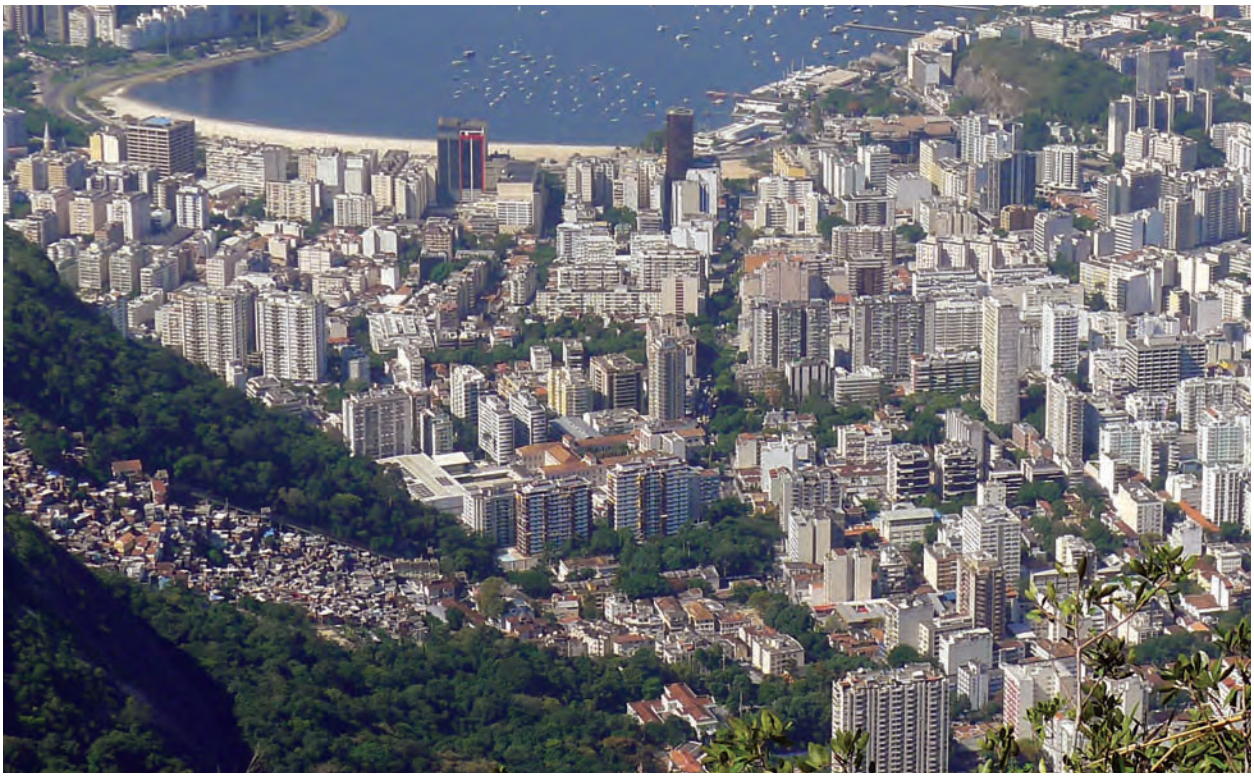


chapter

# 1

## **Introduction:** The Global Urban Question and the Future of the Latin American City

▲ Figure 6: Favela Rocinha, Rio de Janeiro, Brazil (photo by author). Mega-cities in Latin America face enormous development challenges in the current era.



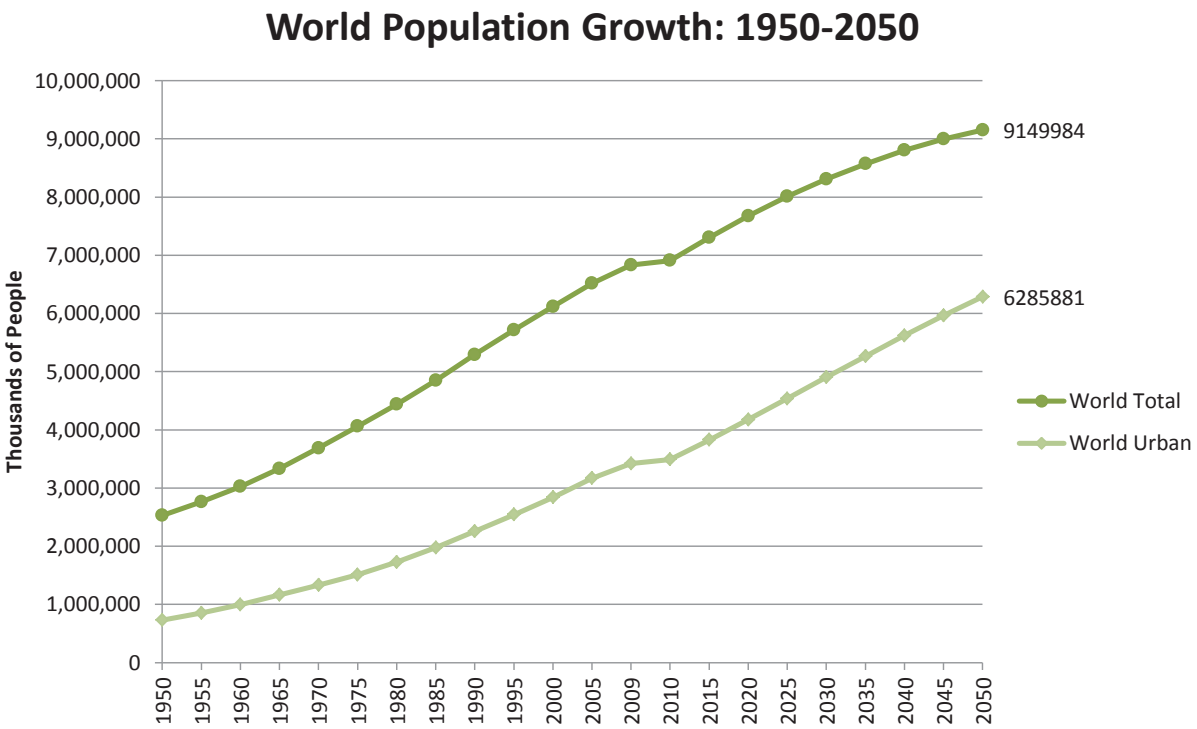
▲ Figure 7: Stark juxtaposition of wealth and poverty in Rio de Janeiro (photo by author).

## Facing the Challenges of the 21st Century:

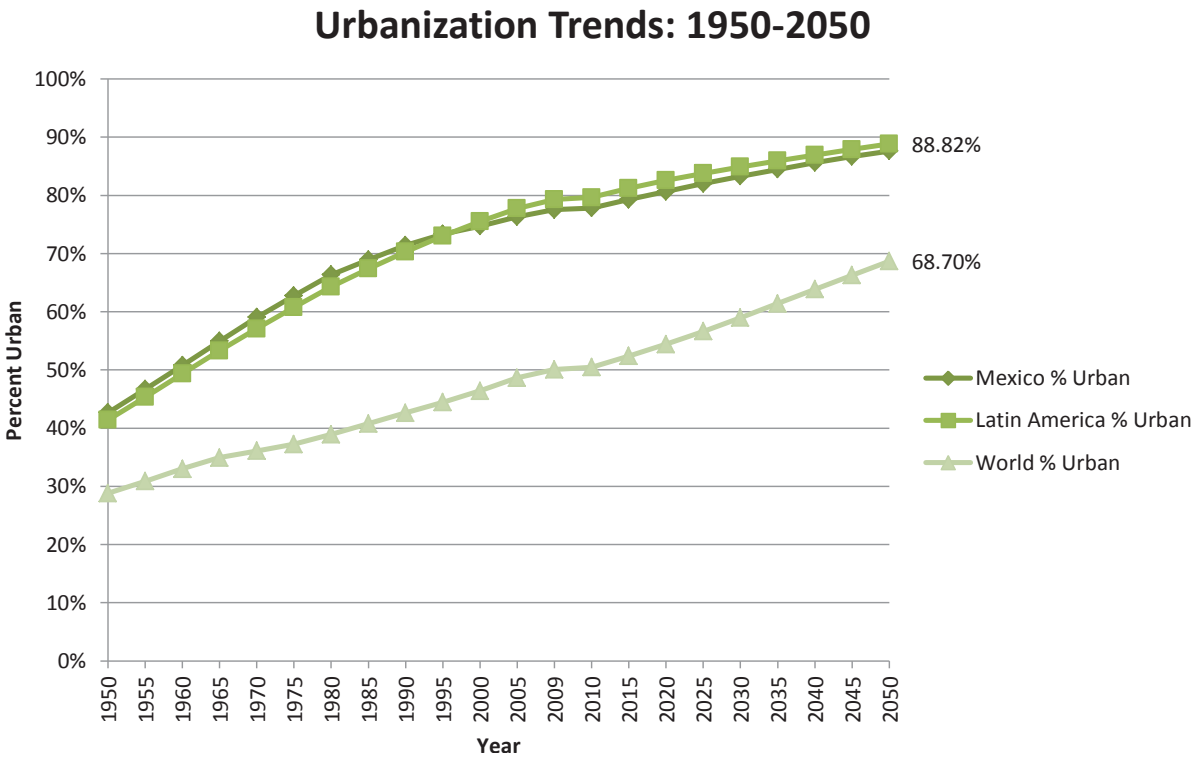
The 21st century is witnessing forces of global change unprecedented in human history. Continued population expansion and urbanization in the face of unrelenting economic globalization are straining the physical and social infrastructures of the urban world. As vast cities rise to meet the burgeoning demands of a swelling populace seeking a higher quality of life, city-builders worldwide are realizing the stark environmental and social ramifications of reproducing outdated development models on a global scale.

As we traverse the global population threshold of seven billion[1], and advance toward perhaps nine billion by 2050[2], concern is mounting that the combined pressures of population growth, urbanization, and rising human development may exact irreversible stress on global resources and capacity of the earth to support life as we know it. The unyielding pace and scope of this transformation are of particular concern. As of 2008, the United Nations estimates that fully one-half of the world's inhabitants live in cities.[3] Over the next forty years, this percentage is projected to rise so that, by 2050, some 70% of the people on the planet will dwell in urban areas. The vast bulk of this growth is occurring in the rapidly developing cities of the "global south," and these cities are being challenged to overcome enormous social, economic, and environmental impacts.

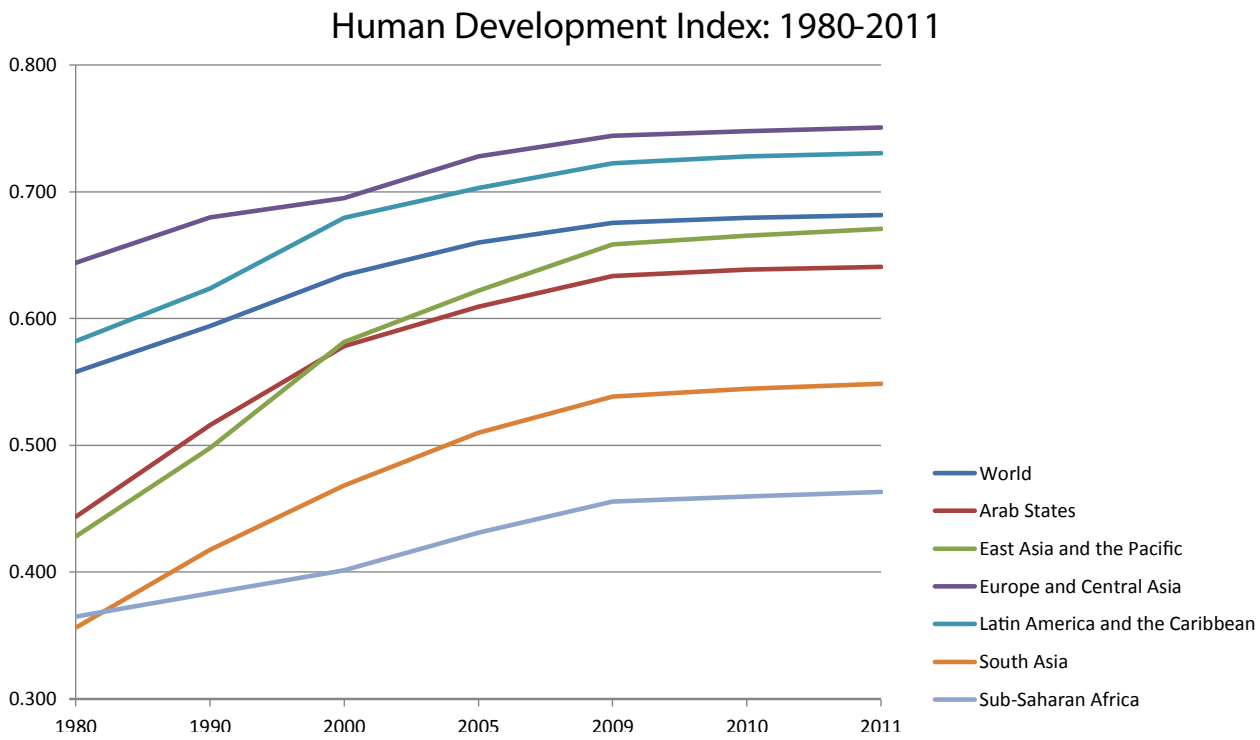
Moreover, as population growth and urbanization continue, the increase in standards of living (while unquestionably positive from a human perspective) are placing intensified pressure on air, water




▲ Figure 8: World Population Growth, 1950-2050 (chart by author). Data Source: United Nations World Population Prospects, 2011.




▲ Figure 9: Urbanization Trends, 1950-2050 (chart by author). Data Source: United Nations World Urbanization Prospects, 2010.




▲ Figure 10: Human Development Index, 1980-2011 (chart by author). Data Source: United Nations Millennium Development Goals Database

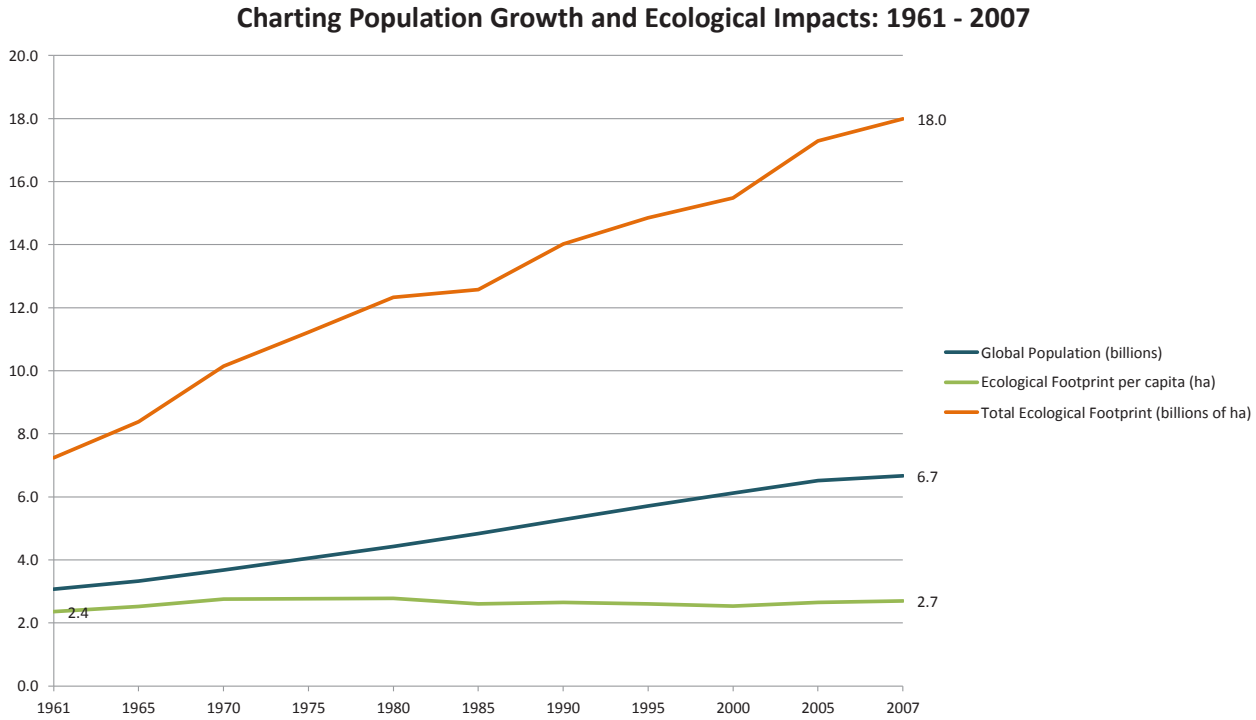
and energy resources, biodiversity, and the overall productivity of the ecosphere. As data from the United Nations Population Division, The United Nations Development Program, UN-HABITAT, The World Bank, The World Wildlife Federation, The Global Footprint Network and others reveals, there is an undeniable correlation between urbanization, increased standards of human development, and a variety of known environmental impacts (see figures 3-8, below).

To better understand the relationship between population growth, urbanization, human development and environmental impacts we turn briefly to the field of Industrial Ecology. The identity formula used by Industrial Ecologists and others to conceptualize the forces contributing to the overall environmental impact of human society is:

$$I=PAT$$

This equation presents total Environmental Impact, (I), as a function of the interplay between: 1) population, (P), or the number of people consuming; 2) affluence, (A), wealth or the total sum of products, services and experiences produced and consumed; and 3) technology, (T), broadly interpreted as the total means and methods by which products, services and experiences are produced and consumed. In this model, 'Consumption' and 'Affluence' include the uses and qualities of urban space; and in this way, urban morphology, the processes of city building and modes of city dwelling can also be conceptualized as types or aspects of 'technology.'

As Marian Chertow (2001) explains, the IPAT equation and related formulas were conceived, along with the modern environmental movement, in the early 1970s.[4] Coined in a variety of competing iterations between 1971 and 1972 (by Barry Commoner, and Paul Ehrlich and John Holdren, among others), it was first used to quantify factors contributing to unsustainability. Commoner, in a



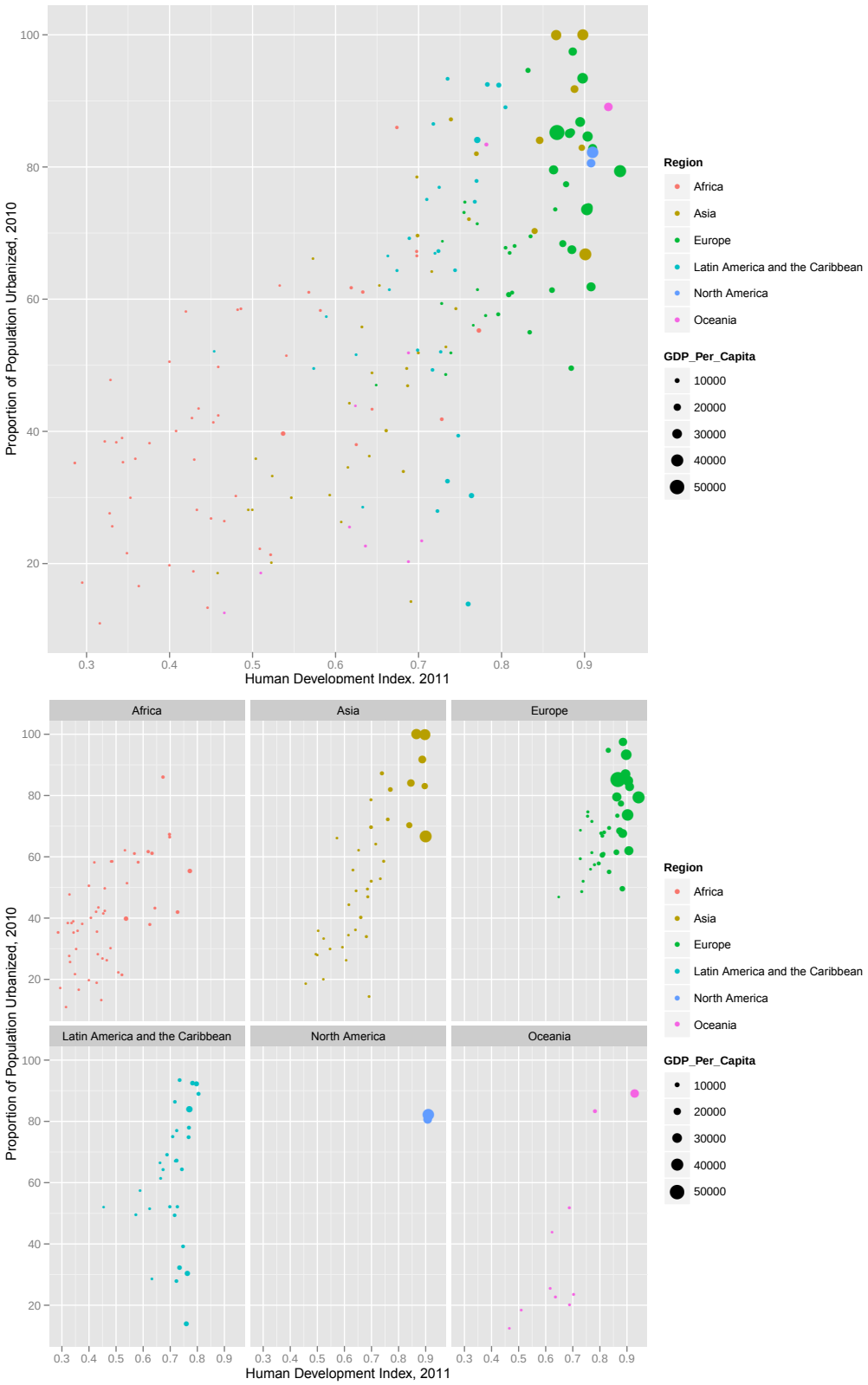

▲ Figure 11: Charting Population Growth and Ecological Impacts: 1961-2007 (chart by author). Data Sources: United Nations World Population Prospects 2011, and the Global Footprint Network, 2011.

particularly neo-Faustian argument, lay the blame for increased environmental impact squarely on technical change itself (1972). Yet in the years following the 1987 issuance of the Brundtland Report,[5] the formulation was reinterpreted to isolate the most promising path to sustainability, with particular focus on the role of technical change in facilitating more efficient 'affluence.'

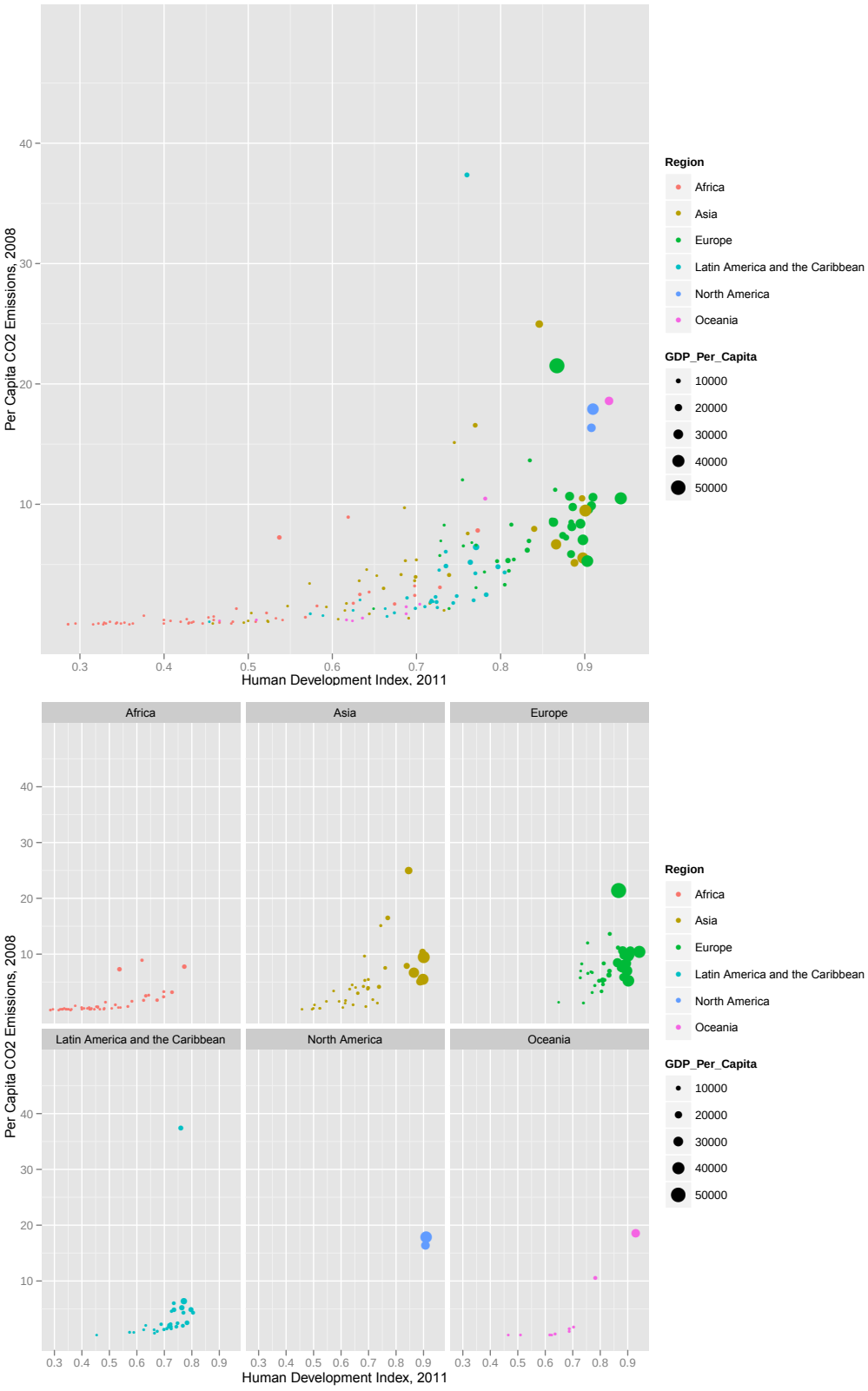
$$\Delta I = \Delta P \times \Delta A \times \Delta T$$

Indeed, re-writing the equation to account for change ($\Delta$) in each variable makes clear that, anticipating a state of continual rise in both Population and Affluence (which we assume here for the purposes of discussion), Technical change improving the efficiency of consumption becomes the only mechanism available to maintain or reduce environmental impacts.

Nevertheless, at current rates of growth the forecasts for the next half-century appear grim. Worldwide demands for energy continue to rise as fossil fuel resources decline. Worldwide greenhouse gas emissions continue to increase, while the capacity of ecosystems to absorb the impacts of these emissions is diminishing. Worldwide populations continue to surge, while a combination of resource depletion and changing climate patterns increases susceptibility to natural disaster, draught, and water and food shortages. The confluence of such trends has the potential to provoke destabilizing forces and cause widespread civil unrest and strife (Friedman, 2008; 49). Thus it is to technology that we must turn if we wish to counter increased population and affluence to maintain, let alone reduce, overall environment impact – not for the sake of philanthropy or altruism, but for the sake of survival. As we will discuss, recent innovations in multiple technologies impacting the built environment, including integrated Urban Information–Communications Technology (ICT), offer particular hope in this regard.




▲ Figure 12: Proportion of Population Urbanized plotted against Human Development Index (chart by author). Data Sources: United Nations World Urbanization Prospects, 2010 and the UN Millennium Development Goals Database.




▲ Figure 13: Per Capita CO2 emissions plotted against Human Development Index (chart by author). Data Sources: UN Millennium Development Goals Database.

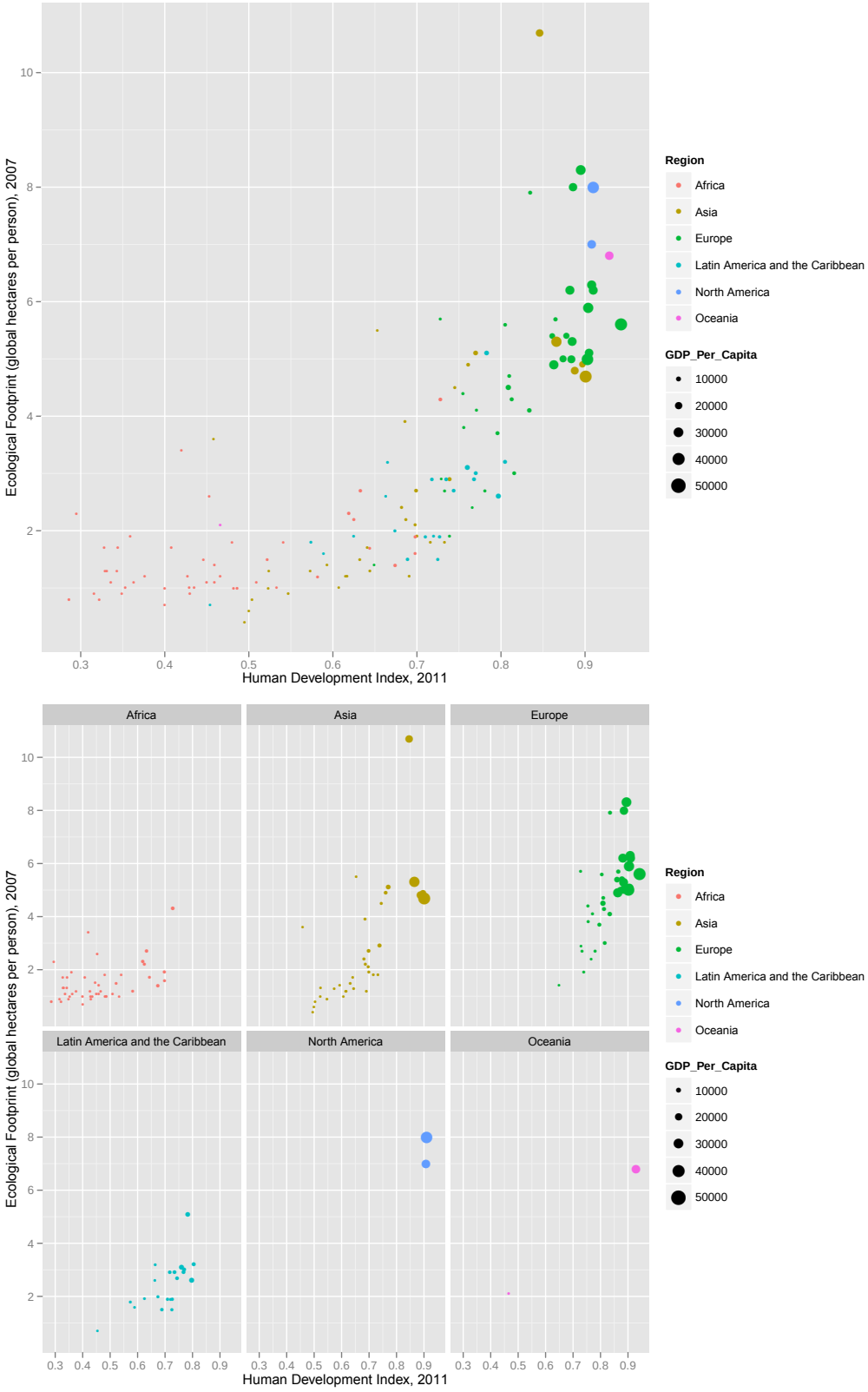
## THE IMPORTANCE AND CHALLENGES OF LATIN AMERICAN CITIES

Even so, the resulting challenges are daunting; and nowhere are they more apparent than in the cities of Latin America, where rapid asymmetric industrialization following WWII focused on (and to some extent succeeded in) advancing economic modernization goals focused on GDP growth, but without corresponding gains in political equity, wealth distribution, and housing and social service provisions.[6] As a result, Latin America overall is highly urbanized, (nearly 80% by 2009 UN estimates),[7] yet some 27% of the population lives in informal settlements, slums or *favelas*[8] (termed in Mexico, *colonias populares* or *paracaídas*). Urbanization without the expansion of physical infrastructure, public facilities, housing and services led individuals to fend for themselves – responding to dire immediate needs through the *autoconstrucción* of informal settlements on an immense scale. But the proliferation of these informal settlements combined with decades of neglect in the provision of basic amenities (water, electricity, public health, education, law enforcement) has led to the perpetuation of cycles of trans-generational poverty and environmental decay. Now entrenched, these structures of inequity – built into the very fabric of the city itself – have proven difficult to redress. Yet, in cities across Latin America – from Mexico City to São Paulo, Caracas, Bogotá, Buenos Aires, Rio de Janeiro, Lima and many others – advocates are working toward change, even as global development resources become increasingly constrained, and anthropogenic Climate Change poses new threats.

Indeed, as we approach the twentieth anniversary of the Rio Earth Summit,[9] in Latin America's largest economies, the process of change is well underway. Bolstered by (comparative) recovery from the global recession and a return to real GDP growth (even as the economies of North America and Europe lag), Brazil and Mexico continue to expand development and search for mechanisms to unite social equity and environmental sustainability. In Mexico City, for example, recent efforts include the five-year Programa de Acción Climática, and the long term Plan Verde, a one billion USD per year initiative to coordinate land conservation, public space, air pollution, waste management, recycling, water, sanitation, transportation and mobility to reduce overall emissions. In Brazil, meanwhile, efforts are focused on preparation for a series of international events (including the 2014 World Cup, the 2015 Copa America, and the 2016 Summer Olympics) poised to set the international spotlight on the country. Attempts are being made to build on prior efforts – of the Favela-Bairro program in Rio de Janeiro for example – by expanding improvements to transportation infrastructure and public facilities. Progress comes not without conflict, however, as entrenched gang and drug forces in both Mexico and Brazil battle the efforts of notoriously violent and sometimes corrupt police forces, and lasting security for the underclass remains elusive.

## THE CASE OF MEXICO:

To understand the immense challenges faced by a given country or city in a global economy of dwindling resources requires knowing something of the history of the specific context. Turning now to the particular case of Mexico – land of the Aztec, Toltec, Olmec, Mayan and other ancient civilizations – in recent years the country has embarked on a number of innovative initiatives (motivating this investigation and) with potential to establish it as a global leader in sustainable development. The rich complexity and contradiction of the country we know today begins with the conquest of the pre-Colombian Aztec civilization, by the Spanish, in 1521.[10] By 1525, the conquistador Hernán Cortés, and his army,




▲ Figure 14: Ecological Footprint plotted against Human Development Index (chart by author). Data Sources: Global Footprint Network, 2011 and the UN Millennium Development Goals Database.

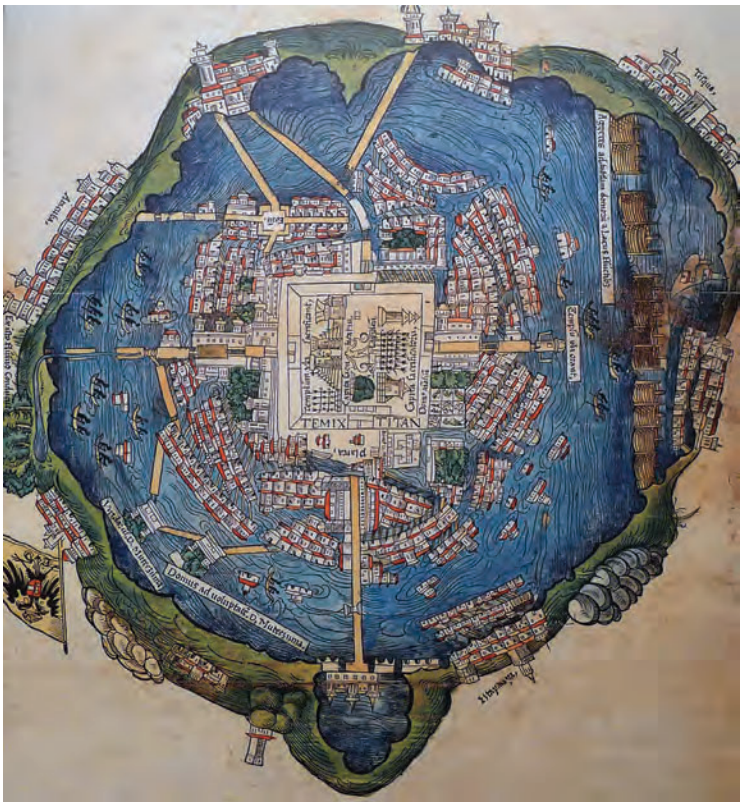
▲ Figure 15: The pre-Aztec settlement of Teotihuacán (photo by author).

had built what would become the capital of New Spain on the rubble of the former Aztec capital of Tenochtitlán – with enduring symbolic and pragmatic implications. The exploit established Spanish dominance over the realm and laid the foundation for nearly three hundred years of colonial rule.

That rule was codified, solidified and reified in the built environment via las Leyes de Indias (the Laws of the Indies). The Laws of the Indies comprise an entire body of Spanish imperial doctrine, issued by the crown, regulating nearly every aspect of social, political and economic life throughout their colonial holdings in the Americas and the Philippines. From the early years of the empire the Spanish realized the need for a mechanism that would allow them to maintain firm centralized control over the subjugated territories. As Jose Guillermo Frontado Saavedra relates, "It became clear for the implementation of the intended control, a regularization of procedures, norms and instructions was essential... Regularization included not only the political, religious and social institutions, but most important, the physical structure of the cities to be founded." (1980, 18)

The Laws of the Indies served as this mechanism of control. Issued first as the Laws of Burgos (1512), they continued to evolve over nearly two-hundred years, with major issuances in 1542 (The New Laws of the Indies), in the *Ordenanzas de descubrimientos, nueva población y pacificación de las Indias* by Phillip II of 1573, and a further edition issued in 1680 as the *Recopilación de las Leyes de los Reynos de Indias* by Charles II. These proclamations of the crown served many goals, including the organization of defensive outposts which also formed a social network for colonists and the regularization of land distribution practices (including the surveying, subdivision, and legal procedures). Frontado Saavedra tells us,

▲ Figure 16: Map of Mexico City, 1560. Image on file at the Archivo Histórico del Distrito Federal, Mexico City (photo by author).




▲ Figure 17: Photo of Hernan Cortés's drawing of Tenochtitlán, from an exhibit at the National Museum of Anthropology (photo by author).


▲ Figure 18: Bird's eye perspective of Mexico City in 1680. Image on file at the Archivo Histórico del Distrito Federal, Mexico City (photo by author).

> "The scope of the document is important to be understood as it controlled the institutional, economical, and social life of the community by determining the structure of its institutions, the reparation of land, of slaves, etc. Actually, the part of the Laws of the Indies dealing with the physical environment of those communities, with its laying out and development is only a minor one, a few pages of the document. Still, its impact on today's Latin American cities is stronger that the rest of the document's parts, as the institutional, economical and social structures have changed, while the physical one remains as a decisive feature of these cities."(1980, 6-7)

Vitruvian inspired, this physical form is typified by an orthogonal gridiron structure, 85m x 85m[11] – adapted locally as topography and other practicalities demanded – customarily oriented to the cardinal axis, with the ancient cardo maximus and decumanus maximus of roman centuriation (Kostof, 2007;142) intersecting at a central plaza. The plaza served as the civic center of the colony; with the church and government facilities watching over all – the symbol of imperial power. This partii is clearly illustrated in the configuration of Mexico City. In choosing this location, Cortez was cunningly able to co-opt the rigorously developed physical and social structure already ingrained by the conquered Aztec – and repurpose them to advance the objectives of the Spanish crown. Significantly, both Cortez's description of Tenochtitlán in his 1524 letter to Charles V, and the city subsequently built on its site, were widely influential in the development of the Renaissance ideal cities, in the further colonization of Latin America, and in later settlements across vast parts of the New World (see also: Lejeune, F.P. in Cruelty and Utopia, 2003; 31-49).

Three centuries of Spanish rule in Mexico (and throughout Latin America) resulted in a strategic network of settlements and infrastructure geared toward supplying the crown with the bounty of the territory, chiefly minerals and other natural resources. The mercantilist system thrived on centrally controlled mining, commerce and agriculture, all powered by coercively-obtained cheap native labor, and discouraging the development of domestic manufacturing. The system, by design, enhanced the power and prestige of Spain, at the expense of local progress (Skidmore, Smith and Green, 2010; 19).

Yet over the course of the 18th century, as the Enlightenment dawned and Spanish dominance in both Europe and the new world waned, a new class of colony-born (primarily mixed-race) 'nobility' began to assume active roles in vital sectors of the economy and political institutions traditionally dominated by the (Spainsh-born) peninsulares. By the turn of the 19th Century, Spain's grip on the empire had loosened and this new world nobility began to assert itself. When Napoleon Bonaparte overthrew Ferdinand VII and planted his brother Joseph on the Spanish thrown in 1808, the creole colonial elite concluded that Spain no longer possessed a viable government. Revolt throughout the empire soon followed (Skidmore, Smith and Green, 2010; 29-30).

On September 16th, 1810 (now commemorated as Mexican Independence Day), Father Miguel Hidalgo y Costilla led a motley band of long suffering mestizos and natives in a raid on the stronghold of Guanajuato, massacring hundreds in an assault on the royalist-controlled municipal granary (Skidmore, Smith and Green, 2010; 32). While this initial attempt by Hidalgo, and subsequent revolutionary efforts of others, were brutally suppressed, calls for independence from both liberal and conservative factions lingered. Independence from Spain would be formally proclaimed by an improbable alliance

▲ Figure 19: Map of Mexico City in 1800. Image on file at the Archivo Histórico del Distrito Federal, Mexico City (photo by author).

of elite and rebel forces in 1821, but the ensuing struggles for power would prevent consolidation of an effective national government for another 30 years (Skidmore, Smith and Green, 2010; 32-37).

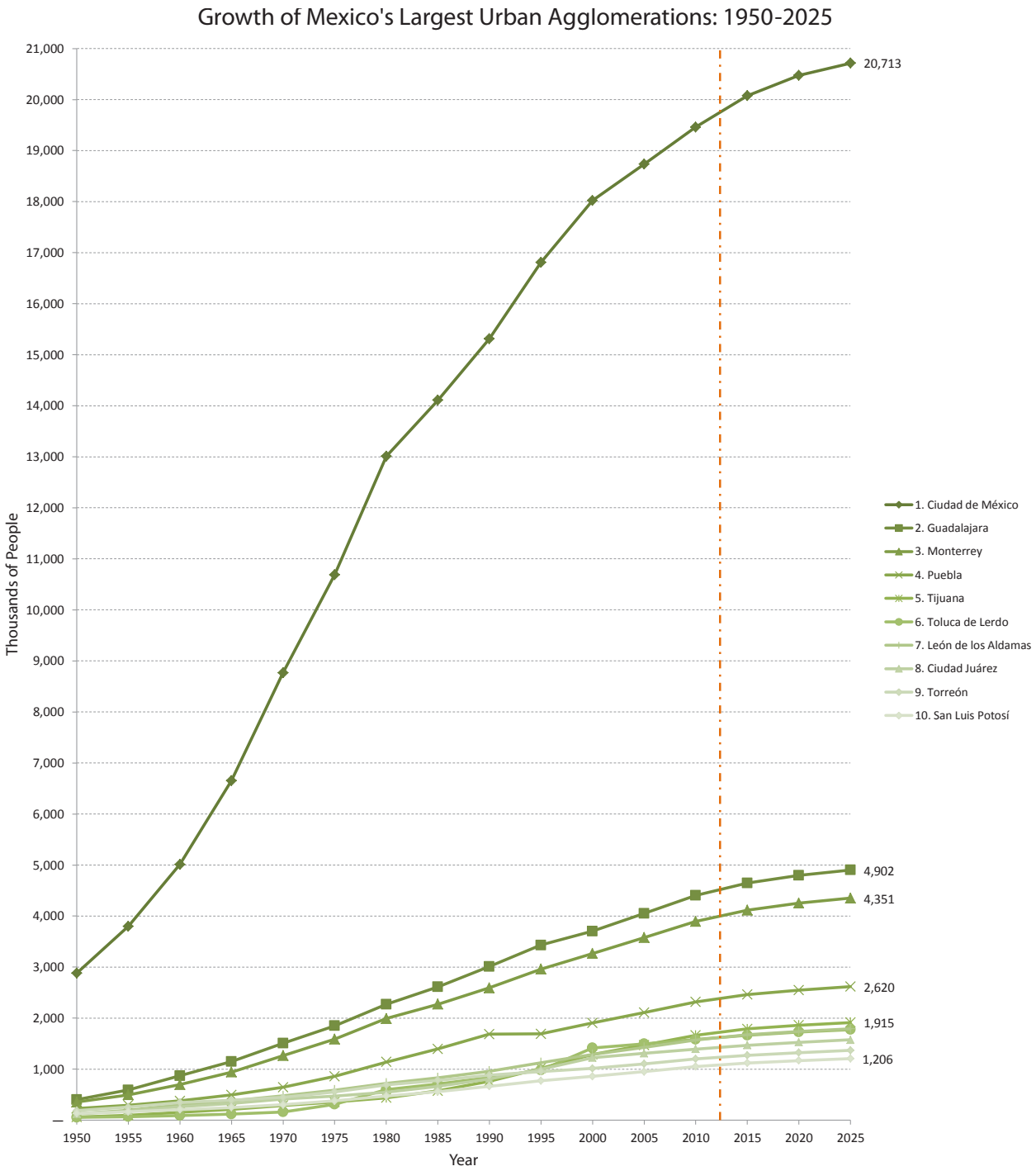
Mexico emerged from the wars of the first revolution deeply battered, the economic infrastructure of the country in ruins – the mining, textile, and agricultural industries destroyed, the roads in shambles, Spanish capital withdrawn. Crippled by civil strife, by 1848 Mexico would lose nearly one third of its northern territory to the United States in the "War of the North American Invasion" (known in American history books as the Mexican-American war). Internal conflict continued, with alternating calls for liberal political and social reform met by conservative retrenchment; peace and stability proved elusive. Power was finally consolidated centrally, and dictatorially, by Porfirio Diaz (of military fame) in 1876. A masterful politician, Diaz marshaled an


▲ Figure 20: Map of Mexico City in 1900; the city maintains a relatively compact footprint. Image on file at the Archivo Histórico del Distrito Federal, Mexico City (photo by author).

unlikely coalition, of military colleagues, regional caudillos (bosses), reformers, and the conservative elite. The Porfiriato, as the period from 1876-1910 came to be known, initiated a generation of federally directed economic growth and industrialization – facilitated by sustained political stability, economic liberalization, private foreign investment, and a plentiful low-wage labor force – if at the expense of the working poor who still comprised the vast majority of Mexican society. (Skidmore, Smith and Green, 2010; 45-54).

The inequitable economic 'progress' of the Porfiriato ushered in the (second) Mexican Revolution, in 1910. By then, a liberal splinter faction within the governing elite began to form an armed rebel movement and call for revolt. Díaz abdicated in 1911, and subsequent elections brought Francisco I. Madero to power in 1812. But the transition failed to win the endorsement of either former Díaz supporters or the more radical leaders of the disenfranchised agrarian lower class (including Emiliano Zapata and Pancho Villa). Another decade of violence ensued (Skidmore, Smith and Green, 2010; 54-58).

The subsequent era brought fits and starts of progress, but lacked the momentum necessary for substantive improvement. It would take the post-World War II administration of President Miguel Alemán to institute broad industrialization in the form of major public works projects (roads, dams, ports, irrigation, hydroelectric, and telecommunications infrastructure) as well as an expansion of domestic manufacturing via increased import protection. Import Substitution Industrialization (ISI), economic modernization, and the jobs they created from the late 1940s through the 1970s, attracted hordes of migrants from the country's rural interior to the capital, Ciudad de México. The city experienced unbridled population growth, from less than




▲ Figure 21: Growth of Mexico's Largest Urban Agglomerations, 1950-2025. The capital is more than five times larger than the country's second largest city, Guadalajara (chart by author). Data Source: United Nations World Urbanization Prospects, 2009

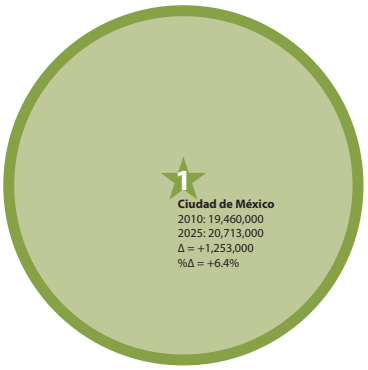
## Mexico's Largest Urban Agglomerations: Charting Population Growth 2010 - 2025


Mexico's Largest Urban Agglomerations:
Charting Population Growth 2010 - 2025

2010 → 2025

**Right of Map:** Inner and outer circles are proportional to population in 2010 and as projected for 2025, respectively. The 14 cities shown are those projected to have more than 1 million residents by 2025.

**Data Source:** United Nations, Department of Economic and Social Affairs, Population Division
*World Urbanization Prospects: The 2009 Revision*
File 12: Population of Urban Agglomerations with 750,000 Inhabitants or More in 2009, by Country, 1950-2025 (thousands)
Online: http://esa.un.org/unpd/wup/CD-ROM_2009/WUP2009-F12-Cities_Over_750K.xls




**4 Puebla**
2010: 2,315,000
2025: 2,620,000
Δ = +304,000
%Δ = +13.1%

**9 Torreón**
2010: 1,199,000
2025: 1,367,000
Δ = +168,000
%Δ = +14.0%

**5 Tijuana**
2010: 1,664,000
2025: 1,915,000
Δ = +252,000
%Δ = +15.1%

**10 San Luis Potosí**
2010: 1,049,000
2025: 1,206,000
Δ = +157,000
%Δ = +15.0%

**11 Querétaro**
2010: 1,031,000
2025: 1,198,000
Δ = +167,000
%Δ = +16.2%

**6 Toluca de Lerdo**
2010: 1,582,000
2025: 1,776,000
Δ = +194,000
%Δ = +12.3%

**12 Mérida**
2010: 1,015,000
2025: 1,164,000
Δ = +149,000
%Δ = +14.6%

**2 Guadalajara**
2010: 4,402,000
2025: 4,902,000
Δ = +500,000
%Δ = +11.4%

**7 León de los Aldamas**
2010: 1,571,000
2025: 1,791,000
Δ = +220,000
%Δ = +14.0%

**13 Mexicali**
2010: 934,000
2025: 1,075,000
Δ = +141,000
%Δ = +15.1%

**3 Monterrey**
2010: 3,896,000
2025: 4,351,000
Δ = +455,000
%Δ = +11.7%

**8 Ciudad Juárez**
2010: 1,394,000
2025: 1,575,000
Δ = +180,000
%Δ = +12.9%

**14 Aguascalientes**
2010: 926,000
2025: 1,073,000
Δ = +147,000
%Δ = +15.9%

▲ Figure 22: Relative size of Mexico's Largest Urban Agglomerations, 2010-2025 (image by author). Data Source: United Nations World Urbanization Prospects, 2009.

▲ Figure 23: Mexico City as seen from the top of Torre Latinoamericana; the mega-city sprawls for thousands of square kilometers (photo by author).

1.8 million inhabitants in 1940 to 3.1 million in 1950, and upwards of 5.3 million in 1960 (Davis, 1994; 329). As Alejandro Portes describes,

> "...movement of the Latin American rural population toward the cities did not occur in a gradual, even manner but in an accelerating influx directed toward a few receiving centers. In most countries, a single city served simultaneously as the political capital, the place of residence of the dominant classes, and the preferred site for industry." (1989; 7)

These receiving centers (of which Mexico City is the prime example), were in many cases larger in size than the three next largest cities combined. Within them, rampant growth combined with highly unequal income distribution to produce a far flung and previously unforeseen social-spatial polarization, at low densities incapable of supporting quality urban services (Portes, 1989; 8). The capital began to choke on its own expansion, with the swelling masses of urban poor relegated to a continuously outward-shifting periphery (Davis, 1994; Rowland and Gordon in Gilbert, Ed. 1996). Moreover, with the political, economic, and social capital of the nation concentrated in a single center, former regional hubs (including Guadalajara, Monterrey, Puebla, and Tijuana) floundered as well. We will return to a discussion of the immense opportunity these second tier cities represent in later chapters.

Worse still, in the context of the unbridled urban migration and uneven development of the Post WWII period, 'theory' emerged to both describe the plight of the growing colonia population and seemingly (though insidiously) to rationalize their continued spatial segregation. As Peter Ward has summarized, Classic Marginality Theory emerged at the nexus of the conflicting

▲ Figure 24: Colonias populares (informal settlements) on the north-eastern edge of Mexico City (photo by author).

paradigms of modernization theory and dependency theory, and came in two primary forms: economic and cultural. On the economic side, some argued that there was a growing separation between the blue-collar elite on the one hand and the marginal masses on the other. "These marginal masses threatened social and political stability and exacerbated the 'great fear,' [of socialist revolution]... in many respects reminiscent of late nineteenth-century Victorian England." On the cultural side, migrants to cities were cast as peasants, carrying with them the backwards trappings of rural and traditional culture, and existing as "marginal" to the mainstream. The "subnormal agglomerations" of the *colonias paracaídas*[12] were described as a growing "Cancer" from which the feared "ruralization of the city" posed a direct threat to modernist notions of progress (Ward et al, 2004).

By the end of the century – exacerbated by economic crisis, successive years of austerity and neo-liberal economic restructuring, and the repudiation of ISI under GATT and NAFTA[13] – four decades of ill-conceived and even subtly-racist urban development policy had coalesced to produce and reproduce urban poverty on a massive scale. As Peter Ward explains, by the turn of the millennium there was

> "... increasing evidence that although Classic Marginality may have lacked empirical veracity in its earliest iteration, changing economic conditions born of the structural adjustment and austerity of the 1980s, together with neo-liberal restructuring of the 1990s, is today creating the very conditions and cultural constructions conceived and predicted by [the early marginality theorists]. Rising unemployment, declining opportunities in even informal sector activities, a rise of private provisioning within a barter economy, social exclusion and new dimensions of marginalization, rising violence and insecurity – these are all-too-frequent features of the contemporary urban scene." (Ward et al, 2004; 186)

Against this intricate and challenging backdrop, the search continues for progressive yet pragmatic approaches to improving quality of life, equity, opportunity, security and environmental integrity, without destroying cultural heritage or the sense of community. In Mexico, this context includes the simultaneous coexistence of seemingly incongruous development paradigms: Modern and Post-Modern, global and local, individual and communal – conflicting spatial logics coexist in a milieu of discord between extremes of wealth and poverty, class and race. And while the goal of improving life for the urban poor remains paramount, increasing awareness of the correlation between improved human development, intensified resource consumption, and decreased environmental quality further complicates the question.

The task remains then, to advance development prototypes and processes that provide an equitable and high quality of urban life while minimizing environmental degradation. Towards this end, new models of Urban Design and Development are needed.

Yet as previously mentioned, signs of progress are abundant. With a return to democracy in 2000, the Fox and Calderon administrations have implemented a number of progressive reforms – focusing efforts to broaden economic opportunity, advance social equity and increase government transparency, while expanding development. Three projects, in particular, point toward a new urban future for Mexico.

First, the Capital – infamous for its strangling air pollution – has embarked on an ambitious multi-lateral effort to reverse environmental damage and implement sustainable development. Through the 15-year comprehensive Plan Verde, and the more targeted Programa General de Desarrollo 2007–2012, and Programa de Acción Climática, México City is working to demonstrate combined social and environmental leadership that it hopes will be a model for cities worldwide. Significantly, the seven goals enumerated by the General Development Plan (Ciudad de Mexico, 2007; 9-10) cover:

1. *Reforma política: derechos plenos a la ciudad y sus habitantes* (Political Reform: full rights to the city and its inhabitants)
2. *Equidad* (Equity)
3. Seguridad y justicia expedita (Security and timely justice)
4. *Economía competitiva e incluyente* (Competitive and inclusive economy)
5. *Intenso movimiento cultural* (Intense cultural movement)
6. *Desarrollo sustentable y de largo plazo* (Long term sustainable development)


▲ Figure 25: Photo of EcoBici, Mexico City's new bike-share program (photo by author).

7. *Nuevo orden urbano: servicios eficientes y calidad de vida, para todos* (New urban order: efficient services and quality of life for all)

Within four years of their inception in 2007, these combined efforts: extended the city's public transportation infrastructure with new Metro and BRT lines, and extension of dedicated transit corridors; introduced EcoBici with over 1,100 public bicycles available from 85 stations; replaced aging high-emissions vehicles – nearly 5,000 mini-buses and a staggering 75,000 taxis; initiated a sustainable housing program; incentivized solar energy use in the commercial and service sectors; instituted an Environmental Management System (EMS) to identify opportunities for saving water, electricity and office supplies; adopted a Green Roofs Program; introduced the Magdalena and Eslava Rivers Recovery Program; and commenced an Ecosystem Restoration Program responsible for the

▲ Figure 26: Photo of Paseo de La Reforma, Mexico City, closed to vehicular traffic (photo by author).

planting of 5.4 million trees between 2007 to 2009 alone. The combined impact thus far has resulted in an estimated annual emissions reduction of 1,570,500 tons of CO2 equivalent (*10 Acciones de la Ciudad de México para Enfrentar el Cambio Climático*, 2011).

Second, recognizing the continued nationwide housing shortage, proliferate sprawl, and deficiencies in urban infrastructure and services at the expanding periphery, the federal government launched Programa Dessarrollos Urbanos Integrales Sustenables (Integrated Sustainable Urban Development Program), or DUIS, in 2008. The DUIS initiative created a federal inter-agency collaborative structure and project evaluation process. The consortium works with state and municipal authorities, banks, and developers to target strategic regional hubs with public-private partnerships, subsidies, and other development incentives to promote an integrated development model – coordinating housing with public transport, services, open space and other amenities. Working with both urban and select peri-urban sites, by 2011 the program was responsible for approving some 250,000 homes on 7,200 hectares, benefiting an estimated 1 million people (DUIS, 2011).

Third, as will be detailed in Chapter 3, a recent federal initiative spearheaded by ProMexico, is an example of one such regional hub – combining the attitude toward sustainable urban development evident in Plan Verde, with the focus on co-locating commerce with housing and amenities of the DUIS program. Ciudad Creative Digital (or the Digital Creative City) represents a major collaborative undertaking, with federal, state, municipal, institutional and industry leaders working together to coalesce a high-value cluster in an existing city. The project is unique in its focus on using 21st Century industry to

▲ Figure 27: Photo of Bosque Chapultepec, Mexico City (photo by author).

rehabilitate the historic city center.

Ciudad Creative Digital returns us to the topic at hand: namely the relationship between technical change and urban development. In the next chapter we will discuss the evolution of prevailing attitudes toward technical change in the city-building industries over the course of the twentieth century. With due diligence and due modesty we will then proceed with an investigation of the New Century City development model (including Ciudad Creative Digital) in Chapter 3, with the aim of deriving lessons and methods applicable to similar development contexts. In Chapter 4, we will examine one such similar context, the city of Puebla – adapting the New Century City model to develop a proposal for Puebla's recently initiated Ciudad del Diseño (City of Design) in Chapter 5. We will conclude, in Chapter 6, with a discussion of the potential and limitations of the proposal as a flexible, transferable 'prototype' for development in other medium sized Latin American cities; as well as lessons, and areas for further work.

## CHAPTER 1 NOTES:

[1] "Seven Billion Day" was marked by the United Nations on October 31st, 2011 (http://www.un.org/apps/news/story.asp?NewsID=40257). The United States Census Bureau estimates that this milestone was crossed in March, 2012 (http://www.census.gov/population/popclockworld.html).

[2] United Nations, Department of Economic and Social Affairs, Population Division (2011). World Population Prospects: The 2010 Revision Population Database. (http://esa.un.org/unpd/wpp/index.htm)

[3] United Nations, Department of Economic and Social Affairs, Population Division (2007). World Urbanization Prospects: The 2007 Revision Executive Summary. (http://www.un.org/esa/population/publications/wup2007/2007WUP_ExecSum_web.pdf)

[4] Chertow, Marian R. "The IPAT Equation and Its Variants: Changing Views of Technology and Environmental Impact," in Journal of Industrial Ecology, v4, n4 (2001): 13-29.

[5] World Commission on Environment and Development, 1987.

[6] See Mega City in Latin America, The. Alan Gilbert, Ed. Tokyo; New York, NY: United Nations University Press, 1996.

[7] United Nations, Department of Economic and Social Affairs, Population Division (2009). World Urbanization Prospects: The 2009 Revision Database. http://esa.un.org/wup2009/unup/index.asp

[8] United Nations, Department of Economic and Social Affairs, Population Division (2008). Urban Population, Development and the Environment 2007. www.un.org/esa/population/publications/2007_PopDevt/Urban_2007.pdf

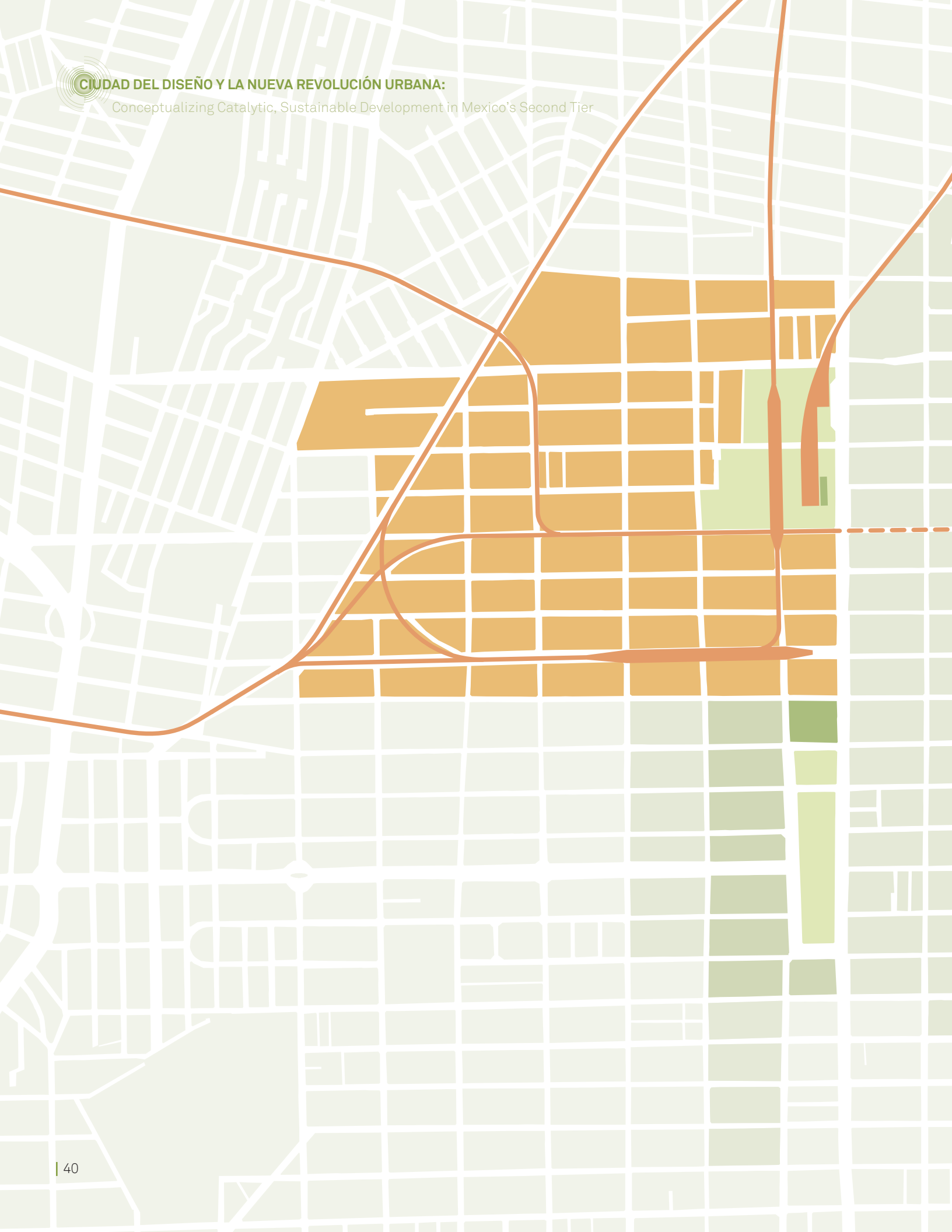
[9] The Rio +20 United Nations Conference on Sustainable Development is scheduled for June 20-22, 2012. http://www.uncsd2012.org/rio20/index.html

[10] See Skidmore, Smith and Green, 2010.

[11] Frontado Saavedra cites the official standard dimension of 100 varas by 100 varas (or approximately 85m square), noting substantial variation among cities (1980, 48).

[12] Parachute Colonies.

[13] GATT is the General Agreement on Tariffs and Trade of 1986. NAFTA is the North American Free Trade Agreement of 1992. Along with the devaluation of the peso in 1994, the combined impact sent Mexico into economic crisis in 1995 (Waters, Ueda and Marrow, Eds. 2007; 75).



# chapter 2

## Of Technophiles and Neo-Luddites:

The Evolution of Attitudes toward Technology in the City Building Industries

▲ Figure 28: Photo of the view from Torre Latinoamericana, north, toward Tlatelolco's Centro Cultural Universitario and the vast settlements beyond (by author). The Centro Cultural is highlighted by a new illuminated façade.

"But, indeed, these great cities are no permanent maelstroms. These new forces [suburban railway and automobile], at present still so potently centripetal in their influence, bring with them, nevertheless, the distinct promise of a centrifugal application that may be finally equal to the complete reduction of all our present congestions. The limit of the pre-railway city was the limit of man and horse. But already that limit has been exceeded, and each day brings us nearer to the time when it will be thrust outward in every direction with an effect of enormous relief." (H.G. Wells, 1902; 45)

"Anticipate the moment at which all your personal electronic devices – headphone audio player, cellular telephone, pager, dictaphone, camcorder, personal digital assistant (PDA), electronic stylus, radiomodem, calculator, Loran positioning system, smart spectacles, VCR remote, data glove, electronic jogging shoes that count your steps and flash warning signals at oncoming cars, medical monitoring systems, pacemaker... and anything else that you might habitually wear or occasionally carry – can seamlessly be linked in a wireless bodynet that allows them to function as an integrated system and connects them to the worldwide digital network." (William J. Mitchell, 1996; 29)

## Technological Change and Urban Form

Technical change impacts human behavior – and thus, urban form and city building – in at least four fundamental ways:

1. Technical change alters consumer demand and consumer behavior, transforming the products, services, entertainment and information consumed as well processes related to the consumption. Just as in the Automobile Age before it, the Information Age and the digital revolution have brought forth the proliferation of (successively small, faster, cheaper and more available) personal devices that alter the ways we live, work, learn and play, and therefore the way we inhabit space. The advent of digital systems as simultaneous means of consumption and data collection (i.e. Google) impels consumers, in the act of consumption, to be complicit in subsequent cycles of production.

2. Technical change alters the production processes of goods, services, entertainment and information, and therefore the spaces of those processes. While high-impact noxious industries still exist, developed economies transition to cleaner forms of computerized production; with an emphasis on digitized mechanization, CAD-CAM technology, rapid prototyping, material efficiency and reduced environmental impact. Low-skilled labor forces associated with heavy manufacturing are much reduced, while those associated with knowledge-labor, including design, are in demand. Opportunities for industrial synergies abound. Open-source systems and crowd-sourced design further diffuse the historically consolidated and separate spheres of production and consumption, born of the modernist era.

3. As the first two points suggest, technical change alters the use of space, eroding traditionally suitable adjacencies or separations, public/private distinctions, and the conventions of "public" space. In the

Information Age, ubiquitous wireless access to data allows any (connected) location to serve as ad-hoc office, conference room, or library; private business can be conducted in public and vice versa. Dedicated use gives way to simultaneity of function and of experience.

4. Technical change initiates transformations in the means and methods of the design, production and management of space. Today, Geographic Information Systems (GIS), environmental sensing, real-time information collection, and stochastic modeling all give city-builders unprecedented levels of data and statistical prediction potential with which to shape urban environments. The proliferation of user interface mechanisms allows increasingly fine-grained spatial management capabilities, as well as new approaches to public interaction and outreach.

Collectively, therefore, technical change transforms the ways in which we dwell (in the language of Heidegger), and therefore the ways in which we build – yet not the human necessities of dwelling, nor of building as dwelling (2001, 143-146).

Historic examples of the impacts of technical change both directly on city form, and indirectly on the planning and design processes that shape city form are both pervasive and fundamental to the dominant notion of urban evolution. The carriage, the elevator, light-rail, electrification, the telephone, the automobile; all contributed to upward and outward expansion; a loosening of previously constrained quarters. Likewise the advancement of survey techniques, improved accuracy in mapping, and (much later) of Computer Aided Design (CAD) and Geographic Information Systems (GIS), have facilitated ever greater capacities in urban development. In each case, speculative theory of the day has heralded a new dawn for the city, equating technological advancement with societal progress. Eager entrepreneurs have sprung on opportunities facilitated by enthusiastic politicians and policymakers, quick to embrace technology as a force for urban renewal. The perceived advantages of technology in these and myriad other applications have contributed to a substantial technocratic bias in the city-building professions, and technological optimism in society more generally. Though tempered (and even improved upon) by subsequent critiques, a version of this techno-rational utopianism persists in current theory and practice. Indeed in the contemporary Information Age, a more-nuanced and pragmatic perspective on technological advancement – incorporating human agency and recognizing the influence of obstinate power structures – offers city-builders renewed prospects and methods for addressing ever more complex global urban challenges via continued technical innovation.

## TECHNOLOGICAL DETERMINISM AND THE ARC OF HISTORY

Broadly speaking, the root of technocratic ideology at the core of the city building disciplines can be traced to the Enlightenment, where reliance on rationality and scientific investigation began to displace faith in traditional institutions of authority, including church and state. The scientific-rational ideology was in turn bolstered by the Industrial Revolution, where advances in production technology through mass mechanization brought increased capacity in diverse industries and allowed industrialized societies to outpace the "Malthusian Trap" faced by pre-industrial civilizations. Western Industrialization proceeded with no small degree of social upheaval, yet overall populations expanded, life expectancy increased, and public health improved leading to the widespread notion that technological change itself was the basis for social progress. As noted planning theorist Bill Pitkin explains, technological

determinism and a technocratic version of progress as politically-neutral became dominant by the end of the 19th century as technological systems transformed industry and economy, in turn producing a "technocratic spirit" in the arts, architecture and urbanism – embodied in the Modernist principles of efficiency, rationality, order and control (2001; 35).

First in American Planning, and subsequently on the international stage, the technocratic mindset expressed itself in social utopianism, where it was envisioned that technology, having transformed industry, could next be employed to improve the quality of life for the working class vis a vis provisions for electric distribution, sanitation, transportation, and all manner of soon-to-be-discovered consumer devices. Expanded by modernist epistemology, technology was to be harnessed to create a new, harmonious and efficiently ordered society at the center of which was the technocratic rational planner, benevolently shaping an objective and unbiased policy in the name of the general public good (Pitkin, 2001; 36-37). Technological determinism as the necessary purveyor of progress resonated with the 1950's post-War zeitgeist of optimism and expansionism that seized on the mechanism of the automobile as liberator from the 'tyranny of geography.'

Bolstered by enormous public policy and infrastructure support in the Federal Housing Act of 1954 and the National Interstate and Defense Highways Act of 1956, and further augmented with the professed technical expertise of modernist planning authorities and a new traffic engineering profession, as well as advances in building technology and domestic amenities (air conditioning, appliances), the United States implemented a new paradigm of dispersed living, invoking the model as an obvious indication that technology was the agent moving society forward (Hall, 2002; 294-51). By the early 1960's the dominant viewpoint was that of an emerging Great Society, with technology leading the way. Americans could enjoy guns and butter; a chicken in every pot and a car in every garage (not to mention a garage). Technology would allow the United States to win the cold war and the space race; to forge an Alliance for Progress stretching to the far reaches of Patagonia; to promulgate economic prosperity and social equity at home and abroad. Worldwide, the long arc of history would bend more sharply toward justice with unbiased and democratic rational technology as catalyst, and facilitator.

The convoluted relationship between the United States and Latin America over the course of the twentieth century is beyond the purview of this investigation. Nevertheless, as Tova Solo details, models for what the World Bank terms "urban upgrading" evolved between the two regions largely in parallel, with a strong North-to-South directionality. Indeed, the Latin American urban renewal model generally followed the US philosophy which focused on the physical appearance of slums as the principal dilemma. By clearing away the shanty towns and replacing them with standards-compliant housing, governments could give the poor a fresh start on their life in the city, and avoid further spread of blight. However, as in the US, the full consequences of these projects were ill-considered, and wholesale "eradication and renewal" became too costly to implement both in physical and social terms.

> "On the one hand, families did not respond well to forcible removals and relocations, even into homes which represented more than they could have afforded on their own. The break up of community ties, and removal from their sources of work and education proved to have costs far beyond the benefits of new and well-served housing. Furthermore, the style of housing selected often proved unfamiliar to the relocated families." (Solo, 4)

Worse still, the most frequent occurrence in such projects was to demolish the informal cities but neglect to rebuild replacement facilities. The "upgrading" simply resulted in removing people to farther flung locales.

In this atmosphere, Modernist mega-projects proliferated; from the Parque do Aterro do Flamengo of Roberto Burle Marx (1965), to Niemeyer and Costa's Brasília (1960), to Villanueva's Ciudad Universitaria de Caracas (1960), to Mario Pani's now infamous Unidad Habitacional Nonoalco-Tlatelolco (1965). Each invoked a tacit acceptance of technology as the purveyor of progress, and with the accelerated urgency of 'subaltern' nations engaged in city-building as a means to 'catch-up' to the 'modern' world.

## CRITIQUES OF TECHNOLOGICAL DETERMINISM

Of course, by the late 1960's technological determinism and the purview of technocratic planning more generally were under coordinated attack, due in large part to four critical issues.

First, citizens and professionals alike had begun to realize that enthusiastic adoption and implementation of the modernist techno-rational model in the name of progress had resulted in unforeseen negative impacts. As Bill Pitkin details, a careful historical analysis of advances in energy technology, the automobile, and computer and information technology, provided ample cause for skepticism of the technology-as-progress mantra. In each case, initial elation and rush to adoption gave way to a (too-late) realization of unintended consequences, and of disparities created, exacerbated or perpetuated. As an example Pitkin (2001), Hall (2002) and others cite the widespread embrace of automobile-centric planning and suburbanization and the myriad unintended consequences for cities. Mass decentralization, while facilitating locational freedom and economic opportunity for the wealthy, also placed an enormous, and ultimately untenable, infrastructure maintenance burden on municipalities. Lack of resources toward (and in some cases wholesale dismantling of) public transit systems resulted new structural inequities visited on the poor, elderly and youth – populations for whom private transportation is burdensome or unfeasible. Affluent 'flight' from urban areas directed funding resources away from the historic center, causing disparities in education and other social services to the remaining populations most in need. In Latin America, departure of the elite from the core to peripheral enclaves produced a recalcitrant social-spatial polarization. Far from achieving the envisioned society of free, independent, dispersed land-owners, automobile-dependency instead resulted in air-pollution, congestion, the economic and social costs of increased travel times, and countless other unanticipated effects, all proving difficult to counteract.

Second, in contrast to claims of democratic objective neutrality and the furthering of equity, the projects implemented according to technocratic ideology were found simply to supplant one form of inequity with another. Douglas Lee (1994; 36) cites the tendency for such technocratic thinking to preference top-down, "Command-and-Control" style planning. This centralization of planning functions allowed the technical authority of planners, traffic engineers, and urban economists to justify urban renewal projects that removed 'blight,' in the name of economic and social progress; though such projects disproportionately impacted poor and minority populations most vulnerable and in need of social services. As opposed to Banks, in Latin America the "redliners" were actually the State authorities, which coordinated the suppression of investments in infrastructure services to 'blighted' informal communities so as to actively discourage their consolidation (Solo, 2). As a contemporary example of this dynamic, M. Christine Boyer (1996; 228) notes the

potential for disparities in internet access to result in "technological redlining," – inequity of access to information in the digital age preserves advantage for some and disadvantage for others analogous to unequal access to financing and other resources witnessed by urban populations in the 1960's and 1970's (see also Hall, 2002, Chapter 12). In both cases, technology serves to protect the dominant power structure at the expense of (not in support of) greater or more democratic social equity.

Third, and perhaps most damning, technology to that point failed outright to live up to the propagandized expectations of proponents – and here is a potent cautionary lesson for our present day endeavors. The promises of comprehensive rational planning, of massive Urban Renewal, and of computer enabled "Large-Scale Urban Models (or LSUMs) were shown to be wildly overstated if not patently false. As Douglas Lee (1994; 36) describes, by the late 1960's comprehensively-oriented LSUMs had proven to be cumbersome, ill-suited to useful analysis, and to lack transparency and replicability. Indeed, the models had been used, inappropriately, to justify dictatorial, top-down command-and-control planning processes that exacerbated inequity instead of alleviating it. In an atmosphere of increasing urban instability and discontent, the technophile utopian visions of the Great Society deteriorated a midst the chaos and violence of urban rioting, the Civil Rights movement and Vietnam War protests. Here again, the backlash against the technocratic, statist, command-and-control regime was in no way limited to the US; the brutally suppressed student demonstrations in Mexico City, ahead of the 1968 Olympics, can be viewed in this light as well. Perhaps ironically, the assumed inevitability of social progress through technological advancement became indefensible when juxtaposed against the stark media imagery (itself facilitated by technological innovation) of violence against students, activists and war protesters.

Finally, assault on technology came from the emerging environmental movement as well. Marian Chertow explains that in many ways, modern environmentalism was a reaction to unbridled faith in technology following WWII (2001, 14). Chertow cites Barry Commoner's 1972 statement that,

> "Most United States pollution problems are of relatively recent origin. The postwar period, 1945–46, is a convenient benchmark, for a number of pollutants—man-made radioisotopes, detergents, plastics, synthetic pesticides, and herbicides—are due to the emergence, after the war, of new productive technologies." (1972, 345).

Commoner categorically assigned blame, asserting his evidence concluded decisively that most of the technological gains accompanying the growth of the United States economy after 1946, resulted in appreciably greater environmental impact than the technology which it displaced. To Commoner, the postwar technological transformation of production was the chief reason for "the present environmental crisis" (1972, 349). The sentiment expressed can be correlated to a version of Jevons' Paradox – the proposition that technological progress which increases the efficiency with which resources are used, tends to increase (rather than decrease) overall consumption (Alcott, 2005). Technocratic-rational efforts to build the efficient city by optimizing individual systems (of land use, traffic, etc.) resulted, counter intuitively, in increased resource use, and, in Commoner's view, overall impact. Here, the role of human behavior in the "rebound" phenomenon becomes clear. Technical change which improves efficiency but fails to consider human agency will ultimately fail to overcome Jevon's Paradox – a lesson which we bear in mind when considering future city-building.

## THE RESURGENCE OF THE TECHNOLOGICAL IMAGINATION IN THE INFORMATION AGE

With the contemporary proliferation of information-communication technology throughout the consumer electronic market, we are again witnessing a resurgence of technological optimism; the full implications of which are as yet unknown.

> "Today, as telepresence augments and sometimes substitutes for physical presence, and as more and more business and social interactions shift into cyberspace, we are finding that accessibility depends even less on propinquity, and community has come increasingly unglued from geography. Our network connections are becoming as important to us as our bodily locations." (Mitchell, 1996; 166)

But what does this prophecied geographical "unglueing" really mean for the city? In his critique of the technocratic-rational ideology, Pitkin emphasized the impact of technology on cities and planning as part of a complex social process that requires a level of deep understanding ill-served by deterministic faith in technological progress. However, Pitkin also concluded that "In the hands of someone with a balanced perspective and historic memory, [advanced information] technologies can further planning goals by informing analysis and democratizing data." (2001; 51) Discredited by the events of the 1960's and 1970's, but hardly dissolved, the technological imagination has made a resurgence in the present day, in no small part due to the swift and widespread proliferation of computer and information technology beginning in the early 1990s, bringing with it a new wave of techno-utopian prophets (and their detractors). Theorized by Mitchell (1996, 1999, 2003), McCullough (2004), Negroponte (1995), Boyer (1996) and others, the development and integration of ever faster, cheaper, and more ubiquitous digital information technology, sensors, and the internet are leading to innovations in city-building, design and management. These trends and innovations can be grouped in three primary categories: 1) innovations affecting professional planning capabilities; 2) innovations facilitating community engagement and empowerment; and 3) innovations in technologically augmented urban environments.

Innovations in professional planning processes and capabilities are those facilitated by technological advancements in the support tools used by ity-builders in their everyday work which have expanded analysis capacity and increased the volume of workflow. The development of Geographic Information Systems (GIS), which allow the merging of database technology with statistical analysis and cartography in order to analyze, visualize and spatialize the data relevant to planning, is the most visible advancement. As a further evolution, Richard Klosterman (1997) described the "perfect" Planning Support System as a

> "user-friendly system that allows the user to 1) select the appropriate analysis or forecasting tool from an 'intelligent digital toolbox'... 2) link the appropriate analytical or projection model to the required... information... 3) run the appropriate model(s) to determine the implications of alternative policy choices and different assumptions about the present and future, and 4) instantaneously view the results graphically in the form of charts, maps and interactive... displays." (52)

Fifteen years of progress since have brought both proprietary and open source GIS software closer to the PSS envisioned by Klosterman, and increased city-builders' professional capabilities, even if the profession is still far from an ideal tool. Additional research and advocacy in this arena will continue to enhance the functionality of digital tools, despite the relatively small market for planning software. City-building is big business,

and global technology conglomerates are expanding capacities and services in this emergent market.

Innovations facilitating community engagement and empowerment are those which decentralize and democratize data access and use, and improve two-way communication capability between planners and their community constituencies. While Ferreira (1998) detailed the difficulties in bringing these hypothetical capabilities to fruition, he also concluded that the infrastructure for a democratized 'middle-out' approach to neighborhood planning including the core elements of internet access, sufficiently powerful personal computing hardware, and user interfaces supporting mapping and visualization, were at that time already widely available and that standards for encoding and processing data were improving rapidly. Fast forward a decade and diverse examples of communication technology use in online community engagement and empowerment abound, including: those of city planning and development authorities such as the Boston Redevelopment Authority (www.bostonredevelopmentauthority.org); those of community advocacy groups such as the Sustainable South Bronx (www.ssbx.org) and of NGOs such as Viva Favela's community organizing website in Rio de Janeiro (www.vivafavela.com.br), just to cite a few. Furthermore, trends away from proprietary systems and towards open source shareware (such as OpenStreetMap, http://www.openstreetmap.org) and interoperability are leading to instances of community knowledge sharing and collective design, including the Open Architecture Network (www.openarchitecturenetwork.org/). And, as we will discuss further in the next chapter, New Century City (NCC) development projects often incorporate a digital public realm that parallels that physical public realm. Indeed, as Lee and Goodspeed (2010) conclude in their analysis of historic and future potentials for the use of media and technology in engaging community,

> "The most profound effect that digital media and technology could have on community engagement is the gradual shift in social behaviors and expectations that a generation of Internet users has come to rely on in daily life. People may simply come to expect that all government data be accessible, all public spending traceable, all neighbors easily contacted and polled, and every policy open to collaborative editing. They may expect more responsive institutions and a vibrant public discourse because they are already experiencing these in the online world."

Yet these potentials are dependent on establishing and maintaining common access to the infrastructure of communication technology, as well as preserving Network Neutrality. As Castells (2010) notes,

> "...the autonomous construction of meaning can only proceed by preserving the commons of communication networks made possible by the internet, a free creation of freedom lovers. This will not be an easy task – because the power holders in the network society must enclose free communication in commercialized and policed networks in order to close the public mind by programming the connection between communication and power." (432)

If a democratized planning process characterized by greater citizen engagement and empowerment is desired then universal access to digital communication technology and a content-neutral internet must be established and sustained.

Lastly, innovations in technologically augmented urban environments are those which employ integrated digital sensing technology, geographic positioning, and other information–communication systems to facilitate more effective control of and interaction with the urban environment.

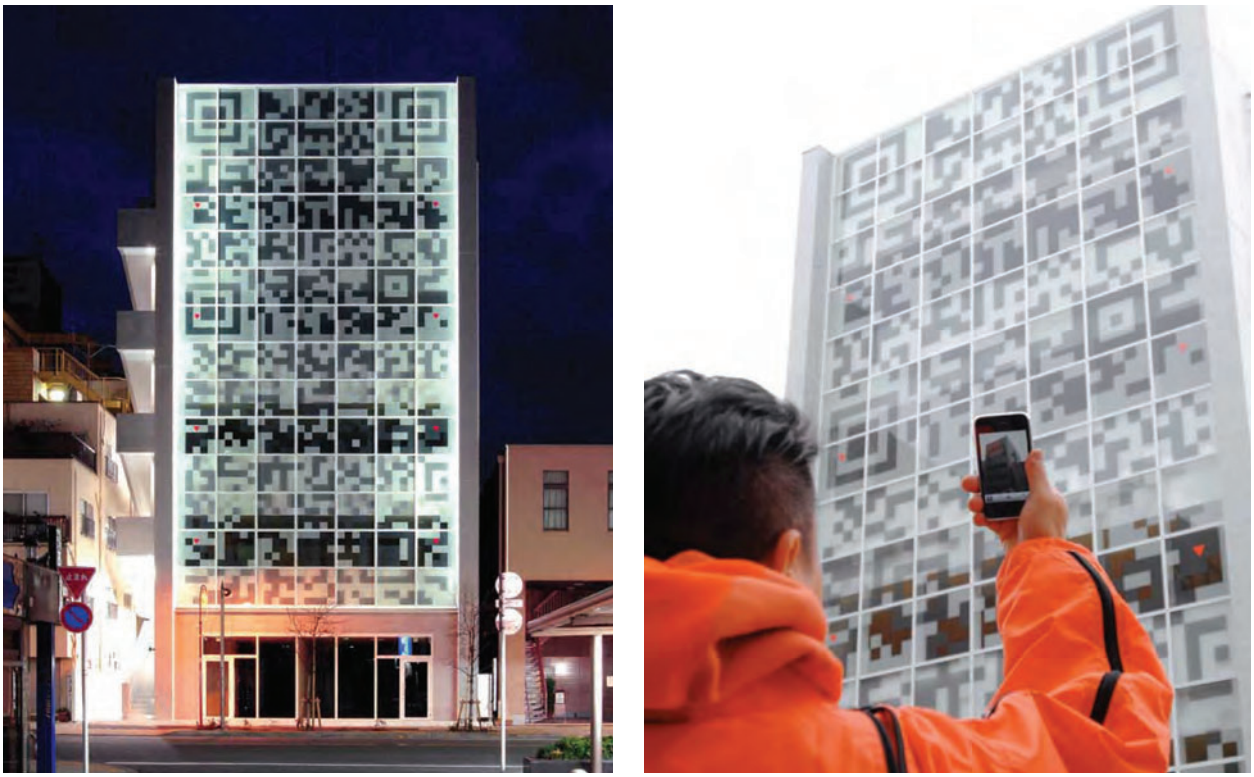

▲ Figure 29: Concept diagram of ICT facilitating urban sustainability (by author).

Explored variously by Boyer (1996), Mitchell (1996, 1999, 2003), Negroponte(1995), Horan (2001), McCullough (2004), Aurigi and De Cindio (2008), Frenchman and Joroff (2011) and many others, the potentials of ubiquitous integrated urban Information-Communication Technology (or ICT) offer great potential, and experiments in augmented urban spaces and systems are becoming more widespread. Often employed in urban systems management – including transportation applications (to coordinate traffic demand management and Bus Rapid Transit systems using real time data and notification, for example) – the question for urban technologists remains, how can ubiquitous technological interface allow a more direct connection between people, society, and the environment? Areas of application include (but are not limited to):

- Urban Resilience: through mechanisms allowing the city to adapt to change and respond in times of crisis, through the development of communication systems, early warning and disaster response coordination, and community leadership structures and capacity development.
- Social Equity: through the disaggregation and decentralization of social services, and the provision of universal internet access, as well as community engagement and empowerment via social media.
- Environmental Sustainability: through the coordination of more efficient resource consumption, preservation of habitats and urban open space, the reduction and cleanup of contamination, and the stabilization of steep topography and other erosion-prone areas.

Realizing the expanded market opportunities these applications suggest, technology companies such as IBM, Cisco, and Sony-Ericsson have launched a wide range of urban ICT initiatives, and are working with cities and institutions worldwide on a myriad of complex issues and projects. From Bogota's Transmilenio BRT system, to the Rio de Janeiro Control Center, to Seoul's Digital Media City; diverse applications of digital technology presage the creation of a new "urban nervous system," linking municipalities, communities and individuals more directly with each other and with their physical environment. As Joroff, Frenchman and Rojas (2009; 10) explain,

> "Elements such as wireless networks, copper wires, fiber optic cables, sensors,



▲ Figure 30: N Building Tokyo, by Terradesign and Qosmo, features a digitally augmented interactive facade. The windows are "Quick Response" (QR) coded with information about the building interior. A user can point their mobile device at the N Building, snap a photo of one or more of the windows to find out what's inside, including information on specials for stores and special events (e-architect, http://www.e-architect.co.uk/tokyo/n_building_tokyo.htm).

> radio frequency identification tags (RFID), digital kiosks and handheld electronic devices provide a nervous system for the public realm in New Century City projects. As in many cities around the world, this system is used to manage traffic, utilities, energy, security and other functions of modern life. This system also provides the channel for the flow of information and communication that is the lifeblood of modern organizations and personal life."

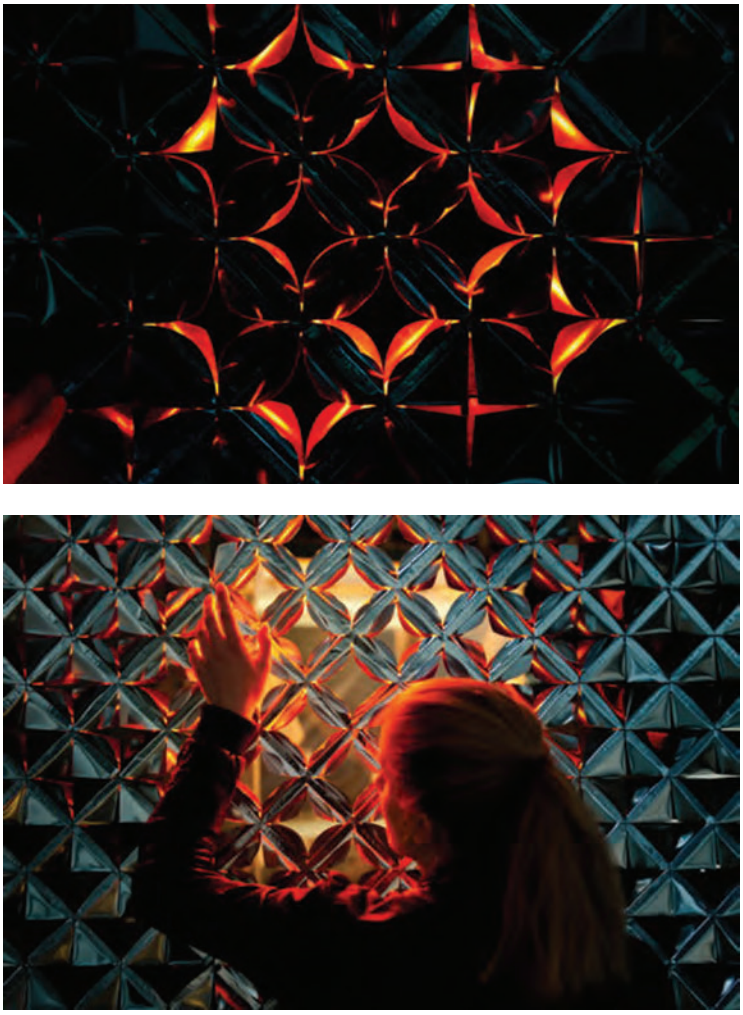
Several examples of experimental projects that apply information technology to experiential environmental interface are shown on following pages.

Moreover, digitally integrated urban information systems and stochastic modeling are beginning to point toward the renewed comprehensive scope of the 1960s LSUM's. While the cumulative impact to cities and to the lives of citizens remains to be seen, the potential is most-clearly perceptible in the so-called New Century City (NCC) projects: large-scale, urban developments of national importance, incorporating digital information-communication technology with 21st century industry cluster development. As will be detailed in the following chapter, New Century Cities are establishing a new paradigm for the integration of digital and physical realms. Not yet the dematerialized, demobilized, mass-customized, intelligently operating, subtly transformed e-topias described by Mitchell (1999); nevertheless the cumulative potentials herald an urban future very different than the one we know today.

## A PRAGMATIC APPROACH: FUSING TECHNOLOGICAL OPTIMISM WITH HUMAN AGENCY

In this age of resurgent technological optimism, city-building professionals can neither afford to be naively wooed by the hyperbolic optimism of technological snake-oil salesmen, nor to be paralyzed by regressive pessimism of Luddite technophobes. Transferring the logic of overcoming the "Malthusian Trap" to present day circumstances, it is difficult to imagine how humankind will face the ongoing challenges of population growth, climate change, sea level rise and resource scarcity projected for the coming decades without further innovations in and applications of technology to the planning and structuring of human civilization. While lifestyle change within the developed world (and as de facto model for the developing world) is necessary, this alone will be insufficient to address the challenges posed by a projected global population of nine billion by 2050. The citizenry of the developing world, will no longer be denied what it perceives as the trappings of progress. Neither will industrial opportunists simply forego burgeoning market opportunities; as long as the status quo is sanctioned by public policy, it will be perpetuated. In economic terms, therefore, both reductions in per capita consumption and a shift in the production possibilities frontier are required. Technological advances and their application to the built environment are absolutely essential if we are to meet the ongoing challenge of facilitating a higher quality of life and social equity, for more people, using fewer resources; yet technology alone does not guarantee this result.

A more balanced perspective anticipates the cycle of opportunity created by technical change while also understanding such innovation as the function of complex and dynamic social processes and the interplay of invested interests and power structures (Pitkin, 2001). A pragmatic approach concerning the role of technology in planning therefore incorporates a number of critical realizations. 1) First and foremost, technology is a function of human agency. Determinism is a fallacy; rather technology is socially constructed, by individuals and groups that see potential for personal or collective gain. 2) Consequently, technological neutrality is a myth. As a social construction, technology is created by and used for the establishment, perpetuation or reinforcement of power



▲ Figure 31: "Lotus 7.0" by Studio Roosegaarde. A curved wall (400 cm long, by 50 cm wide, by 200 cm tall) made out of smart foils which fold open in response to human behavior. Walking by "Lotus," hundreds of aluminum foils unfold themselves in an organic way; generating transparent voids between private and public. (Studio Roosegaarde , http://www.studioroosegaarde.net/uploads/files/2011/02/25/50/Factsheet%20Lotus-%20Daan%20Roosegaarde.pdf).


▲ Figure 32: "Platform 5" by Jason Bruges Studio, Sunderland Station, UK. The 144m long by 3m tall glass block wall is illuminated with over 11,000 programmable LED lights creating a large, low-resolution video matrix of 755×15 pixels (Jason Bruges Studio, http://www.jasonbruges.com/projects/uk-projects/platform-5).

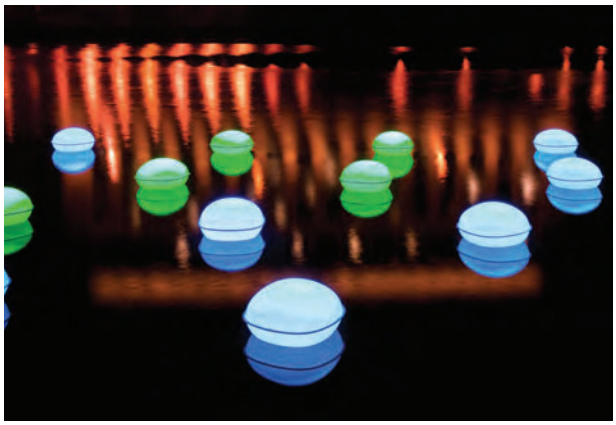
structures according to a dominant interests. 3) Because of this, while technical change may help overcome some disparities, it can also result in new disparities (of access, for example). 4) In addition, technological advancement is an ongoing process, not a static solution; at every moment city-builders must use the best tools and information available to the decision making process, while advocating for the continued development of better or more suitable tools or models. 5) Finally, unanticipated consequences result from over-eager adoption. A healthy skepticism concerning the scope, scale, and speed of implementation may be appropriate (especially when the risks are great). Strategies a phased rollout may allow opportunity for refinement, and curb the ultimate impact of unintended consequences.

Technology facilitates previously unrealized opportunity, but it is neither neutral nor spontaneously self-generating, and it does not inevitably equate to social progress. Rather people are the ultimate source of and purpose for both technical and social advancement. As Pitkin stated, "[City-builders] should reject simplistic technological determinism in favor of a richer understanding of technological innovation as a social process" in which human agency is critical (Pitkin, 2001; 51). Technology alone cannot and will not miraculously facilitate sustainable economic growth, instill social equity or make our cities more livable; it is still up

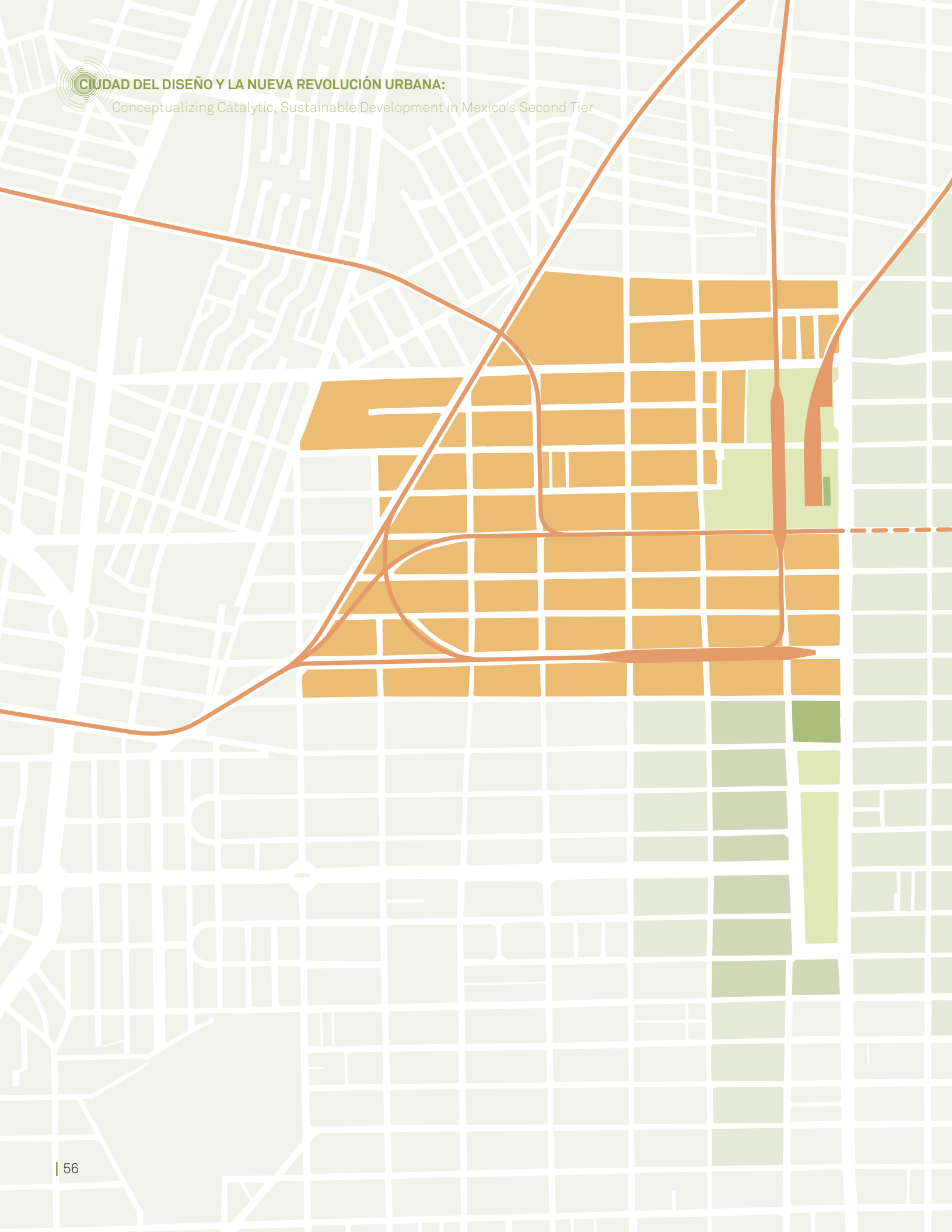
▲ Figure 33: "Amphibious Architecture" by the Living Architecture Lab at Columbia University. Floating interactive tubes on the Hudson and East Rivers monitor water quality. SMS interface allows citizens to "text the fish," and to receive real-time data on the river (Photos by The Living and Chris Woebken, http://thelivingnewyork.com/amphibiousarchitecture.htm).

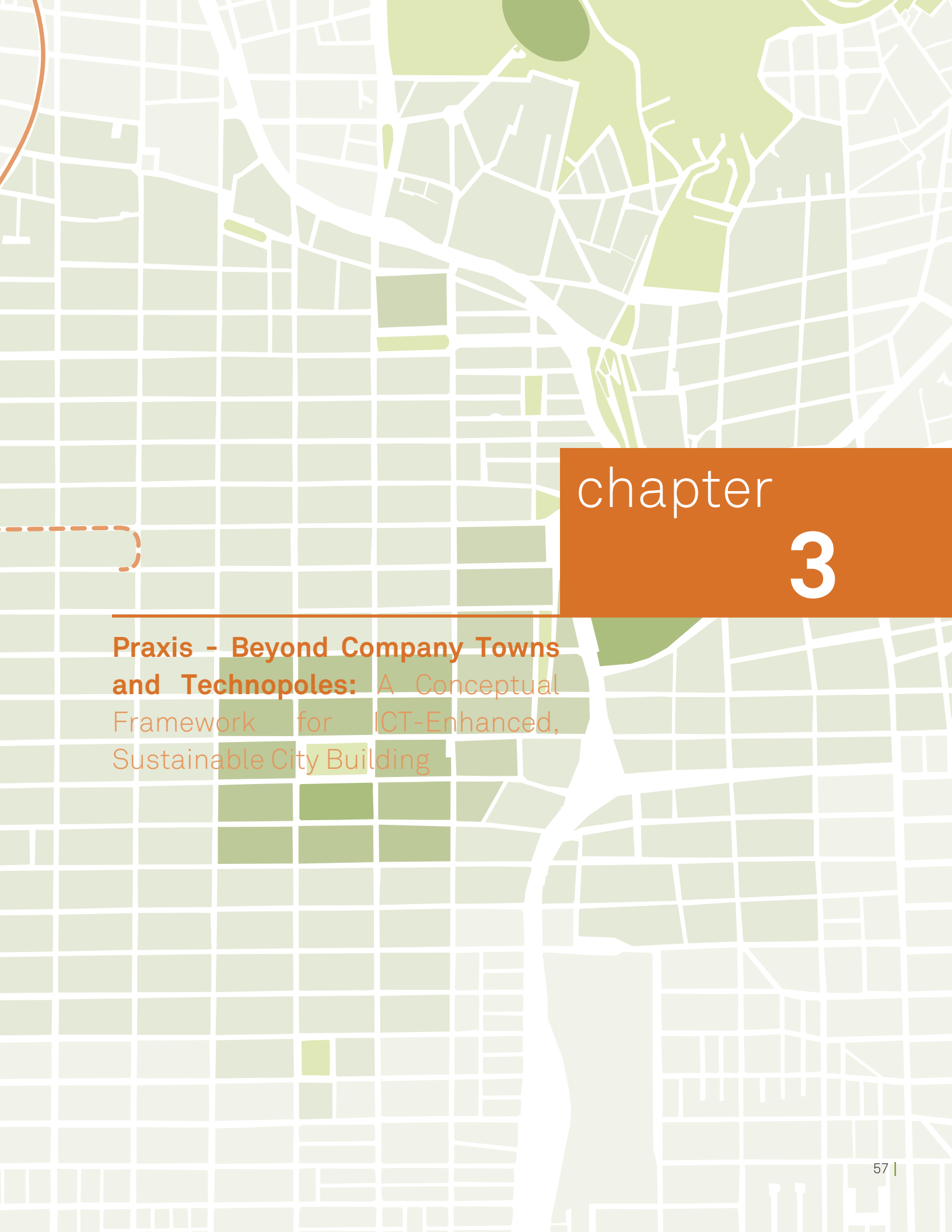
to people to put technology to purpose. And it is to people and their institutions – including advocates, politicians, policymakers and designers (and therefore to ourselves) – that we must ultimately look for progress.

With these lessons in mind, we turn now to a detailed analysis of the emerging New Century City development model – where technological innovation as industry, as method, as place maker and as way of life are being fused to create a new type of urban environment.



▲ Figure 34: "LightDrift" by Meejin Yoon. RFID-activated orbs floating on the Schuylkill respond to the touch of participants on shore (Höweler + Yoon Architecture, http://hyarchitecture.com/).





chapter

# 3

**Praxis - Beyond Company Towns and Technopoles:** A Conceptual Framework for ICT-Enhanced, Sustainable City Building

▲ Figure 35: Photo of public space in the Digital Media City, Seoul (by author).

"...we can see a major social trend standing out from all of our observations: the historical emergence of the space of flows superseding the meaning of the space of places. By this we understand the deployment of the functional logic of power-holding organizations in asymmetrical networks of exchanges which do not depend on the characteristics of any specific locale for the fulfillment of their fundamental goals. The new industrial space and the new service economy organize their operations around the dynamics of their information-generating units, which connecting their different functions to disparate spaces assigned to each task to be performed; the overall process is then reintegrated through communication systems. The new professional-managerial class colonizes exclusive spatial segments that connect with one another across the city, the country, and the world; they isolate themselves from the fragments of local societies, which in consequence become destructured in the process of selective reorganization [and decoupling] of work and residence. The new state, asserting its sources of power in the control and strategic guidance of knowledge, fosters the development of an advanced technological infrastructure that scatters its elements across undifferentiated locations and interconnected secretive spaces.

- Manuel Castells, 1989; 348

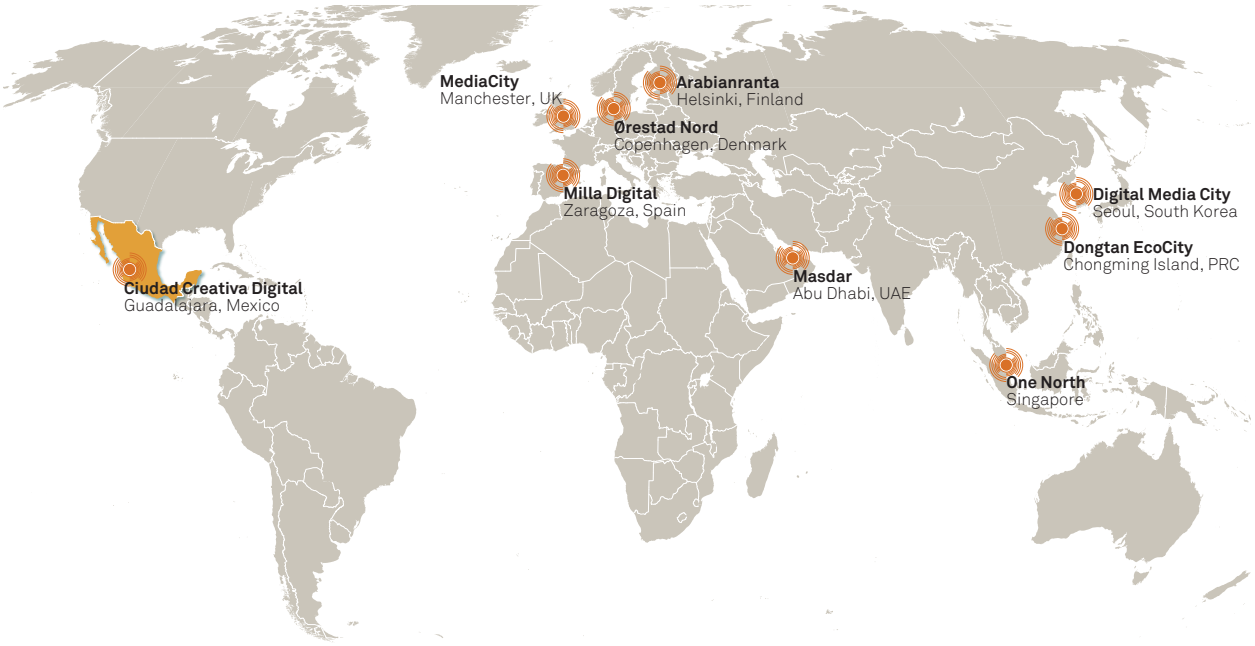
# The Evolution of New Century Cities

New Century City (NCC) projects are a specific form of purpose-built territorial concentration, or clustering, of technological innovation with the potential to generate techno-industrial synergies and increase economic productivity. Such projects have evolved from a protracted lineage of Company Towns and later of Technopoles or Science Cities. Indeed, the Enlightenment visions of Ledoux for an ideal factory town *Saline de Chaux* at *Arc-et-Senans* (1773–1778) is among the earliest examples. Yet the techno-city ideology can be traced variously from the paternalistic, industrial-revolution factory towns of 18th and 19th century American utopianism (towns such as Lowell, MA, and the ill-fated Pullman, IL) through the Garden City, *Città Nuova*, and techno-rational Modernist movements, to the late 20th Century state-directed developments of East Asia – notably Japan, Taiwan, and South Korea (Kargon and Molella, 3-4; Hayden, 39). As Manuel Castells and Peter Hall (1994) describe, Technopoles, and their permutations[1] became a redefining feature of statist economic development worldwide. Rising from the technological revolution, the formation of the global economy and the emergence of new forms of production and management, they constitute the 'mines and foundries' of the information age, redefining the conditions and processes of local and regional development. From Silicon Valley, California to Songdo, South Korea these planned centers for the promotion of high-technology industry can be viewed as both a response to and an accelerator of the transformation of global economic structures of the late 20th Century.

Yet Technopoles, bound to modernization ideology, the modernist dogma of use segregation, and mono-functional efficiency, disconnected physically, socially and culturally from their local contexts. Characteristic of early (and sometimes hasty) responses to worldwide processes of economic restructuring, such sites display a singular focus on global competitive strategy, and indifference to the geography of marginality such a strategy creates in cities. Sassen (2000, 83-84), for example, describes the ascendance of new producer-service[2] complexes as creating sites for the valorization of international corporate capital and high-value production and a consequent devaluation of traditional sectors – a process visible in territories increasingly peripheral, and increasingly excluded from the processes of the global economy. Graham and Marvin (2001), similarly expressed concern towards such models of "Splintering Urbanism" – contemporary development linking a mobile elite into the global networks of exchange, but disconnected from and even fortified against the immediate physical locale.

> "In all of these "technopole' spaces which Castells and Hall label the 'mines and foundries of the informational economy,' highly customized and packaged 'edge-city'-style landscapes are emerging. Within these, produced space is carefully combined with customized infrastructure whilst design practices, 'filtering' local infrastructures, surveillance, and simple geographical distance are often used to connect selectively with only more prosperous parts of the host city or region. In fact the produced spaces, the customised infrastructures, the secure withdrawal and the supporting institutional and financial infrastructures... are seen to be central to supporting and nurturing the appropriate 'innovative milieu'... to create self-sustaining growth and development." (335)

Indeed, Graham and Marvin's critique of Technopoles centers on the dubious investment of public resources for the implementation of selective global linkages

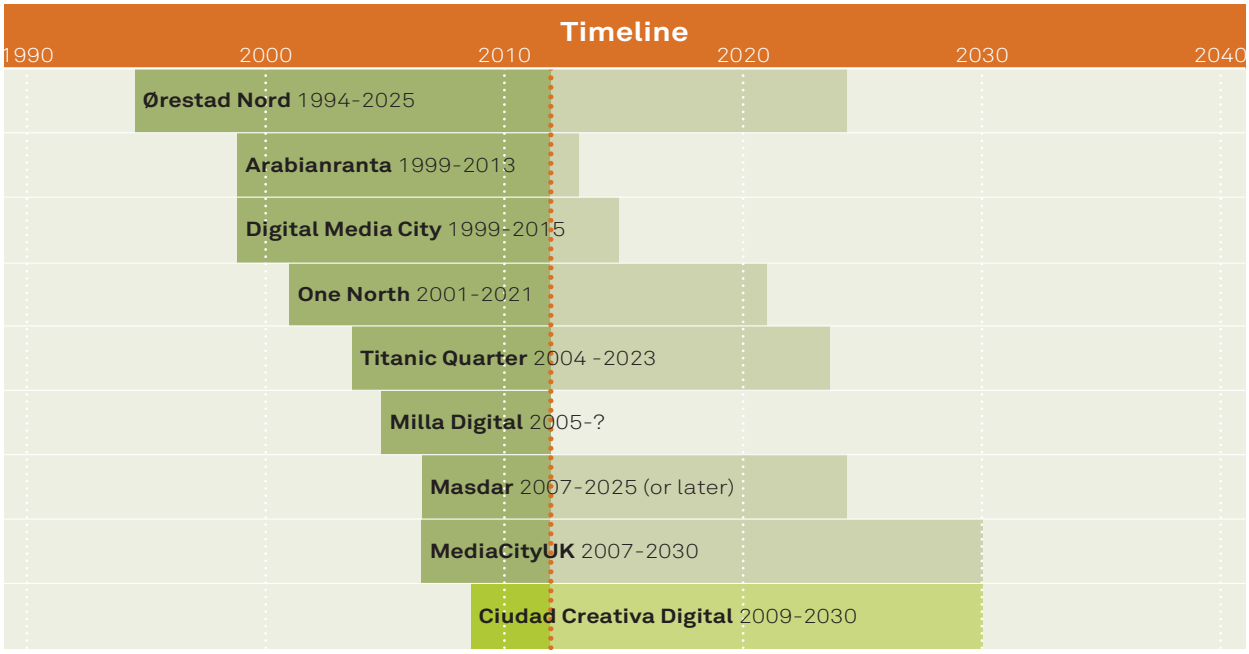



▲ Figure 36: Map of New Century City projects worldwide (by author).

supporting largely private transnational ventures combined with a local securing – the intentional disconnection reinforcing ever-more pervasive geographies of marginality.

## NEW CENTURY CITIES: AN OVERVIEW

By contrast, New Century City projects take a fundamentally different approach; viewing the immediate local context as a value-enhancing resource rather than a liability. The term "New Century City" was first coined at the Massachusetts Institute of Technology (MIT) in the early 2000's, by Professors Dennis Frenchman and Michael Joroff, for a course and series of ULI-sponsored workshops dedicated to the topic (Joroff, Frenchman and Rojas, 2009). The first global conference on New Century Cities was held in 2004 at MIT, with subsequent meetings in Stockholm (2007), Seoul (2009), and the next assembly planned for Zaragoza in 2012. While the projects vary in many respects, some generalizations can be made. NCC's are large scale projects of strategic national and international importance; often driven by federal or state governments, in partnership with developers. As with Technopoles, New Century Cities are similarly characterized by an emphasis on consolidating clusters for emerging and internationally high-value knowledge industries (such as Information-Communications Technology, Media and Entertainment, Research and Development, Bio-Technology, Art, Lifestyle and Cultural Tourism) geared toward global economic competition. Indeed, such projects are focused on economic development and job creation, particularly in attracting knowledge industry workers (e.g. Richard Florida's "Creative Class"). However, unlike ex-urban technopoles, they also frequently involve the re-introduction of commercial activity into the existing city; the creation of a diversified industrial ecology that includes a mix of institutional, residential, and support service uses; and a future-oriented technophilic narrative manifested in the architecture of the city – that is in the design of buildings and coordinated public realm. They are often located on post-industrial (rather than peripheral) land; adjacent to, but not yet within, the




▲ Figure 37: Timeline of New Century City projects (by author). Completion dates are as projected or estimated.

historic city core. While this locational condition places New Century Cities in much closer proximity to the local context, the pre-existing pattern of industrial-scale infrastructure often prevents full physical integration. However, integration with public transit infrastructure and other urban systems is often incorporated to help mitigate the initial physical, social, and cultural disconnect.

Dispersed among a diversity of conurbations worldwide, a number of New Century City projects are mapped in Figure 36, and compared in Matrix form in the following pages. Such projects have often succeeded in:

1. presenting a compelling narrative and vision for the integration of industrial policy, urban development, and Information-Communication Technology, and

2. employing that vision to mobilize political will and catalyze economic and physical development, and

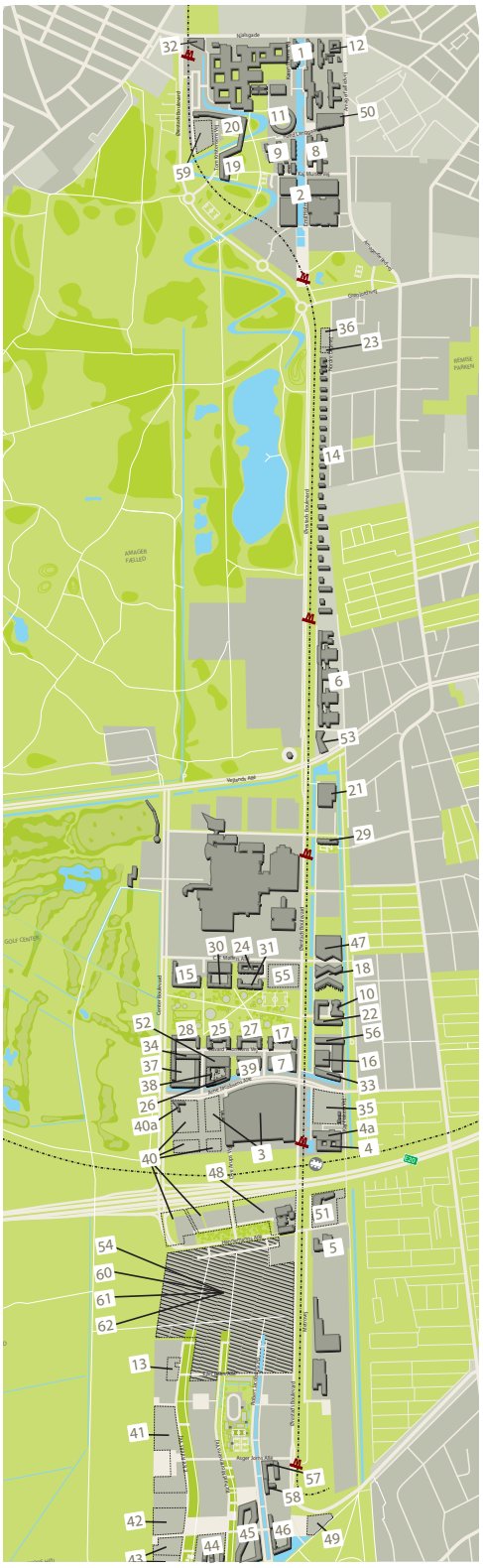
3. improving access to IT infrastructure, thereby promoting information equity, at least within a defined project area.

However, mega-projects of this size and complexity are not without risk. Large scale urban developments require massive commitment of land, resources and political will, sometimes at the expense of and in opposition to local concerns. A high degree of complexity and delicate stakeholder relationships make such projects prone to delay and even failure; some stall for years, and many are never realized as originally envisioned. When built within an existing city, mega-projects can overwhelm or destroy historic fabrics. As illustrated by the Urban Renewal projects of prior decades, they can 'land like a spaceship' on an unsuspecting 'blighted' district – razed in the name of 'progress.' When not part of a wider economic diversification strategy, they are vulnerable to eventual decline, much as the company towns of the 19th century. Indeed, the tendency of Technopoles to locate peripherally on undeveloped (and therefore uncontested, and 'ideologically' pure) land can be seen in part as a direct response to many of

| | Ørestad Nord | Arabianranta | Digital Media City | One North |
|---|---|---|---|---|
| **Location** | Copenhagen, Denmark | Helsinki, Finland | Seoul, Republic of Korea | Buona Vista, Singapore |
| **Timeline** | 1994 - 2025 | 1999 - 2013 | 1999 - 2014 or 2015 | 2001 - 2021 |
| **Industry or Development Theme** | Innovation in Communication, Media, Culture and Lifestyle | City of Innovation in Art, Culture and Design | Digital Media and Entertainment (M&E) Production and Distribution | Multiple Industry Cluster Developments |
| **Developers** | Ørestad Development Corp. and Ørestad Nord Grupen with development by land-owners and other private ventures | City of Helsinki with Art and Design City Helsinki (ADC) Ltd. | Seoul Metro Government, Seoul Housing Authority, and the Seoul Metropolitan Development Corporation | Science Hub Development Group (SHDG), Jurong Town Corporation (JTC) |
| **Status** | nearing completion | nearing completion | nearing completion | development ongoing |
| **Planning Area** | 310 hectares (765 acres) | N/A | 480 hectares (1200 acres) | N/A |
| **Development Area** | 45 hectares (110 acres) | 85 ha (210 acres) | 57 ha (141 acres) | 200 hectares (490 acres) |
| **Gross Floor Area** | 328,500m² completed or underway (additional 120,000m2 possible) | 575,000m² | 2,936,000m² (estimated full build-out) | 5,000,000m² |
| **Gross FAR** | 1.00 | .68 | 5.15 | 2.5 |
| **Population** | | 10,000 (118 persons/ha) | 60,000 (employees) | 138,000 (690 people/ha) |
| **Major Program Elements** | • 9,500m² Commercial<br>• 136,000m² Cultural / Broadcasting<br>• 95,000m² Housing (including market rate, owner-occupied co-op, dormatories, and social housing - 1000 units in 7 buildings)<br>• 18,000m² mixed-use<br>• 70,000m² (Faculty of Humanities at Copenhagen University and the IT University of Copenhagen)<br>• Multiple public spaces. | • 315,000m² Commercial<br>• 260,000m² Housing<br>• (10,000 residents)<br>• Helsinki Living Lab, Hub for Creative Industries<br>• 6 Educational Institutions (6,000 students) Helsinki Univ. of Art & Design, Arcada Univ. of Applied Sciences, Helsinki Metropolia of Applied Sciences, Swedish Prakticum, Finnish Heltech, and the Helsinki Pop & Jazz Conservatory).<br>• Multiple Public Spaces | • 1,800,000m² Comercial<br>• 110,000m² Incubator<br>• 200,000m² R&D<br>• 30,500m² Housing (rental for international workers)<br>• 24,000m² Hotel (one)<br>• 580,000m² Mixed Use<br>• 192,000m² Institutional (2 international high schools, a gallery, a digital content center and the IT offices of the Seoul Metropolitian Government)<br>• Multiple Public Spaces | • Multiple commercial industry clusters, including Biopolis: research facilities for Biomedical Sciences; Fusionopolis: Hub for ICT, Media, Physical Sciences and Engineering; and Mediapolis: media hub for incubation and R&D, content production, distribution and playout.<br>• Vista Xchange: business center, residential and entertainment hub. |
| **Notes** | Well-served by the Vestamager Metro line (6 stations), as well as local bus and highway. Bike infrastructure is also considered. | Residents, students and workers are linked by the Helsinki Virtual Village (HVV) an online network incorporating community services. | The project features the 'Digital Media Street' incorporating development and testing of new technologies in a living lab. The street mixes entertainment with technology, incorporating new digital urban devices. | One-North focused on the developing a community centered on knowledge-industries. A mixed-use approach incorporates multiple clusters interconnected by housing, live-work, retail spaces, and parks. |
| **Selected References**<br><br>(see also: Joroff, Frenchman and Rojas, 2009 and http://web.mit.edu/cre/research/ncc/casestudies.html) | http://www.orestad.dk/en/Fakta.aspx | www.arabianranta.fi | http://dmc.seoul.go.kr/eng/index.do | http://www.zaha-hadid.com/masterplans/one-north-masterplan/ |
| | http://www.orestad.dk/Fakta/~/media/Orestad/pdf/Copenhagen-Growing_web.ashx | http://www.arabianranta.fi/en/info/ | http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382 | |
| | http://www.byoghavn.dk/ByOgHavn/~/media/ByOgHavn/Pdf/MIPIM_tablet_1280x800.ashx | http://www.helsinki.fi/jarj/mao/urban/arabia.html | Frenchman, 2007; 25-45 | http://www.jtc.gov.sg/RealEstateSolutions/one-north/Pages/default.aspx |

▲ Figure 38: Above and right, Comparison Matrix of New Century City projects.

| | Titanic Quarter | Milla Digital | Masdar | MediaCityUK |
|---|---|---|---|---|
| **Location** | Belfast, United Kingdom | Zaragoza, Spain | Abu Dhabi, UAE | Salford (Manchester), UK |
| **Timeline** | 2004 - 2023 | 2005 - onward | 2007 - 2025 | 2007 - 2030 |
| **Industry or Development Theme** | Maritime / Industrial Waterfront Regeneration; N. Ireland Science Park | City of Knowledge and Innovation in the Arts | City as Eco-Laboratory; R&D in Energy and Urban Sustainability | Global M&E Production, Distribution & Innovation Hub |
| **Developers** | Titanic Quarter Limited – a subsidiary of Harcourt Developments, Dublin. | Zaragoza Alta Velocidad with planning by the City of Zaragoza | Masdar / Mubadala Development Company | Peel Holdings, Ltd./Peel Media, Ltd |
| **Status** | development stalled | development ongoing | development stalled | development ongoing |
| **Planning Area** | 200 hectares (490 acres) | 150-200 hectares (estimate) | 600 ha (1480 acres) | 81 hectares (200 acres) |
| **Development Area** | 75 hectares (185 acres) | 108 ha (264 acres) | 300 hectares / 740 acres (estimate) | Phase 1: 15 ha. Later phases: 10 ha. Total 25 ha. |
| **Gross Floor Area** | 1,500,000m² (estimate) | | | 692,000m² (estimate) |
| **Gross FAR** | 2.0 (estimate) | | | 2.75 |
| **Population** | | 10,000 (118 persons/ha) | 47,500 (160 persons/ha) | 138,000 (690 people/ha) |
| **Major Program Elements** | • Northern Ireland Science Park (NISP) including 70 companies. Offices for a range of industries including construction, hospitality, IT, financial services, retail, and creative industries. The Titanic Belfast signature building.<br>• 5,000 housing units, including affordable housing<br>• Campus of Belfast Metropolitan College<br>• Multiple public spaces. | • Commercial Offices<br>• Some residential included in plan. Additional residential development on adjacent sites<br>• Expo 2008 Facilities, Hotel, Convention Center and a Health center<br>• Public Institutional facilities include the Digital Water Pavillion and the Center of Art and Technology (CAT)<br>• Interactive public spaces incorporating water and light | • The Masdar Institute of Science & Technology<br>• Masdar headquarters<br>• Commercial Office<br>• R&D Facilities<br>• Residential<br>• Retail and Entertainment<br>• PRT System<br>• Attempting to develop the city as a living laboratory for sustainability | • 280,000m² Commercial<br>• 18,000m² Retail and Entertainment<br>• 142,500m² Residential (estimate)<br>• 36,000m² (est.) includes a 218 bed Holiday Inn, plus an additional 24,000m² planned.<br>• 192,000m² Parking (estimate)<br>• 23,500m² Production Studio<br>• Public space includes a 5000 person piazza and a potential pedestrian loop around Dock 9 |
| **Notes** | Target of 20,000 jobs total. NISP has a parallel cyber environment. Research is conducted on- and off-site, with partnering universities and technology companies. Much of the research is intended to benefit NISP directly. | Unique for focus on a network of public realm infrastructure creating physical and digital connections between previously divided areas (physically and virtually). Community-oriented, designed for user appropriation. | Target for 100% renewable energy, zero carbon emissions and zero waste. Planned for 80% of water recycled. Solar energy infrastructure provides 200 MW of PV (10 MW field + 190 MW rooftop). | Vision to become a leading international hub for the creative and digital sectors, and a vibrant destination to work, live and play. Serving adaptation in global media via high speed connectivity, a purpose-built infrastructure, and other features. |
| **Selected References**<br><br>(see also: Joroff, Frenchman and Rojas, 2009 and http://web.mit.edu/cre/research/ncc/casestudies.html) | http://news.bbc.co.uk/2/hi/uk_news/northern_ireland/7753171.stm | http://www.carloratti.com/projects/pdf/16_Zaragoza.pdf | http://www.fosterandpartners.com/Projects/1515/Default.aspx | http://www.peel.co.uk/activities/mediacityuk |
| | http://www.planningni.gov.uk/index/policy/dev_plans/devplans_az/bmap_2015/bmap2015-techsupp6-urbanenviron-titanicqtr.pdf | http://www.milladigital.org/ingles/home.php | http://www.greentechmedia.com/articles/read/masdar-update/ | http://www.salford.gov.uk/mediacityuk.htm |
| | | http://www.dwp.qaop.net/ | | http://www.mediacityuk.co.uk/ |
| | | Frenchman, 2007; 25-45 | http://www.masdar.ae/en/home/index.aspx | |



▲ Figure 39: Master plan of Ørestad, noting projects completed or underway by the end of 2011 (By& Havn, http://www.orestad.dk).

▲ Figure 40: Plan of Ørestad Nord, noting projects completed or underway by the end of 2011 (By& Havn, http://www.orestad.dk).

the tensions and acrimonious challenges involved in developing en-masse within an existing urban core. The question, then, is whether large scale projects of this type have evolved beyond their Technopole antecedents; and whether technology can be employed in further adapting the typology more sensitively to the complexities of developing contexts?

A comparative analysis of four successful NCC projects and a more recently initiated development follows, with additional information available in the Appendix.

# Ørestad Nord

Location: Copenhagen, Denmark

Timeframe: 1994 - 2025 (nearing completion)

Industry Focus: Innovation in Communication, Media, Culture and Lifestyle

Development Partners: Ørestad Development Corp. and Ørestad Nord Grupen with development by landowners and other private ventures

Planning Area: 310 hectares (765 acres)

Site: 45 hectares (110 acres)

GFA: 328,500m$^2$ completed or underway (additional 120,000m2 possible)

FAR: 1.00

Major Program Elements: 9,500m2 Commercial; 136,000m2 Cultural / Broadcasting (DBC); 95,000m2 Housing (mixed housing typologies); 18,000m2 mixed-use; 70,000m2 Institutional (Faculty of Humanities at Copenhagen University and the IT University of Copenhagen)

Transit: New Vestamager Metro, local bus and Bike lanes

Virtual Public Realm: Ørestad.Net

## PROJECT SUMMARY:

Beginning in the early 1990's the development of Ørestad was seen as a strategic maneuver to augment the Copenhagen's transportation infrastructure and create a competitive center of innovation Communication, Media, Culture and Lifestyle. The overall Ørestad site is the largest building site in Scandinavia, the development of which was used to finance construction of the new Vestamager Metro line. The winning entry in the international competition held in 1994 divided the overall area into four smaller districts: Ørestad Syd, Amager Fælled, Ørestad City and Ørestad Nord.

Ørestad Nord, as its name suggests, is the northern-most district of the development site, the area nearest in proximity to the historic city center, and portion closest to completing build-out. The development is envisioned as a nexus of experimental living, with student housing, apartment buildings and multiple other residential typologies mixed with public and private institutions and commercial businesses as well as the headquarters of DR Byen (the Danish Broadcasting Corporation), and campuses for the University of Copenhagen and IT University.

▲ Figure 41: Photo of the Danish Broadcasting Corporation Headquarters at Ørestad Nord (*Copenhagen Growing*, http://www.orestad.dk/~/media/Orestad/pdf/Copenhagen-Growing_web.ashx).

▲ Figure 42: Photo of Bikuben Residence Hall, near IT University and the Southern Campus of the University of Copenhagen (*Copenhagen Growing*, http://www.orestad.dk/~/media/Orestad/pdf/Copenhagen-Growing_web.ashx)

▲ Figure 43: Photo of Ørestad Nord. (Photographer, Peter Sørensen. *Copenhagen Growing*, http://www.orestad.dk/~/media/Orestad/pdf/Copenhagen-Growing_web.ashx)

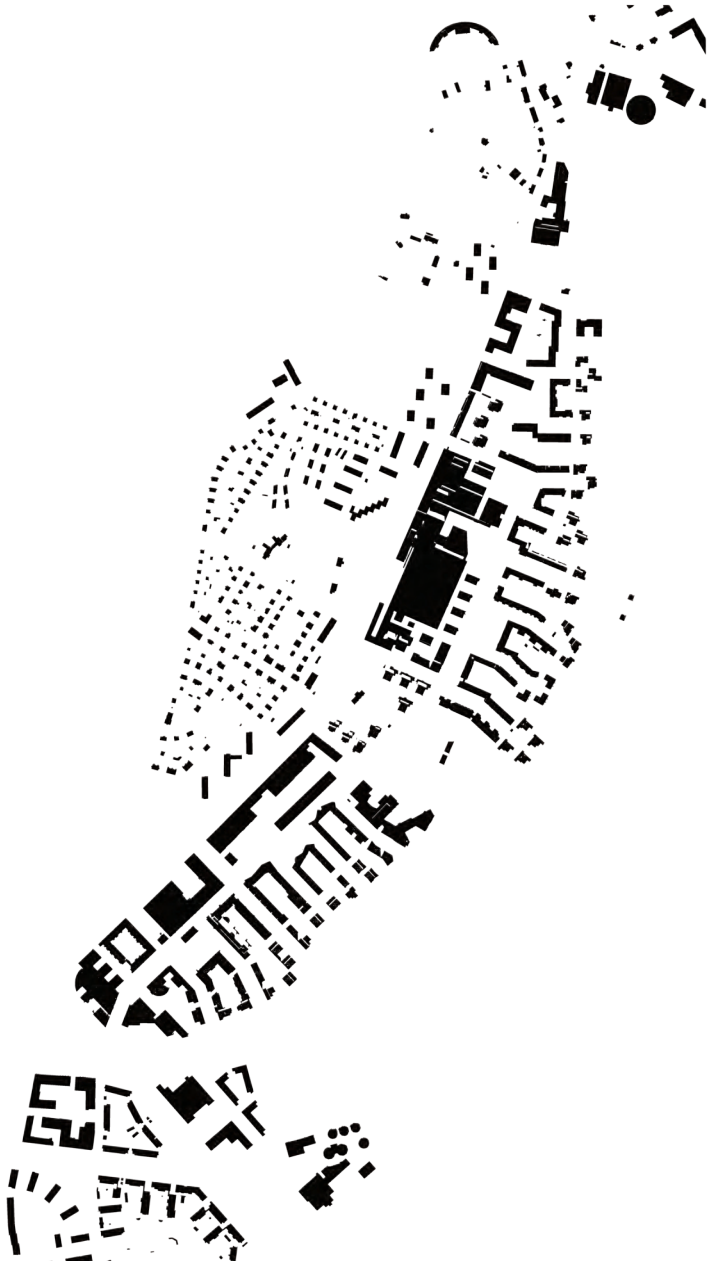

▲ Figure 44: Access Network and Figure-Ground studies of Ørestad Nord (by author).

## STATUS OF ØRESTAD NORD AS OF DECEMBER 2011:

By December 2011, City & Port Development has entered sales agreements with the following companies and institutions:

1. University of Copenhagen, Amager (University: 40,000m$^2$)
2. DR Byen, DBC – City (Culture / Broadcasting: 136,000m$^2$)
8. IT University of Copenhagen (University: 30,000m$^2$)
9. Karen Blixen Parken (Residential - 212 units 20,700m$^2$)
11. Tietgenkollegiet (Residence Hall - 400 people: 25,000m$^2$)
12. Bikuben Kollegiet (Residence Hall - 107 units: 6,800m$^2$)
19. Fælledhaven (Social Housing - 114 units: 13,000m$^2$)
20. Universitetshaven (Res.Co-Op, 170 apartments: 19,000m$^2$)
32. Metropolen (Commercial: 9,500m$^2$)
50. Mikado House (Mixed-Use: 18,000m$^2$)
59. Radiorækkerne (Residential - 87 units: 10,500m$^2$)

▲ Figure 45: Master Plan of Arabianranta, Helsinki (http://www.hel.fi/wps/wcm/connect/d7460d004a17a7ad8170e93d8d1d4668/26_01_2009_ARABIA_havainne.pdf?MOD=AJPERES&lmod=214505478).



▲ Figure 46: Figure-ground study of Arabianranta (by author).

# Arabianranta

Location: Helsinki, Finland

Timeframe: 1994 - 2013 (nearing completion)

Industry Focus: City of Innovation in Art, Culture and Design

Development Partners: City of Helsinki with Art and Design City Helsinki (ADC) Ltd.

Site: 85 hectares (210 acres)

GFA: 575,000m2

FAR: 0.68

Major Program Elements: 315,000m2 Commercial including the Helsinki Living Lab, Hub for Creative Industries and 6 Educational Institutions; 260,000m2 Housing; Reuse of the arabia Ceramics and Glassware factory

Transit: Helsinki Tram lines 6 and 8; frequent bus service:

Virtual Public Realm: Helsinki Virtual Village

## PROJECT SUMMARY:

Built on the site of the former Arabia Ceramics and Glass Factory, since the early 1990s Arabianranta has been redeveloped as a "City of Art and Design." With over 300 primarily small and medium enterprises and some 4,000 employees, this purpose-developed hub for creative industries also boasts six educational institutions with some 6,000 students: The University of Art and Design, Arcada University of Applied Sciences, Helsinki Metropolia University of Applied Sciences, the Swedish Prakticum, Finnish Heltech, and the the Helsinki Pop & Jazz Conservatory. As with Ørestad, Arabianranta is also envisioned as a locus of "experimental" living, with multiple 'alternative' housing types including condos, lofts, student residences, group, elderly and special needs facilities housing upwards of 10,000 residents.

▲ Figure 47: Photo of Arabianranta from the waterfront (www.arabianranta.fi).


◄▲ Figure 48: Left and Above. Re-purposed factory buildings are in-filled with new construction at Arabianranta (City of Helsinki Planning Department, *Walking in Arabianranta*, http://www.hel2.fi/ksv/julkaisut/esitteet/Arabianranta_EN.pdf)

▲ Figure 49: Aerial photo of Arabianranta from the waterfront (www.arabianranta.fi).

Managed by the foundation, Art and Design City Helsinki, Ltd. the development features one of the first examples of a parallel digital public realm manifested in the “Helsinki Virtual Village.” This online site provides a medium to showcase the work of the district, publicize its schools and events, as well as a networking mechanism for local enterprises to find new business partners and customers via the internet. Companies are able to update their own web site through the virtual village portal, providing additional marketing and networking opportunities for fledgling enterprises.

▲ Figure 50: Rendering of Seoul Lite Landmark Tower and the overall extent of Sangnam New Millennium Town (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382)

▲ Figure 51: Aerial Photo of Digital Media City (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382)

# Digital Media City

Location: Seoul, South Korea

Timeframe: 1999 - 2014 or 2015

Industry Focus: Digital Media and Enternatinment Production and Distribution

Development Partners: Seoul Metro Government, Seoul Housing Authority, and the Seoul Metropolitan Development Corporation

Planning Area: DMC is part of the larger Sangnam New Millennium Town development site of approximately 480 hectares (1200 acres)

Site: 57 hectares (141 acres)

GFA: Approx. 3,000,000$m^2$

FAR: 5.15

Program Elements: 1,800,000m2 Comercial; 110,000m2 Incubator; 200,000m2 R&D; 30,500m2 rental Housing; 24,000m2 Hotel; 580,000m2 Mixed Use; 192,000m2 Institutional (2 international high schools, a gallery, a digital content center and the municipal IT offices)

Transit: Digital Media City Station, with subway and regional rail connections.

## PROJECT SUMMARY

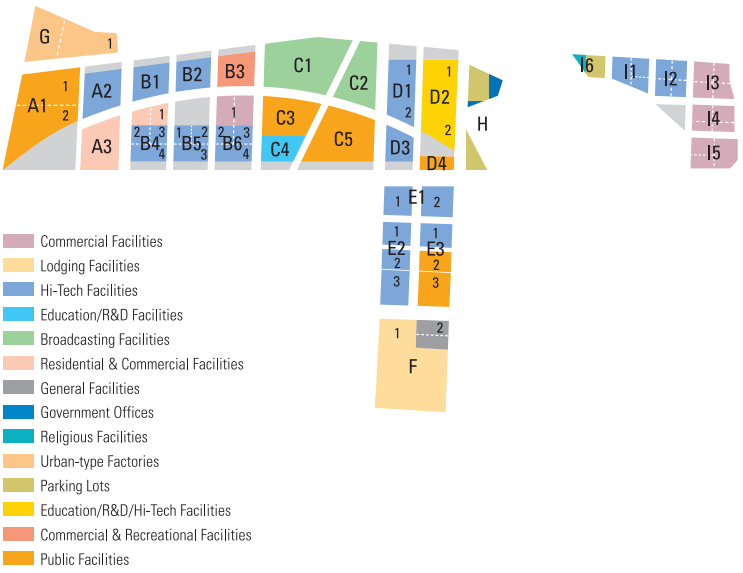
Located on the former island of Nanjido (now annexed into the mainland), on the site of what was, from 1978 to 1993, the municipal landfill, Digital Media City is now the preeminent global hub of Media and Entertainment (M+E) production and distribution. Part of the larger Millennium City (or Sangam New Millennium Town) development; the overall district incorporates a wide mix of uses; with Residential units, Educational facilities, Government office and Cultural Institutions integrated with industry headquarters for broadcasting, movies, video games, music, e-learning and related media industries. As of 2009, DMC is home to some 220 businesses with a standing workforce of 17,000. The project has attracted well-known international IT companies including LG Telecom, Pantech and LG CNS, as well as various kinds of public exhibition facilities including the Korean Film Archive and the Korean Film Museum.

A central feature of the project is the Digital Media Street, an experimental space for the incorporation of media technologies and content within the public realm, where technological innovation meets the everyday experience of a conventional street, mixing entertainment and retail uses with technology applications and incorporating advanced digital urban devices. The Digital Media Street, and its four nodal plazas, are seen as an opportunity to develop and test new technologies, and to refine them in a 'living laboratory' environment. The street is intended as a permeable realm that blurs the transitional edge between public and private space and joins digital information with the physical spaces of media production and social interaction. New types of information-rich and responsive infrastructures, based upon wireless and

► Figure 52: Commercial Development in Digital Media City (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382)

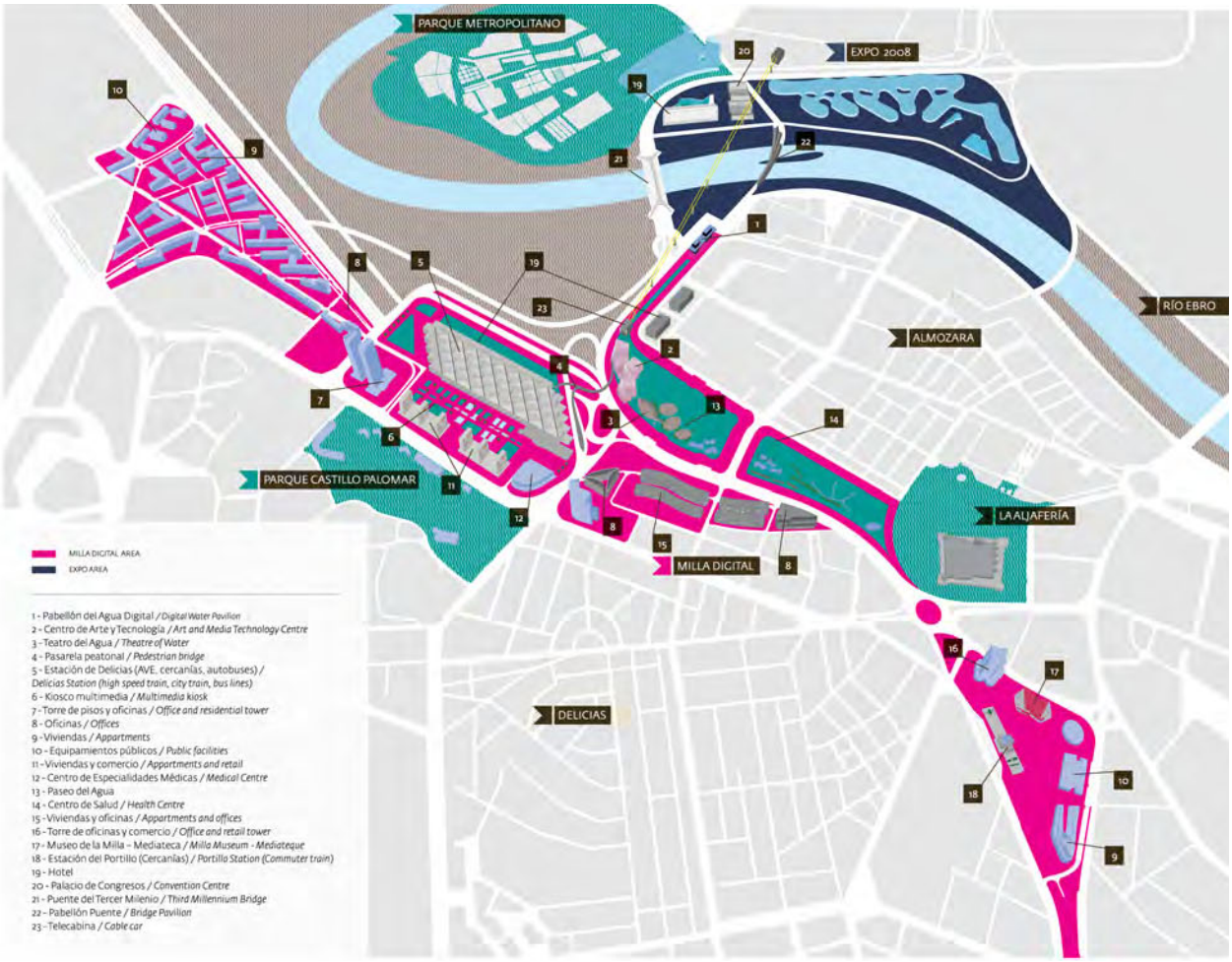
► Figure 53: Massing Model Rendering of Sangnam New Millennium Town and Digital Media City (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382)

► Figure 54: Land Use Plan for Digital Media City (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382)



▲ Figure 55: Commercial Development in Digital Media City (Digital Media City: Dreams Made a Reality, http://dmc.seoul.go.kr/download.ddo?type=b&att_seq_n=382).

sensor networks, are being installed on the street in several phases including: interactive media boards, sign boards, IP-Intelights, Info-Booths, and e-Boards.

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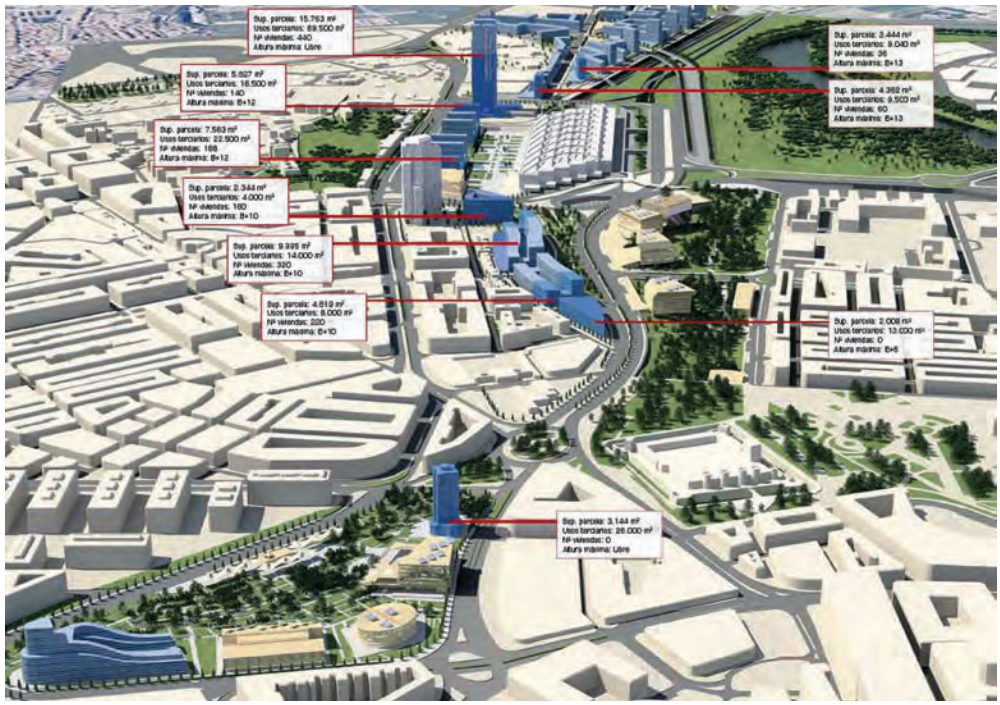
◄ Figure 57: Photos of the Digital Water Pavilion at Milla Digital (Guy Hoffman, http://www.dwp.qaop.net/?lang=en#gallery).



▲ Figure 58: Rendering of Milla Digital Masterplan (http://www.urbanity.es/foro/urbanismo-ara/210-zaragoza-milla-digital.html)

# Milla Digital

Location: Zaragoza, Spain

Timeframe: 2005 – onward (private development currently stalled due to European financial crisis)

Industry Focus: Digital City (Knowledge and Innovation in the Arts

Development Partners: Zaragoza Alta Velocidad with planning by the City of Zaragoza

Site: 108 hectares (264 acres)

Program Elements: Expo 2008 Facilities, Hotel, a Convention Center and a Health center, Commercial Offices, Some residential included in plan with additional residential development on adjacent sites; Public Institutional facilities include the Digital Water Pavilion and the Center of Art and Technology (CAT); Interactive public spaces incorporating water and light

Transit: Zaragoza Delicias Intermodal Station, with High Speed and Regional Rail service, as well as bus service.

## PROJECT SUMMARY

In 2006, a high speed rail was completed, linking Zaragoza to Madrid and Barcelona, and putting the city in easy commuting distance of Spain's largest employment centers. The abandonment of the old rail station at the center of the city, and the undergrounding of previous rail lines, opened up a linear mile of post-industrial land, which had for previous eras been a scar – separating districts of the historic city. Milla Digital was an historic opportunity to heal this industrial scar, with a new connective tissue of interactive public spaces and civic programs and a center for technology innovation that would create a new global identity for Zaragoza. The

development was planned in conjunction with the 2008 European Expo on the theme of "Water," and the open space network incorporates multiple public facilities reinforcing this theme, including the Digital Water Pavilion, and the Paseo del Agua featuring a collection of digitally-controlled fountains.

In the wake of the European Debt crisis, the private development components of Milla Digital have stalled, revealing the vulnerability of all large scale projects to the shocks of economic cycles. Yet the public components of the project have proceeded (in no small part due to a compelling project narrative with full political backing from the mayor and vice mayor) and the city recently celebrated the opening of the new Center for Art and Technology (CAT). And while initial efforts to attract larger international technology companies has waned, the city has transitioned its strategy to cultivating smaller business and a local ecosystem of creativity, fostering community capacity building. In this way, the project hints at the strength of providing an overall vision, with a strategy for flexible implementation should industry conditions or development cycles change unexpectedly.


▲ Figure 59: Aerial Photo of the Parque Morelos district of Guadalajara (Google Earth): page 80. The prosed site for Ciudad Creative Digital lies within the zone of the historic city.


▲ Figure 60: Ciudad Creative Digital Draft Strategic Plan Concept, Dennis Frenchman, MIT. (in *Ciudad Creativa Digital Draft Strategic Plan*, Prof. Dennis Frenchman and Prof. Carlo Ratti, carloratti asscociati, for ProMexico)

Public uses (4 - 5 story stuctures)
Private uses (4 - 5 story structures)
Tower elements (8 - 12 stories); natural ventilation for block below
Developed public space / squares; key pedestrian routes
New infrastructure pedestrian bridges
Water features former river course (water theme)

| | |
|---|---|
| A | Cathedral |
| B | Teatro Degollado |
| C | Hospicio Cabanas |
| 1 | Food market |
| 2 | Theatre in park |
| 3 | Digital arts institute campus |
| 4 | Digital arts elementary school |
| 5 | Incubator (reuse of hospital) |
| 6 | Sports facilities for workers and residents |
| 7 | Mexican Media Museum and marketing center |
| 8 | Relocated BRT stations (away from park) |
| 9 | Pedestrian bridge over highway |
| 10 | Pedestrian bridge over BRT |
| 11 | N-S pedestrian route and spaces Food, restaurants, shopping |
| 12 | E-W pedestrian route and spaces Food, restaurants, shopping |
| 13 | Neighborhood space |

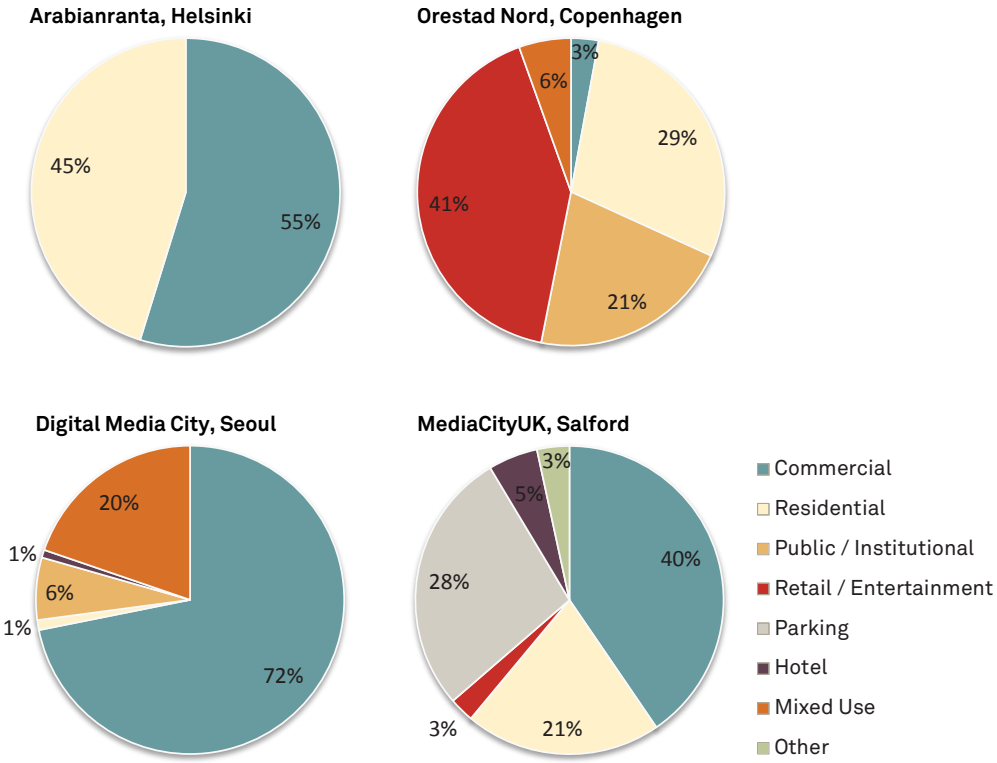
# Ciudad Creativa Digital

In Mexico, the first Latin American development proposed in the New Century City model is now underway. Currently in the initial planning stages, the *Ciudad Creativa Digital* (the Digital Creative City) is a federal initiative to establish, in Guadalajara, *the* global hub for Spanish language media production and distribution. The project represents a major post-industrial development undertaking that has the potential to become a critical precedent for technologically-enhanced sustainable development globally.

Spearheaded by ProMéxico – in collaboration with a number of federal agencies, the city of Guadalajara, and a consultant team (led by Professors Dennis Frenchman and Carlo Ratti, with carloratti associati[SRL], the MIT Senseable City Lab, as well as Accenture and Studio FM Milano) – the Strategic Plan has recently been completed, and the bidding process for the Master Plan is proceeding. Significantly, CCD is unique among NCC projects in three critical ways:

1. its proximity to and focus on augmenting the historic core;
2. the degree of proposed physical integration with the core, and
3. the propsed 'acupunctural' infill of non-contiguous sites over time.

These three elements push CCD beyond prior NCC projects in the degree of integration with and support of the historic urban core. The project thus represents a new evolutionary step in the NCC lineage; one that allows us to envision such projects, not just as one-off initiatives, but as a flexible model for catalytic sustainable development in the developing mid-sized cities of Mexico, and Latin America more broadly.




▲ Figure 61: Comparison of New Century City program distributions, based on available data (by author)

## Lessons and Implications

From the above discussion, and the additional case studies in the Appendix, six critical lessons are apparent:

1. Industry / Development Focus: New Century Cities are, first and foremost, themed industry clusters. This development model works best when the industry focus or theme emerges out of the existing place (that is, when the industry is already present). The development cluster then merely helps consolidate, concentrate, expand, and innovate in an industry or industries which have historically been part of the city. By contrast, attempting to build such industries 'from scratch' in places they don't already exist, can prove challenging, if not impossible.
2. Physical Integration: New Century Cities, in one way or another, seek integration with the structure of the existing city. In the Digital Media City, this principle manifested in the preservation of an existing informal village on the development site; in Milla Digital, it can be seen in the use of a network of public spaces provided as the connective tissue between neighborhoods once separated by former industrial land; at Arabianranta integration took the form of the adaptive reuse of the Arabia ceramic factory. In this effort, development size, scale, and form can be used to help reinforce the existing urban fabric and civic structure. Where physical integration is constrained, it is augmented by transit, or other means.

3. Use Mix: New Century Cities utilize diversification to create a vibrant urban ecosystem. This requires a wide mix of uses, incorporating commercial, residential, civic and institutional spaces and amenities. Perhaps most significantly, after 200 years of separating industry from urban life, New Century City projects attempt to reintegrate industry and commerce into the city.

4. Public Realm: New Century City projects incorporate a rich and interactive public realm that reinforces the sense of place and the industry focus. Spaces work best when they are engaging; facilitating collaboration and community appropriation, as well as linkages between industry and community as in the DMC Digital Media Street, or Milla Digital's Paseo del Agua. New Century Cities also incorporate a digital public realm that parallels the physical public realm, reinforcing the spatial networks with corresponding digital networking capabilities, and vice versa.

5. Narrative: As long-term, multi-phase endeavors, New Century City projects require the weaving of a compelling narrative story that derives from a connection to local culture and the unique qualities of the place – merging heritage with a projective and forward facing vision of the future. This narrative vision often incorporates ideals of urban sustainability (as at Masdar, for example) among other aspects. Such a narrative serves to maintain the project vision over time, through leadership transitions and the shifting of political, economic, and social milieu.

6. Implementation Flexibility: As a matter of pragmatism, the Master Plans in New Century Projects are taken as a starting point, with conceptual direction and strong guiding principles. Yet the development is intended to evolve over time with changes in the industry, market forces, community needs, etc. The challenge then becomes finding the right balance between the clarity and purpose of the overall project vision and the agility of a flexible implementation plan.

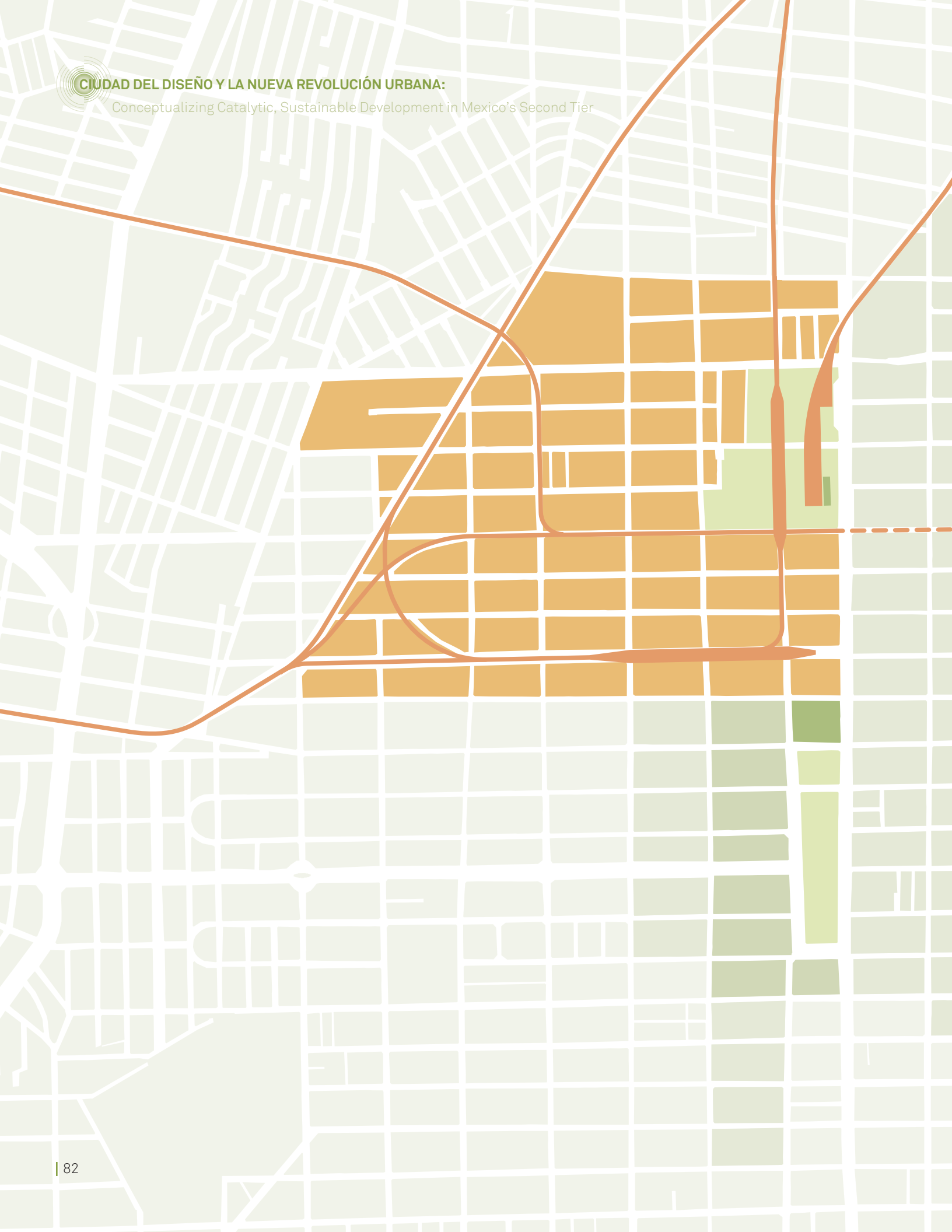
Perhaps most importantly, despite the early theorizations that prophesied the death of the city at the hands of digital technology, New Century City projects reveal the coordinated architecture of the city (of its buildings, streets, public spaces, and associated systems) to be fundamental. Place-making has become a critical element in attracting the globally mobile "creative class" described by Florida (2004). In a world of global competition, the image of the city, indeed the city itself, is once again seen as a competitive asset.

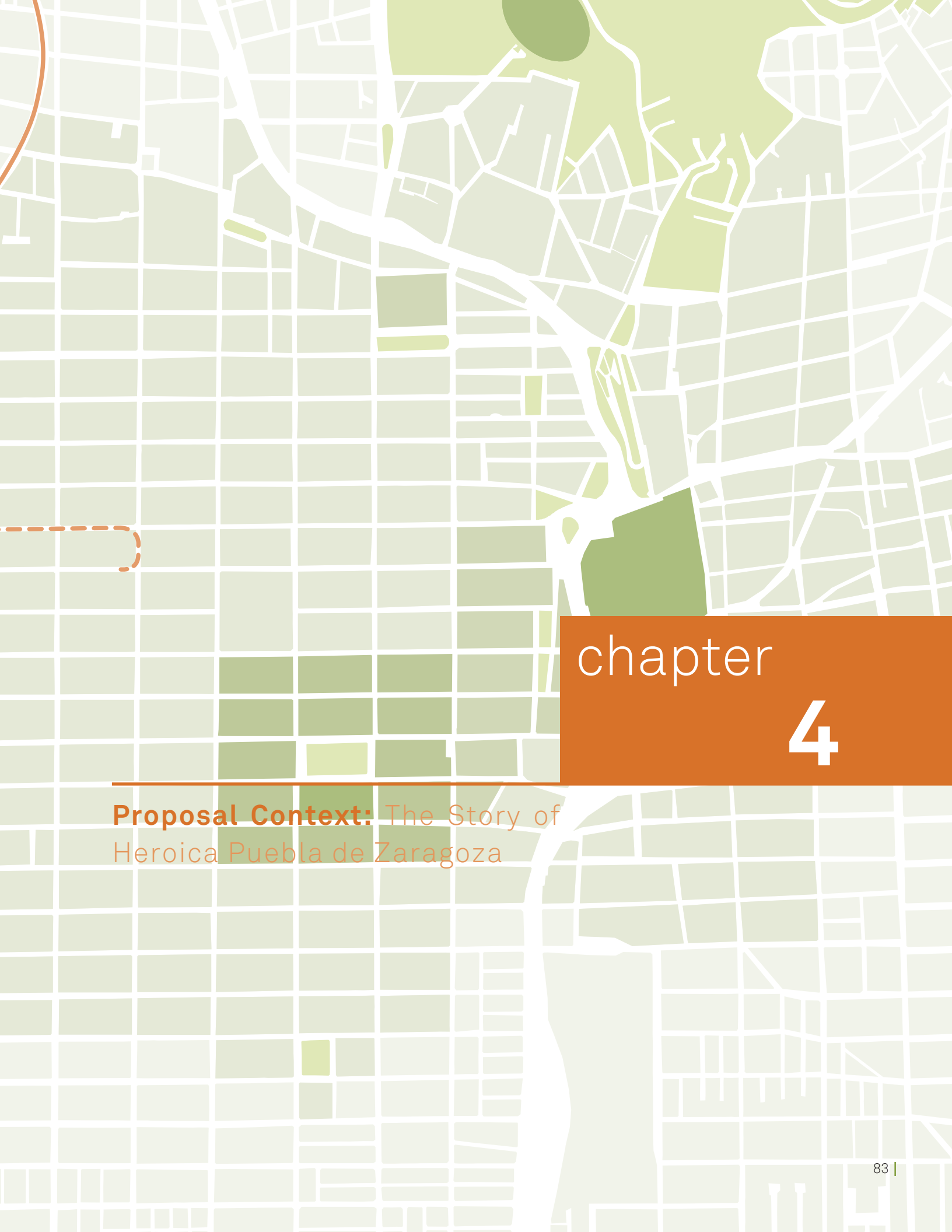
Bearing these lessons in mind, the next chapter turns to a discussion of the story of the City of Puebla, a medium-sized Mexican city working to meet the challenges of the 21st century, compete globally, and improve overall economic opportunity.

## CHAPTER 3 NOTES:

[1] It should be noted that Castells and Hall detail a number of different types of Technopoles (1994, 10-11) which, for the purposes of this discussion, have been consolidated under a single umbrella term.

[2] Producer Services industries include: financial, management, innovation, development, design, technology and communications, among others.





# chapter 4

## **Proposal Context:** The Story of Heroica Puebla de Zaragoza


▲ Figure 62: Map locating the city of Puebla within Latin America (by author).


▲ Figure 63: Map locating the city of Puebla globally (by author).

# The City of Puebla

The City of Puebla (officially *Heroica Puebla de Zaragoza*) is the Capital of the State of Puebla, in the country of México (officially *Estados Unidos de México*). The country's fourth largest city, it is located in the mountain valley of *Cuetlaxcoapan*, approximately 120 kilometers southeast of the Federal District. Surrounded by the dramatic snow-capped Popocatépetl, Iztaccíhuatl, and la Malinche volcanoes to the West and North, the Sierra de Azmoc range to the East, and Lake Valsequillo to the South, the city lies along a strategic route connecting the Capital to the vital Port of Veracruz. As a result of the altitude of Mexico's central valley (nearly 2,200m), the region is characterized by a favorable subtropical highland climate, featuring pleasant temperatures nearly year-round.

Close proximity to Ciudad de México, and a regionally central location, has allowed Puebla to develop strong connections both locally and globally. Served directly by Hermanos Serdán International Airport, and with convenient business-class express bus connections from Benito Juarez International Airport, the center of Puebla is easily accessible from nearly 100 cities in over 20 countries. Moreover, the city's position along Mexican Federal Highway 150 has allowed it to maintain its status as a regional hub, with connections to Oaxaca, Tlaxcala, Cuernavaca, Veracruz and other nearby towns.

## CITY FOUNDING

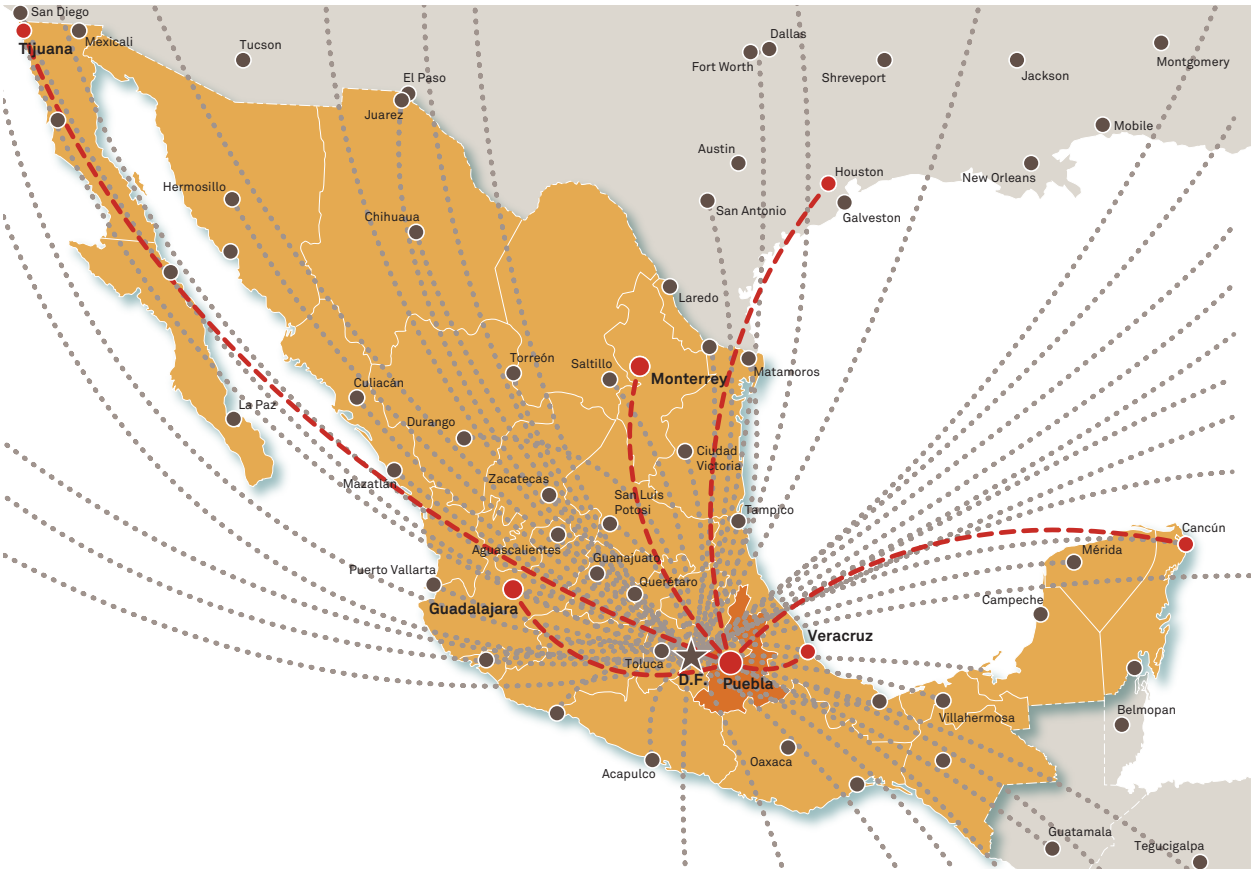
Puebla's strategic location is indeed its historic *raison d'être*. Located in between of two of the main indigenous settlements, Tlaxcala (to the North) and Cholula (to the West), the area was uninhabited at the time of the Spanish Conquest. Although historic accounts of the city's founding vary by source (Velez-Pliego, 2007; 49-50) the archetypal story begins in 1530 with

| Puebla | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sept. | Oct. | Nov. | Dec. | Year |
| Average High (°C \| °F) | 17 \| 63 | 18 \| 64 | 21 \| 70 | 23 \| 72 | 22 \| 72 | 21 \| 70 | 20 \| 68 | 20 \| 68 | 20 \| 68 | 19 \| 66 | 19 \| 66 | 17 \| 63 | **20 \| 68** |
| Daily Mean (°C \| °F) | 13 \| 55 | 14 \| 57 | 16 \| 61 | 18 \| 64 | 18 \| 64 | 17 \| 63 | 17 \| 63 | 17 \| 63 | 16 \| 61 | 15 \| 59 | 14 \| 57 | 13 \| 55 | **16 \| 61** |
| Average Low (°C \| °F) | 8 \| 46 | 9 \| 48 | 11 \| 52 | 13 \| 55 | 13 \| 55 | 13 \| 55 | 13 \| 55 | 13 \| 55 | 13 \| 55 | 11 \| 52 | 10 \| 50 | 8 \| 46 | **11 \| 52** |
| Precipitation (mm) | 0 | 0 | 10 | 20 | 70 | 160 | 140 | 140 | 140 | 60 | 20 | 0 | **770** |
| Wind (knots \| direction) | 7 \| S | 7 \| S | 7 \| S | 7 \| S | 6 \| S | 6 \| S | 5 \| SSE | 5 \| SSE | 6 \| S | 7 \| NNW | 6 \| S | 6 \| S | **6 \| S** |

▲ Figure 64: Climate of Puebla (by author). Data from weatherunderground.com.

| Global Connections to Puebla | | | |
|---|---|---|---|
| **Hermanos Serdán Int'l Airport, Puebla (PBC)** | **Aeropuerto Internacional de la Ciudad de México Benito Juárez (AICM)** | | |
| | **Domestic** | | |
| Guadalajara, México | Acapulco, México | Ixtapa/Zihuatanejo, México | Puerto Escondido, México |
| Monterrey, México | Aguascalientes, México | La Paz, México | Puerto Vallarta, México |
| Tijuana, México | Campeche, México | Lázaro, México | Reynosa, México |
| Veracruz, México | Cancún, México | Leon/El Bajío, México | Saltillo, México |
| Houston, Texas (USA) | Cárdenas, México | Los Mochis (Sinaloa), México | San Jose del Cabo, México |
| | Chetumal, México | Manzanillo, México | San Luis Potosí, México |
| | Chihuahua, México | Matamoros, México | Tampico, México |
| | Ciudad del Carmen, México | Mazatlán, México | Tapachula, México |
| | Ciudad Juarez, México | Mérida, México | Tepix, México |
| | Ciudad Obregón, México | Mexicali, México | Tijuana, México |
| | Ciudad Victoria, México | Minatitlán/Coatzacoalcos, México | Torreón/Gómez, México |
| | Colima, México | Monterrey, México | Tuxtla Gutierrex (Chiapas), México |
| | Culiacán, México | Morelia, México | Veracruz, México |
| | Durango, México | Nuevo Laredo, México | Villahermosa, México |
| | Guadalajara, México | Oxacaca, México | Xalapa, México |
| | Hermosillo, México | Piedras Negras, México | Zacatecas, México |
| | Huatulco, México | Poza Rica, México | |
| | **International** | | |
| | Amsterdam, Netherlands | Las Vegas, Nevada (USA) | Phoenix, Arizona (USA) |
| | Atlanta, Georgia (USA) | Lima, Peru | Salt Lake City, Utah (USA) |
| | Bogotá, Columbia | London, United Kingdon | San Antonio, Texas (USA) |
| | Buenos Aires, Argentina | Los Angeles, California (USA) | San Diego, California (USA) |
| | Caracas, Venezuela | Madrid, Spain | San Francisco, California (USA) |
| | Charlotte, North Carolina (USA) | Mérida, Colombia | San José, Costa Rica |
| | Chicago, Illinois (USA) | Miami, Florida (USA) | San Pedro Sula, Honduras |
| | Dallas-Ft. Worth, Texas (USA) | Montréal-Trudeau, Canada | San Salvador, El Salvador |
| | Denver, Colorado (USA) | New York-JFK, New York (USA) | Santiago, Chilé |
| | Detroit, Michigan (USA) | Oakland, California (USA) | São Paulo, Brazil |
| | Frankfurt-Munich, Germany | Ontario, Canada | Shanghai, China |
| | Fresno, California (USA) | Orlando, Florida (USA) | Tokyo, Japan |
| | Guatamala City, Guatamala | Panama City, Panama | Toronto, Canada |
| | Havana, Cuba | Paris-CDG, France | Washington, D.C. (USA) |
| | Houston, Texas (USA) | | |

▲ Figure 65: Global connections to Puebla (by author).




▲ Figure 66: Global Flights to Puebla (by author)

a letter from the Bishop of Tlaxcala, Friar Julian Garces, to Queen Isabella of Spain, detailing the need for a Spanish settlement between the Capital of the colonies and the critical Port of Veracruz, by which the bounty of the New World was transported to the seat of the empire (http://puebla.travel/destinos/acerca-de-puebla/puebla.html). According to legend, the bishop later had a dream, wherein he envisaged a fertile valley with woods and meadows crossed by a river. While contemplating the landscape, Angels descended from heaven and traced out a city. Certain he had experienced a divine revelation, the Bishop went in search of the place. Thirty kilometers south of the monastery he declared discovery of the blessed location from his vision– naming the settlement *Puebla de los Angeles* (or City of the Angles).

Franciscan friar Toribio de Benavente was then commissioned with the task of establishing the village. The original area chosen was a site on the east bank of the San Francisco River, bounded by the hills Loreto and Guadalupe. There, the first Mass was celebrated on April 16, 1531 – now accepted as the official date of the city's founding. However, heavy rain and unpredictable flooding of the river threatened the nascent settlement, and a new site on the west bank of the San Francisco River was chosen in 1532 (www.elclima.com.mx/fundacion_e_historia_de_puebla.htm). In accordance with the Law of the Indies, the city was organized around the Plaza Mayor (now called the Zocalo) and the Cathedral – construction of which began in 1536 and concluded in 1649. The urban grid was oriented approximately thirty degrees off the cardinal axis, aligning


▲ Figure 67: Connections to Puebla via Mexican Highway system (by author).

instead with routes connecting neighboring settlements: Cholula and Mexico City to the northwest, Veracruz to the southeast, Tlaxcala to the northeast.

## COLONIAL ERA

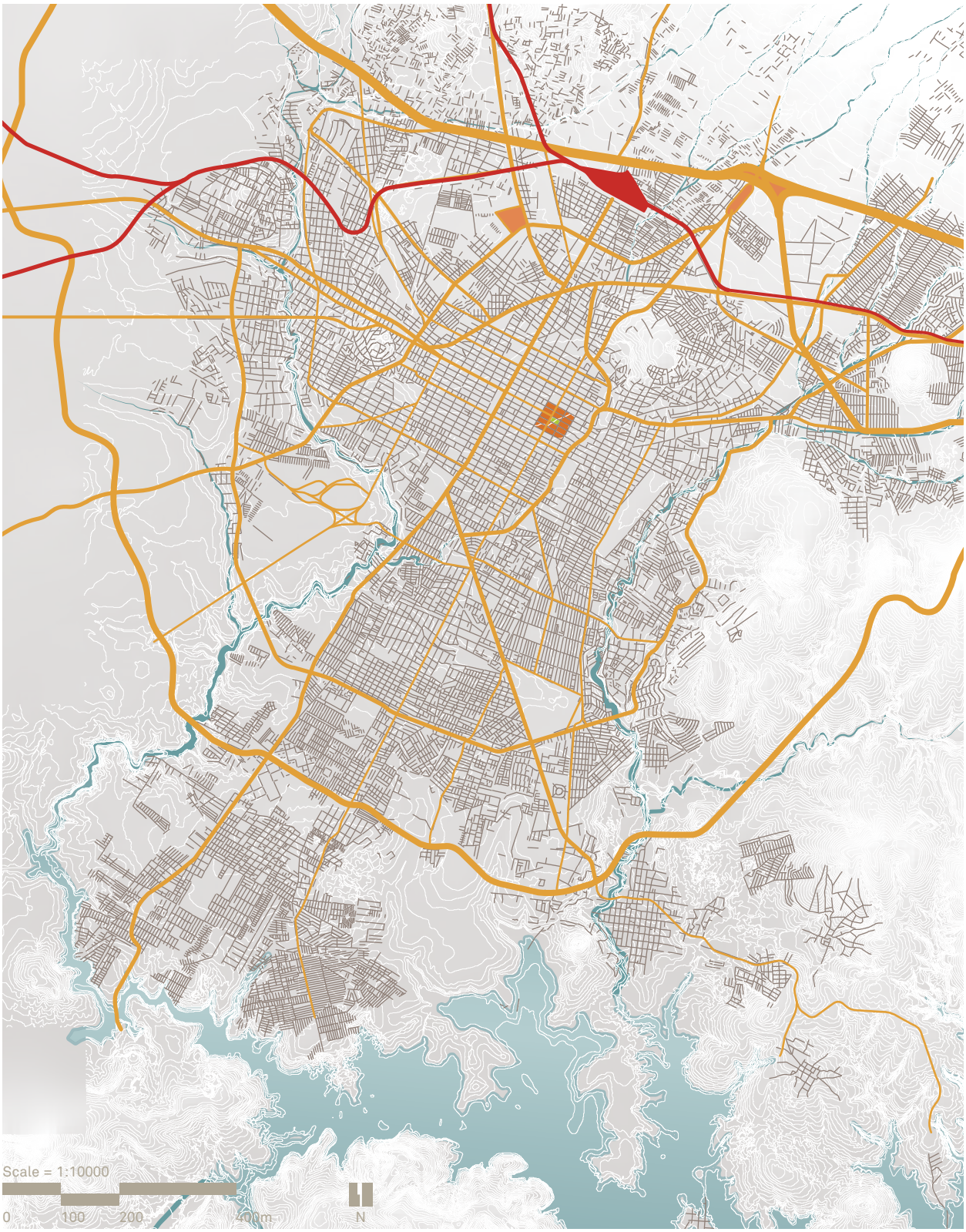
Founded originally as a settlement for Spanish immigrants under the Encomienda system (as opposed to a site dedicated to the religious conversion of native inhabitants) the city grew to become the second largest settlement in the colonies, and one of the most important centers for trade in New Spain. Mills were installed on the banks of the Atoyac and Alseseca rivers to fuel agriculture and industry. Under the colonial mercantilist economy, minerals and other resources were exported at low prices to Spain, which then processed the raw materials and sent the (more expensive) finished goods back to the colony. This system inhibited development of domestic manufacturing, maintained Spanish monopoly over industry, and reinforced colonial dependence on Spain. However, as the colony matured, and as a new class of Mexican-born land-owners amassed wealth, demand from the emerging elite expanded. Subsequent conflicts in Europe between the Spanish, French and English disturbed the supply chain, inhibiting reliable distribution, and driving a boom in local textile production. By the last decades of the Empire, Puebla had become a leading producer of cotton cloth, and a center for fashion, supplying the expanding colonial market. As an example, one historian reports that by 1604 there were about twenty-five textile mills in the Mexico City that produced fabrics

▲ Figure 68: The dramatic Cathedral of Puebla at night (photo by author).

(some high quality, but others quite crude); while in Puebla there were 35 of the largest and best mills of the viceroyalty (Velez Pliego, 2007; 58-59). Over the course of the 17th and 18th centuries, the economy diversified. Production of soap, leather, wood furniture, glass and ceramics (namely Talavera pottery, tile and architectural ornamentation) also flourished (Velez Pliego, 2007; 59-62). Puebla became a critical center of trade between Europe, the New World and the far East, and a hub of colonial wealth – home to the country estates of both peninsulare and creole elite outside the capital. (http://www.pueblacapital.gob.mx/wb/pue/historia)

## POST-INDEPENDENCE

Yet, encumbered first by the restrictions of the mercantilist system, and later by the turmoil of revolution (1810), the ensuing struggle for power, multiple health epidemics (1812, 1833, and 1850) and military conflicts with the United States (1848) and France (1862 and 1863-1866), Puebla grew slowly and consistent expansion of both population and industry was limited. A map of the settlement in 1900 shows a relatively compact urban footprint, not much larger than it had been two centuries prior. Following the conflict with France in the 1860s, and under the Porfiriato (1876 to 1910), multiple rail lines were introduced, further solidifying the city's role as an important regional hub; the city and its industries grew. The Mexicano and Interoceánico train stations




▲ Figure 69: Road structure of Puebla today (by author).

▲ Figure 70: Photo of the Zocalo, Puebla's historic central plaza (by author)

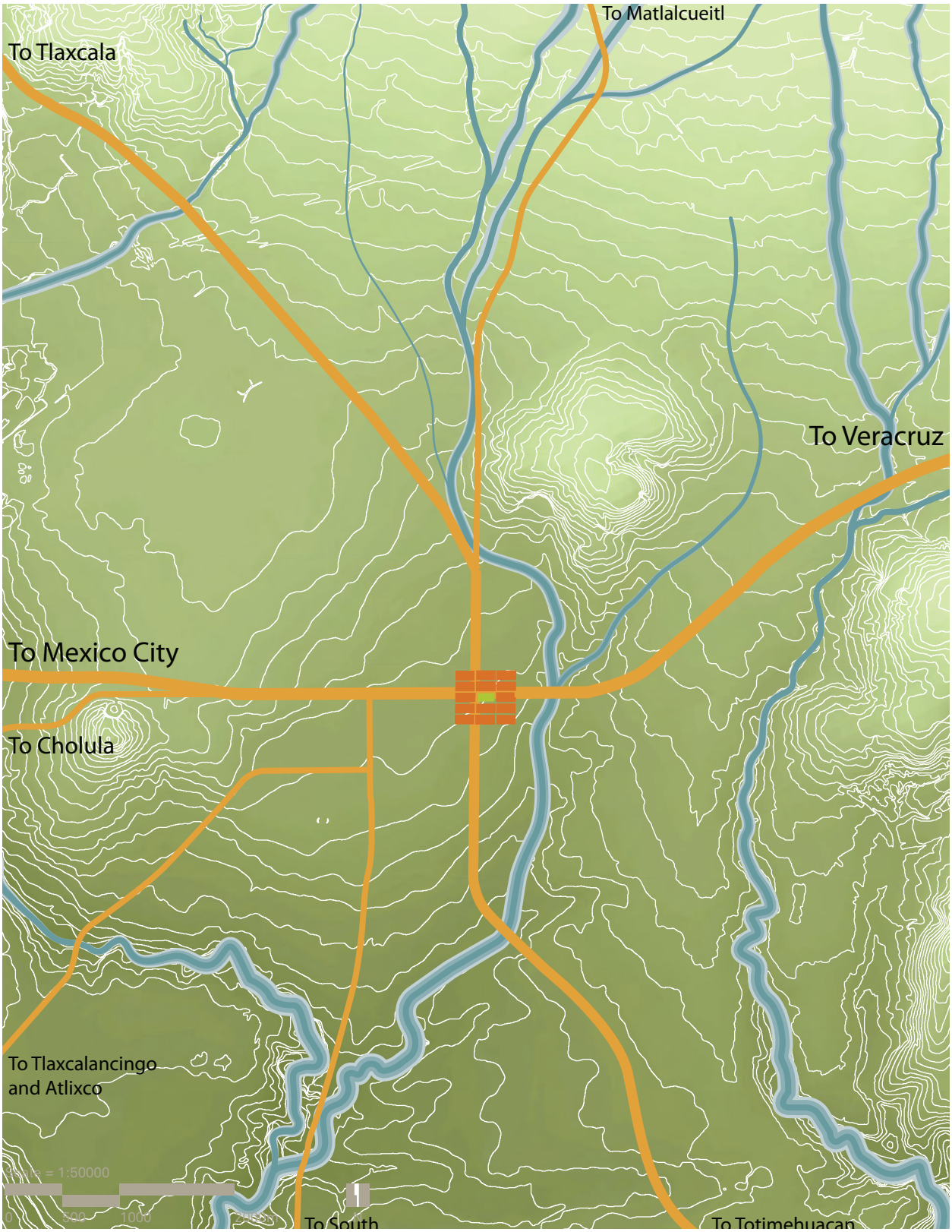
were constructed on the western edge of the city in 1869 and 1888, respectively; and telecommunications, sewage and potable water lines were installed as well (Velez Pliego, 2007; 65).

## 20TH CENTURY

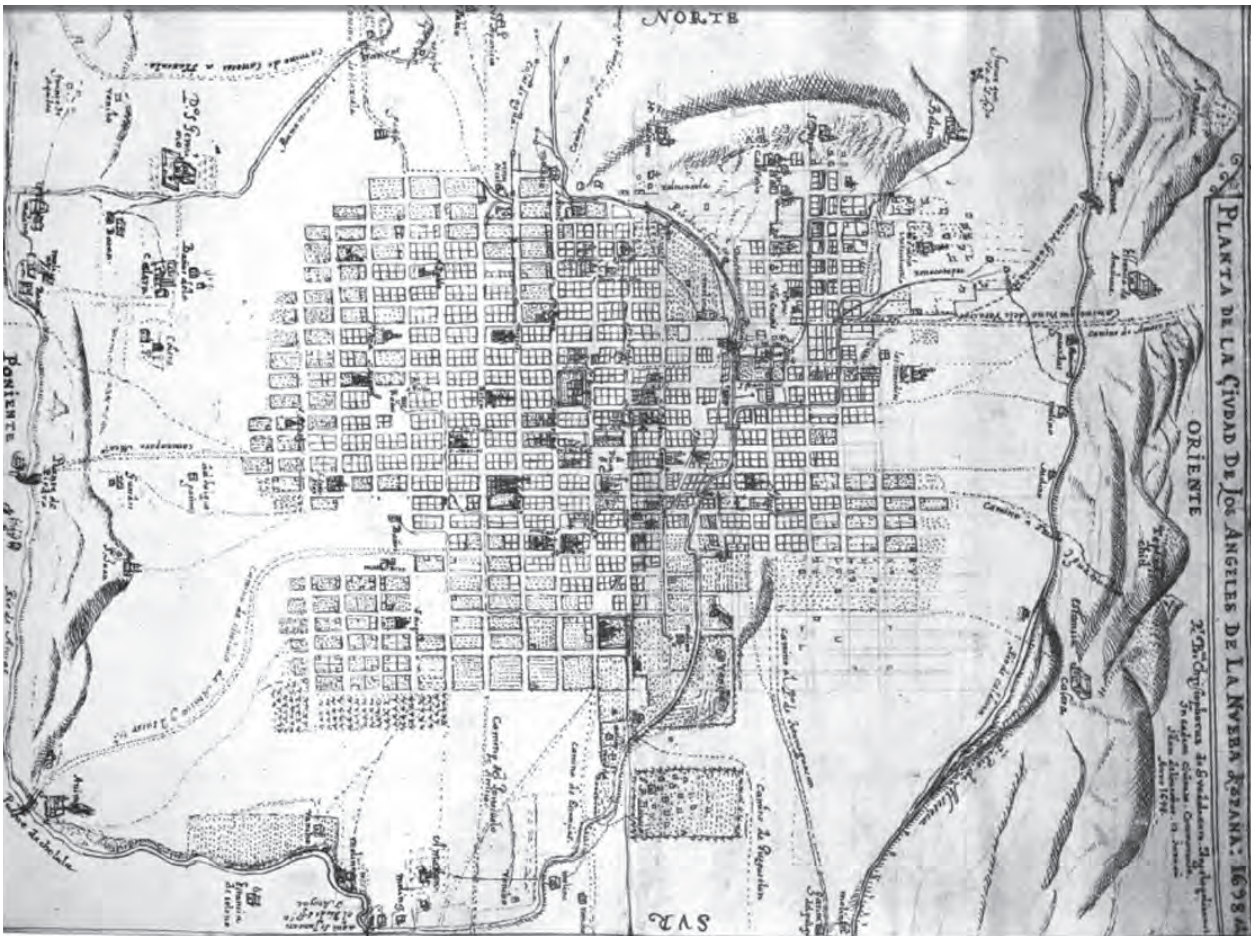
After 1900, the city began to expand outward, from six square kilometers in area at the turn of the century to 10 square kilometers by 1930. On the eve of the 1910 revolution, Puebla was well-positioned economically and infrastructurally; but wars at home and abroad again deterred large scale industrial consolidation and expansion. Following WWII, the federal modernization effort focused on strategic development of the Capital city, draining population and resources out of the hinterland. Nevertheless, during this time, Puebla continued to expand; from a population of 230,000 in 1950 to nearly

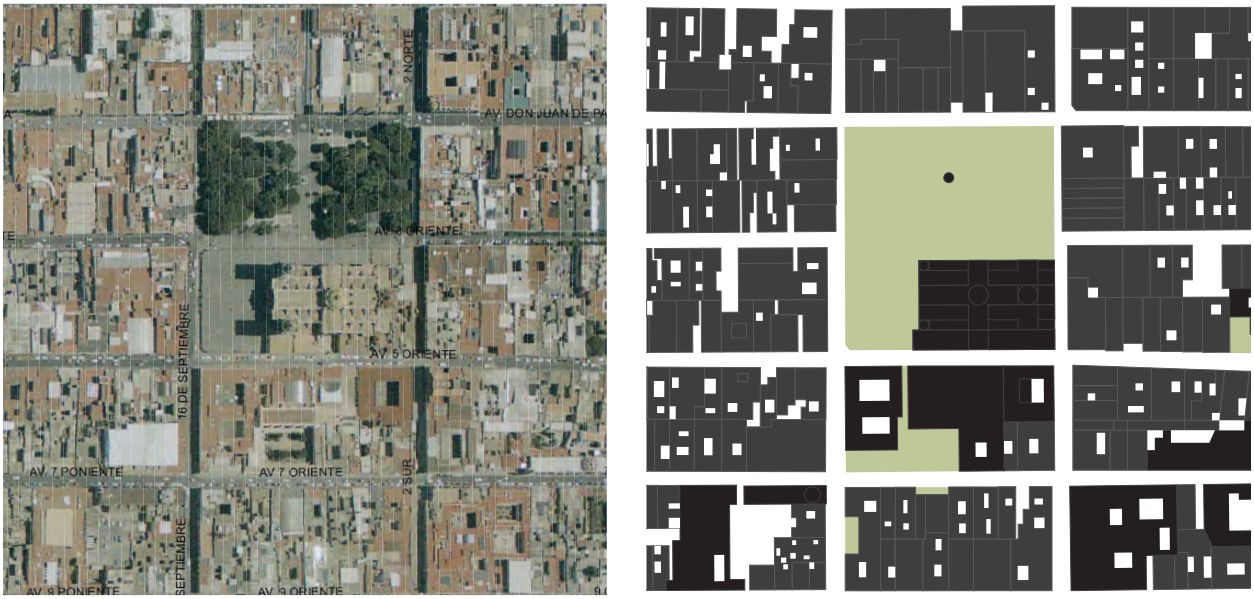
| YEAR | POPULATION |
|---|---|
| 1532 | 3,160 |
| 1550 | 18,250 |
| 1678 | 69,800 |
| 1746 | 50,366 |
| 1777 | 71,366 |
| 1793 | 56,859 |
| 1802 | 67,800 |
| 1825 | 44,756 |
| 1835 | 40,000 |
| 1854 | 84,000 |
| 1869 | 60,000 |
| 1870 | 65,000 |
| 1876 | 76,817 |
| 1878 | 72,743 |
| 1887 | 105,000 |
| 1888 | 78,530 |
| 1895 | 88,674 |
| 1900 | 93,521 |
| 1910 | 96,121 |
| 1921 | 95,535 |
| 1930 | 114,793 |
| 1940 | 148,701 |
| 1950 | 234,603 |
| 1960 | 289,140 |
| 1970 | 401,603 |
| 1980 | 772,908 |
| 1990 | 1,007,170 |
| 2000 | 1,271,673 |

▲ Figure 71: Estimated population of the City of Puebla, 1532-2000 (by author). Prior to the 20th century, the city experience periods of uneven growth and decline. This was followed by a period of rapid expansion after WWII (Source: Vélez Pliego, 2007; pages 60 and 68). As of 2010, the United Nations estimates the larger urban agglomeration of Puebla to have approximately 2.3 million people (United Nations, 2010).

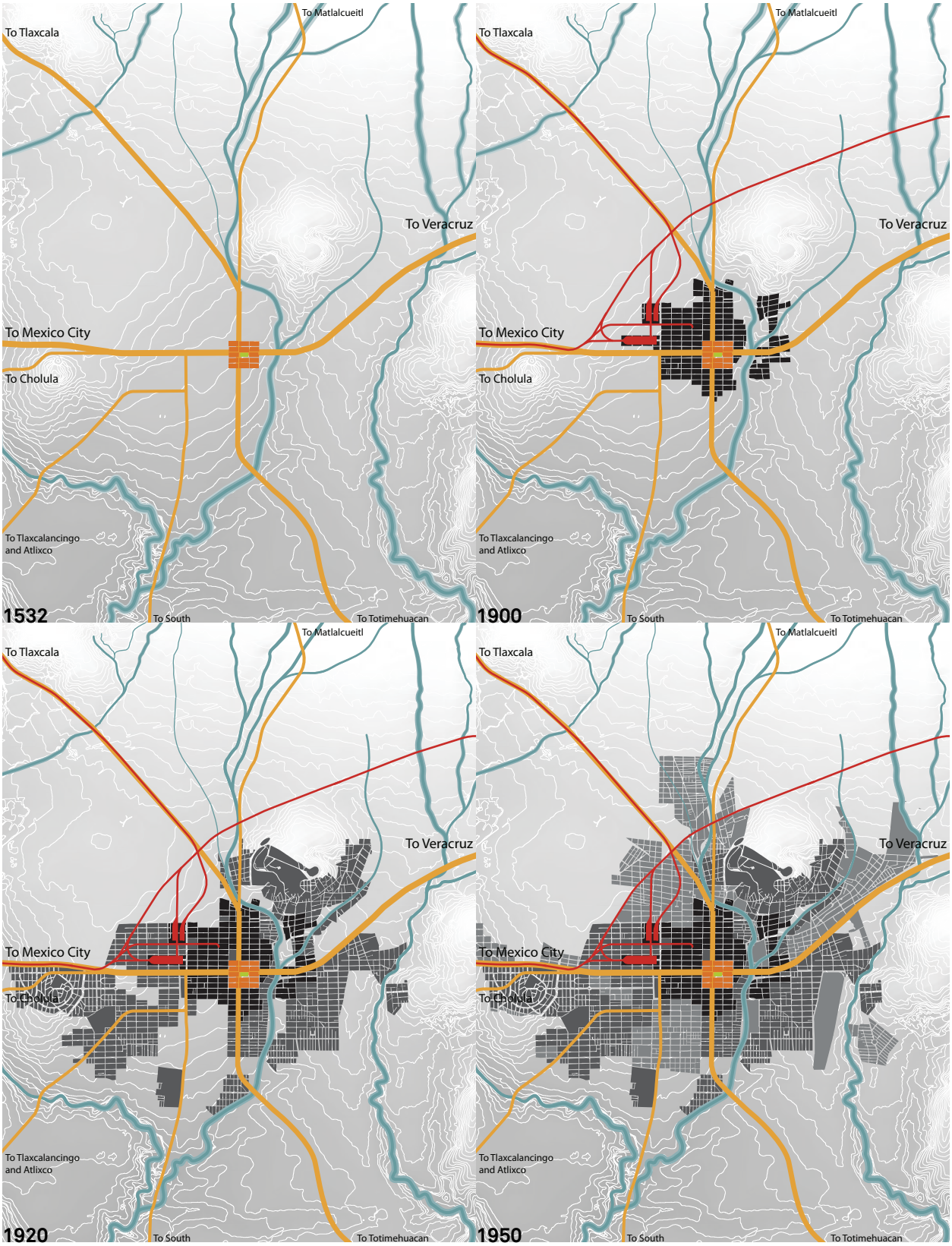


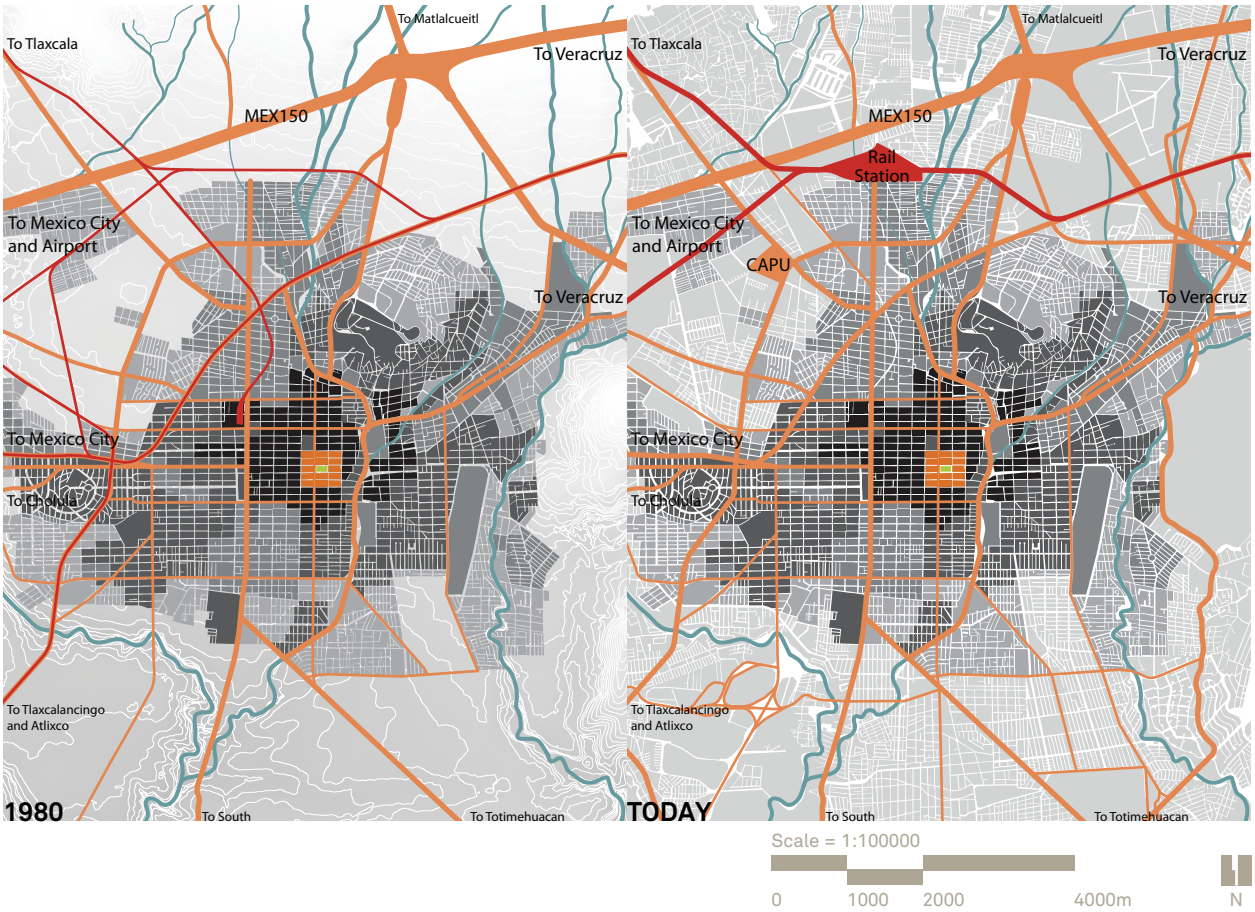

▲ Figure 72: Geography of Puebla at founding. The second, and final, location of the city is on a relatively flat plain near the bank of the Rio San Francisco (by author):



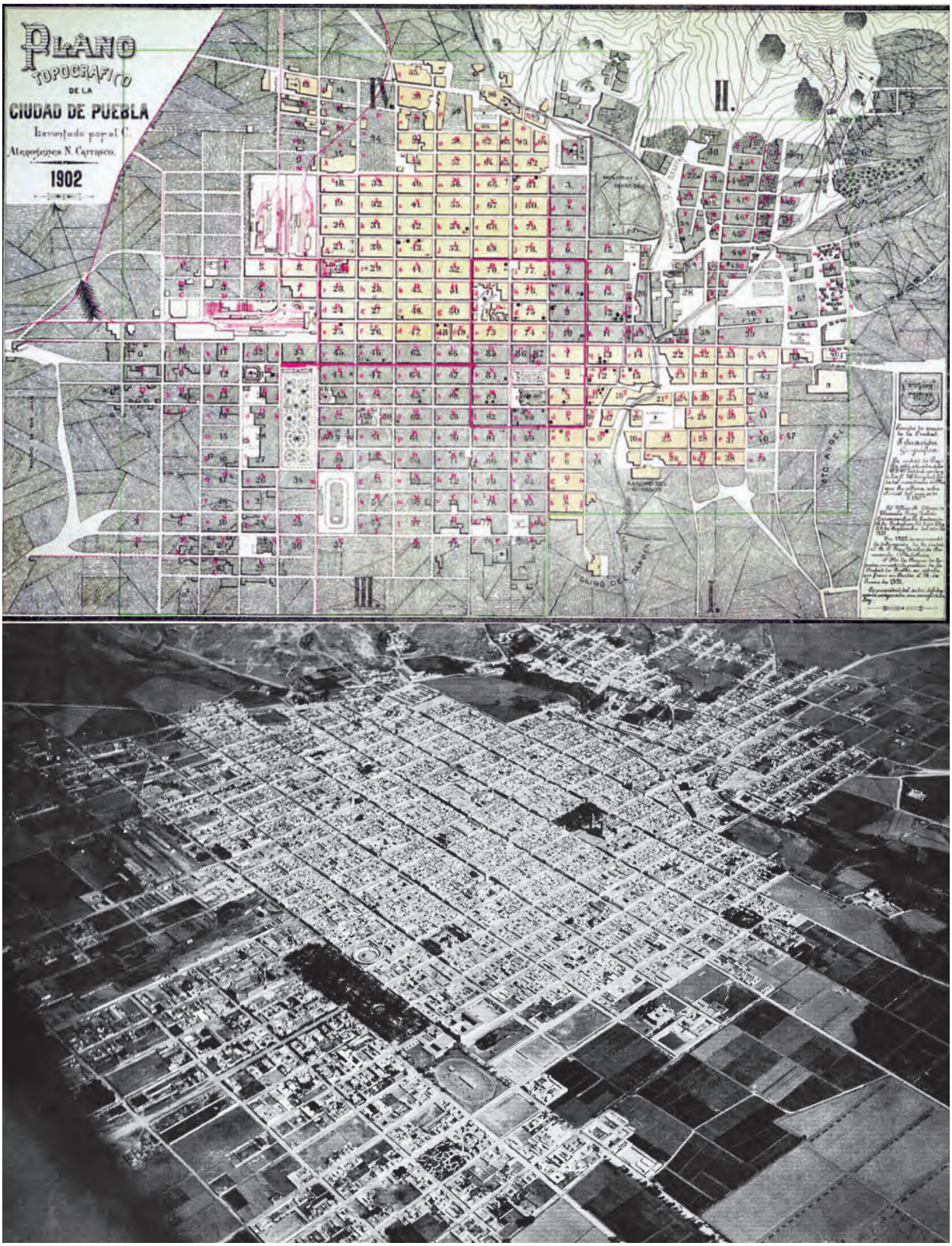




▲ Figure 73 (top): Map of Puebla in 1698 (http://www.fotosdepuebla.org). Figure 74 (bottom): Aerial photo and figure-ground drawing of Puebla's central plaza and cathedral (Aerial from Google Earth; figure ground by author).

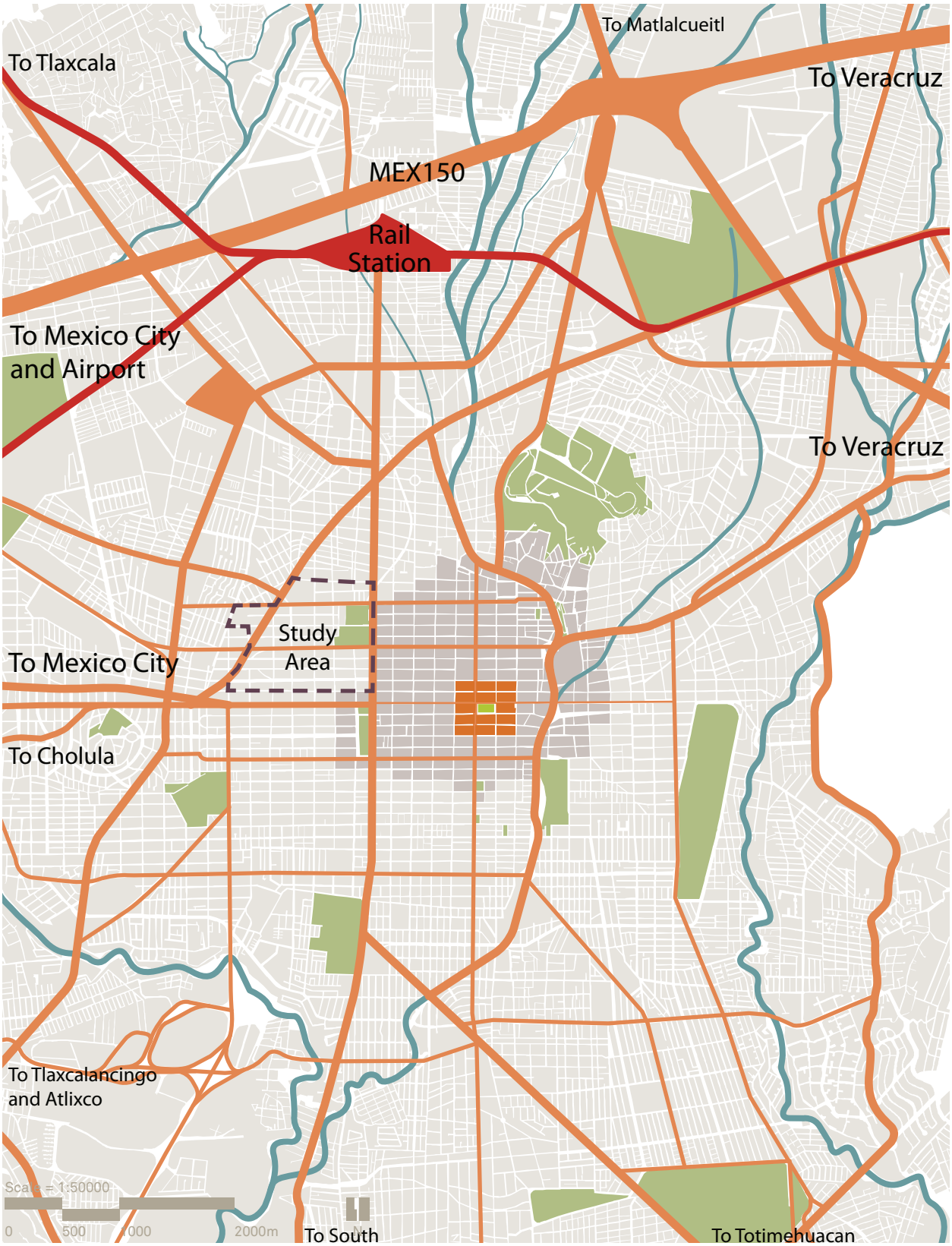

To Matlalcueitl
To Tlaxcala
To Veracruz
To Mexico City
To Cholula
To Tlaxcalancingo
and Atlixco
1532
To South
To Totimehuacan
To Matlalcueitl
To Tlaxcala
To Veracruz
To Mexico City
To Cholula
To Tlaxcalancingo
and Atlixco
1900
To South
To Totimehuacan
To Matlalcueitl
To Tlaxcala
To Veracruz
To Mexico City
To Cholula
To Tlaxcalancingo
and Atlixco
1920
To South
To Totimehuacan
To Matlalcueitl
To Tlaxcala
To Veracruz
To Mexico City
To Cholula
To Tlaxcalancingo
and Atlixco
1950
To South
To Totimehuacan



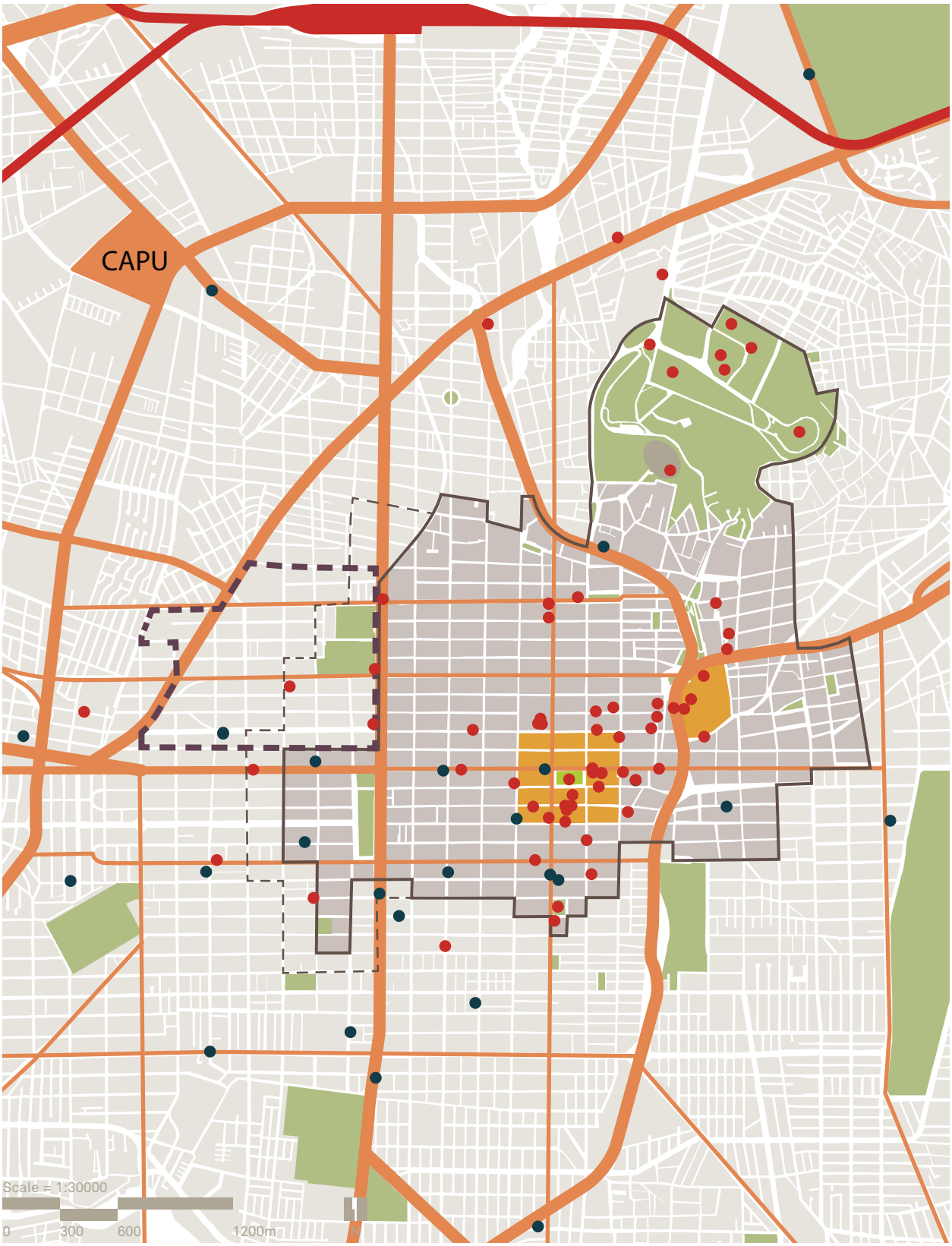

▲ Figure 75: Left and Above, an approximation of the growth of Puebla over time. The city was founded in a historically strategic location along a critical trade route between Mexico City and Port of Veracruz, as well as other neighboring settlements. Founded as a city of Spanish commerce and industry, the original settlement was modest, and grew slowly. Rail lines were first introduced in late 1860s and expanded through the end of the 19th century. Yet due to disease and military conflicts, the city witnessed uneven growth up through the turn of the 20th Century. With the push for industrialization post-WWII, the city began to grow outward. Highways and major arterials were added in 1960s and the city began to sprawl rapidly. The San Francisco was river tunnelized and the central rail station relocated to northern edge of the city. Puebla's City Center designated a World Heritage Site in 1987 (by author).




▲ Figure 76 (top): Map of Puebla in 1902 (http://www.fotosdepuebla.org). Figure 77 (bottom): Aerial photo of Puebla in 1910 (http://www.fotosdepuebla.org).




▲ Figure 78: Puebla today (by author).




▲ Figure 79: Location map of Historic Landmarks (red dots) and Educational Institutions (blue dots). By author:


▲ Figure 80: Photo of an artisan plaza in central puebla (by author).

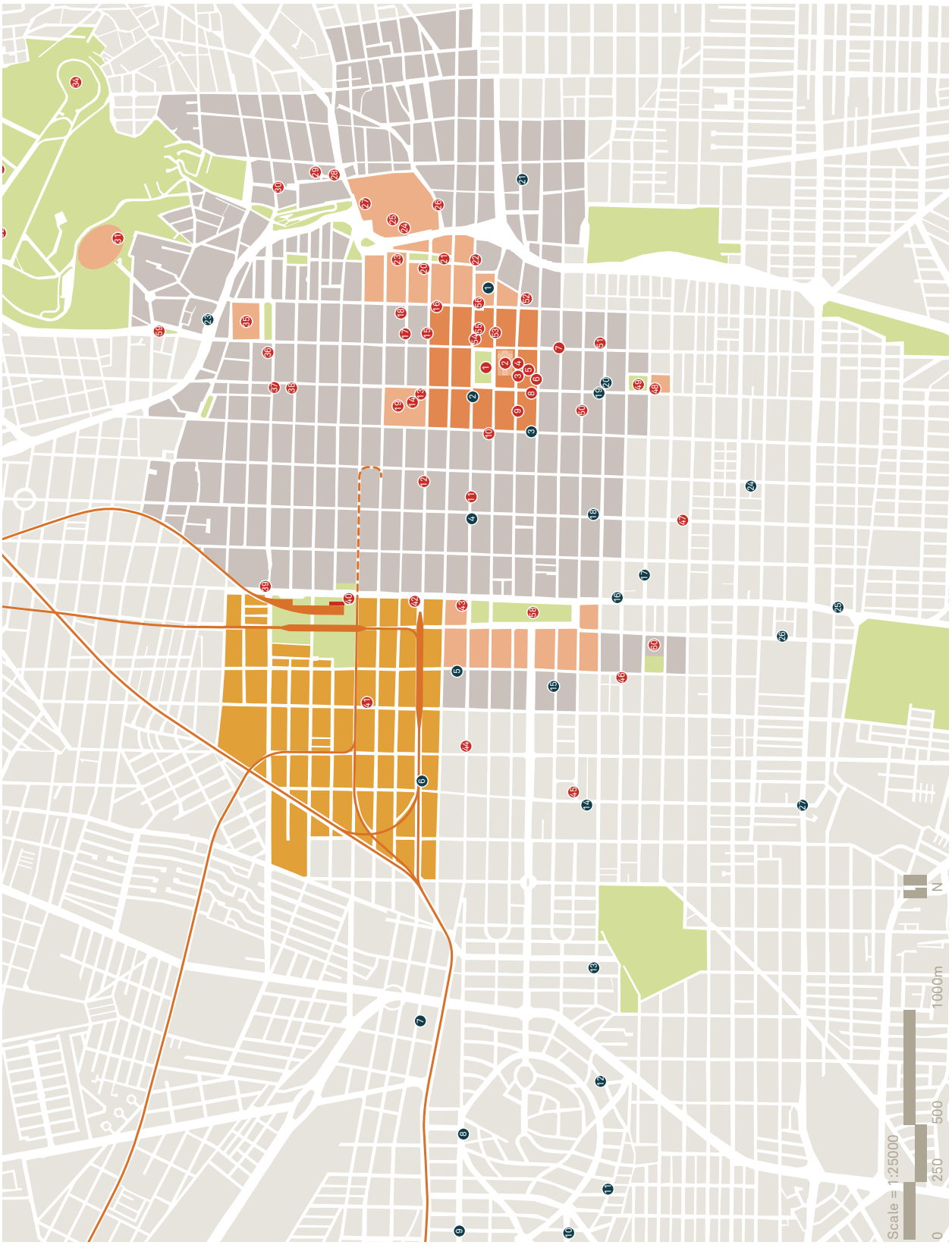
1.3 million in 2000. The construction of the Mexico-Puebla highway in 1962, the undergrounding of the San Francisco river, and the proliferation of major arterials facilitated further expansion. Population growth was accompanied by further economic diversification in the city and its adjoining region. To the traditional industries of pottery, glass, furniture, blacksmithing, tanning, silver and textiles (some of these now waning) the city added modern industries, including: automotive, chemical, electronics and other various export-oriented services. In addition, the city and its region developed and sustained an important role in the supply of tourism, cultural and educational services (Velez Pliego, 2007; 97).

As such, despite centuries of asymmetrical modernization, the city today is not lacking in assets. Puebla boasts the largest number of educational institutions and the second largest student population in the country.

International recognition of its rich and dramatic urban and architectural heritage culminated in the city's establishment as a UNESCO World Heritage Site in 1987. Abundant attractions, world famous Poblano cuisine, and an ever-present culture of craft attracts tourists globally – further bolstered by the recent completion of a new 10,000m2 convention center, hotel and shopping complex in 2007.

## PUEBLA IN THE 21ST CENTURY

Nevertheless, if Puebla is to continue to compete successfully on the world stage, there is still much to do. No doubt aware of this fact, the city is in the process of implementing a number of infrastructure upgrades, including the expansion of the airport, roadway improvments, and the proposed introduction of a number of BRT routes. In addition, in mid-February of this year, the city made public new plans for


N
1000m
500
250
0
Scale = 1:25000

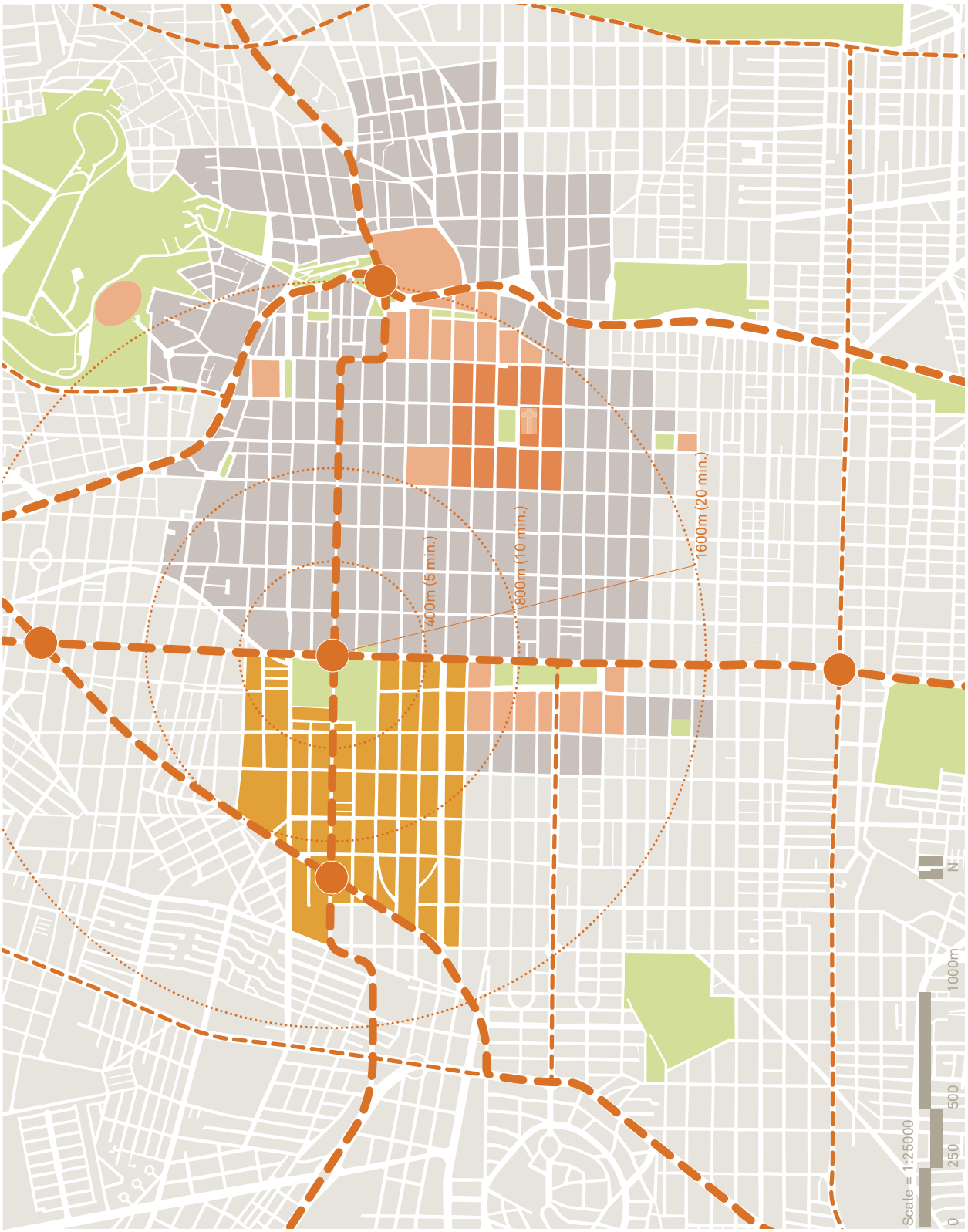
1. Puebla Zocalo
2. Puebla Cathedral
3. Biblioteca Palafoxiana
4. Casa de la Cultura
5. Oficina del Turismo
6. Museo E. Cortéz Juárez
7. Museo Amparo
8. Casa del Deán
9. Museo de Reliquias
10. Museo Bello y González
11. Librerías de Cristal
12. Museo del Ejercito
13. Iglesia Santo Domingo
14. Capilla del Rosario
15. Museo de la Revolución
16. Museo de San Pedro
17. Casa Hermanos Serdán
18. Iglesia de San Cristobal
19. Mercado la Victoria
20. Casa de Alfeñique
21. Mercado de Artisanas
22. Instituto de Artesanías
23. Teatro Principal
24. Centro de Convenciones
25. La Purificadora
26. Cinemex Puebla
27. Iglesia Fransciscano
28. Casa Aguayo
29. Iglesia Santa Cruz
30. Jose Maria Yermo y Parres
31. Estadio Olympico
32. Auditorio de la Reforma
33. Planetario
34. Fuerte de Guadalupe
35. IMSS M.A. Camacho
36. Iglesia de San Jose
37. Templo de Santa Monica
38. Museo de Arte Religioso
39. HJ Exhibit Muebles S.A.
40. Museo de Ferrocarril
41. Iglesia de San Miguel
42. Mercado Gastronomico
43. Iglesia de Guadalupe
44. Centro Cultural Poblano
45. Museo UPAEP
46. Museo de Automovil
47. Comercial Mexicana
48. Templo del Carman
49. Jardín del Carmen
50. Patio de los Azulejos
51. Iglesia de la Soledad
52. Plazuela de los Sapos
53. Secretaria de Cultura
54. Palacio Municipal
55. Museo Universitario
56. Iglesia de la Compañia
57. Edificio Carolino
58. Paseo Bravo
59. Portada de Loreto
60. Iglesia de Santiago

1. Benemérita Universidad Autónoma de Puebla (BUAP)
2. Escuela Profesional de Diseño de Modas
3. Universidad del Siglo XXI
4. Universidad Alba Edison A.C.
5. Instituto de Estudios Superiores Empresas de México
6. Instituto de Estudios Universitarios
7. Institutos de Estudios Superiores en Ingeniería
8. Instituto Culinario de México
9. Universidad de la Sierra, A.C.
10. Universidad Politécnica Hispano México, A.C.
11. Instituto de Arte, Decoracion y Diseño S.C.
12. El Colegio de Puebla
13. Universidad del Desarrollo del Estado de Puebla
14. Universidad Popular Autónoma del Estado de Puebla
15. Universidad Popular Autónoma del Estado de Puebla
16. Escuela Libre De Diseño Y Artes Bauhaus, A.C.
17. Colegio Nacional
18. Escuela de Comunicación y Ciencias Humanas
19. Instituto Franklin D. Roosevelt A.C.
20. Escuela Libre de Derecho de Puebla
21. Instituto Universitario Carl Rogers A.C.
22. Instituto de Estudios Superiores Arquitectura y Diseñc
23. Instituto de Artes Visuales del Estado
24. Universidad Politécnica Hispano Mexicana
25. DASC Instituto Tecnológico Universitario
26. Facultad de Medicina BUAP
27. Escuela en Diseño de Moda Revolución

◄▲ Figure 81: Location map of Historic Landmarks (red dots) and Educational Institutions (blue dots) in central Puebal (by author).



◄▲ Figure 82 (above and left): Photos of central Puebla (by author). The city has grown into a locus of wealth, knowledge, art and culture.

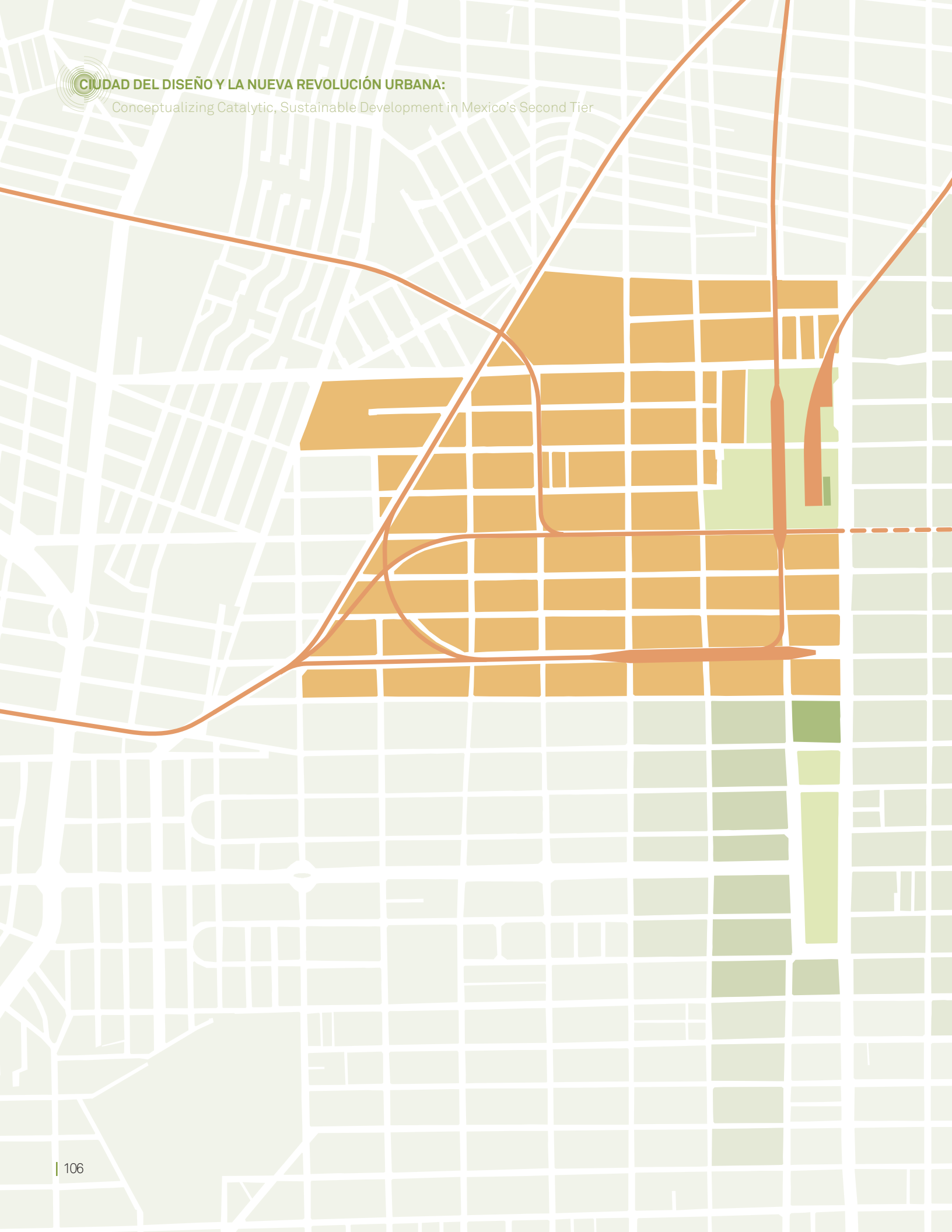


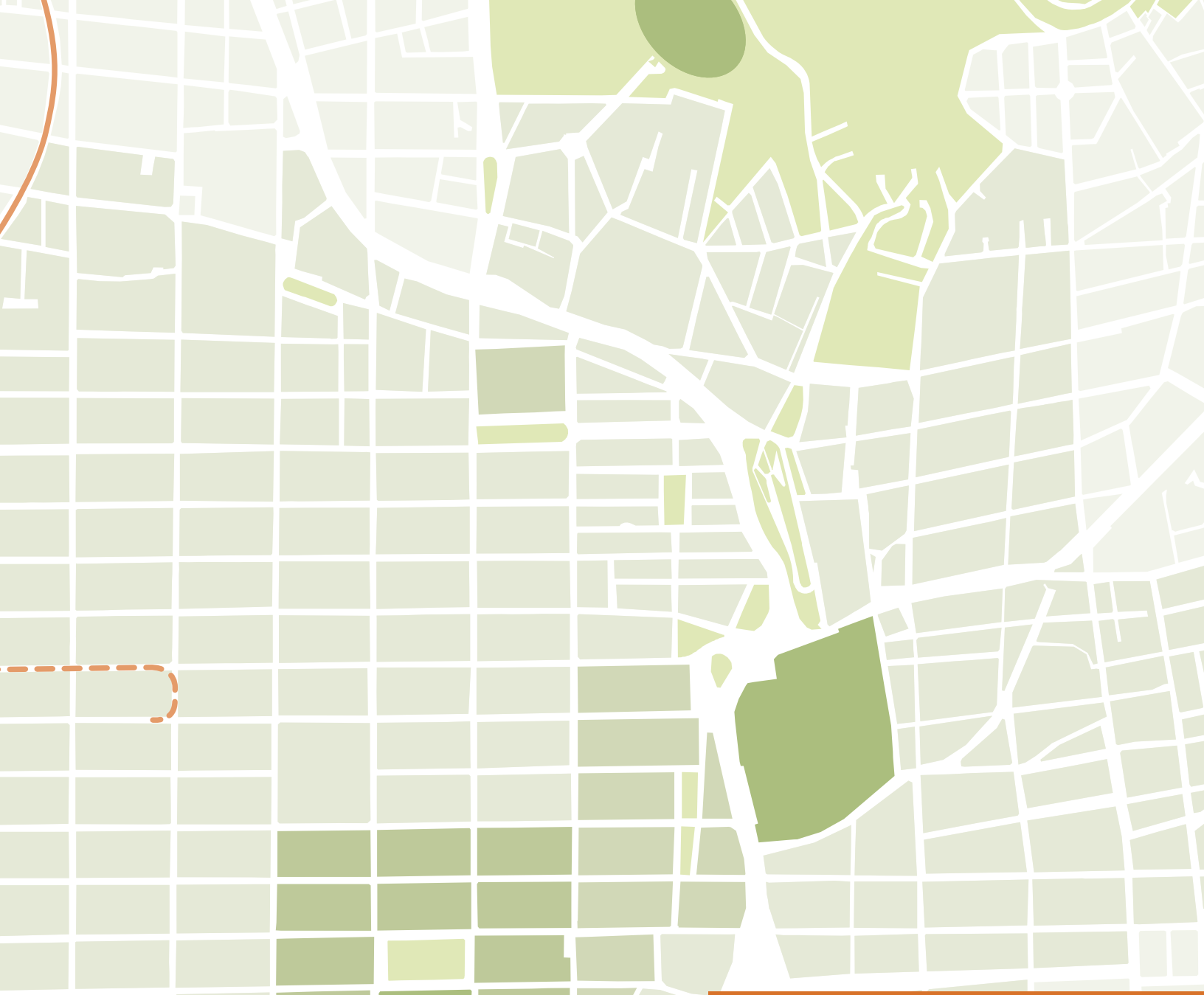

▲ Figure 83: Diagram of planned transit lines in relation to proposal study area (by author).

▲ Figure 84: Photo of Puebla's Artisan Market (by author).


▲ Figure 85: Photo of Puebla's Convention Center (by author)

new initiative called Ciudad del Diseño – or 'City of Design' (http://eleconomista.com.mx/estados/2012/02/14/definiran-proyecto-ciudad-diseno-puebla). The project represents an ambitious coordinated effort to consolidate and expand Puebla's established industries (including textiles, fashions, ceramics, architecture, and automotive production) with a new focus on innovation and design. Drawing on the lessons of New Century City projects discussed previously, the following chapter details a projective design proposal for Puebla's new mixed-use design and innovation cluster. The proposal is envisioned as a flexible prototype for catalytic, sustainable development in other medium-sized Mexican and Latin American cities.





chapter

# 5

**The City of Design and the Design of the City:** A Proposal for Puebla's 21st Century Green-Tech Design and Production Hub

▲ Figure 86: Photo of a side street in the study area selected for Ciudad del Diseño proposal (by author).

▲ Figure 87: Photo of industrial shed in the study area selected for Ciudad del Diseño proposal (by author).

# Ciudad del Diseño

## INTRODUCTION AND RECAP:

Before engaging the design proposal, it is useful to briefly review of the territory covered thus far. Chapter 1 of this study examined the challenges faced by cities in a global era of declining energy, water, and material resources and of increasing environmental impacts; noting the particular difficulties for industrializing regions working to overcome a history of underdevelopment manifesting socio-economic and spatial polarization. Countries and cities are increasingly looking to advancements in technology to aid in this effort. While the inevitability of technical change alone offers no guarantee of successful urban transformation, recent advancements are enabling alterations in consumer demand and behavior, industry production processes, spatial configuration and usage efficiency, and environmental design means and method, cumulatively affecting extensive and (potentially) positive impacts to the urban realm. Chapter 2 discussed the evolution of attitudes toward technical change in the city building industries, and current trends in technology impacting Urban Design. These trends are collectively most apparent in in 'New Century City' Projects, where technological innovation as industry, method, place-maker and way-of-life are fusing to create new urban experiences, as detailed in Chapter 3. Chapter 4 focused on the historic development of the City of Puebla, a medium-sized Mexican city working to meet the challenges of the 21st century, compete globally, and improve overall economic opportunity. Towards this end, the city has recently launched an initiative to develop *Ciudad del Diseño* (or the City of Design) as a means to strengthen and promote innovation in Puebla's design-related industries.

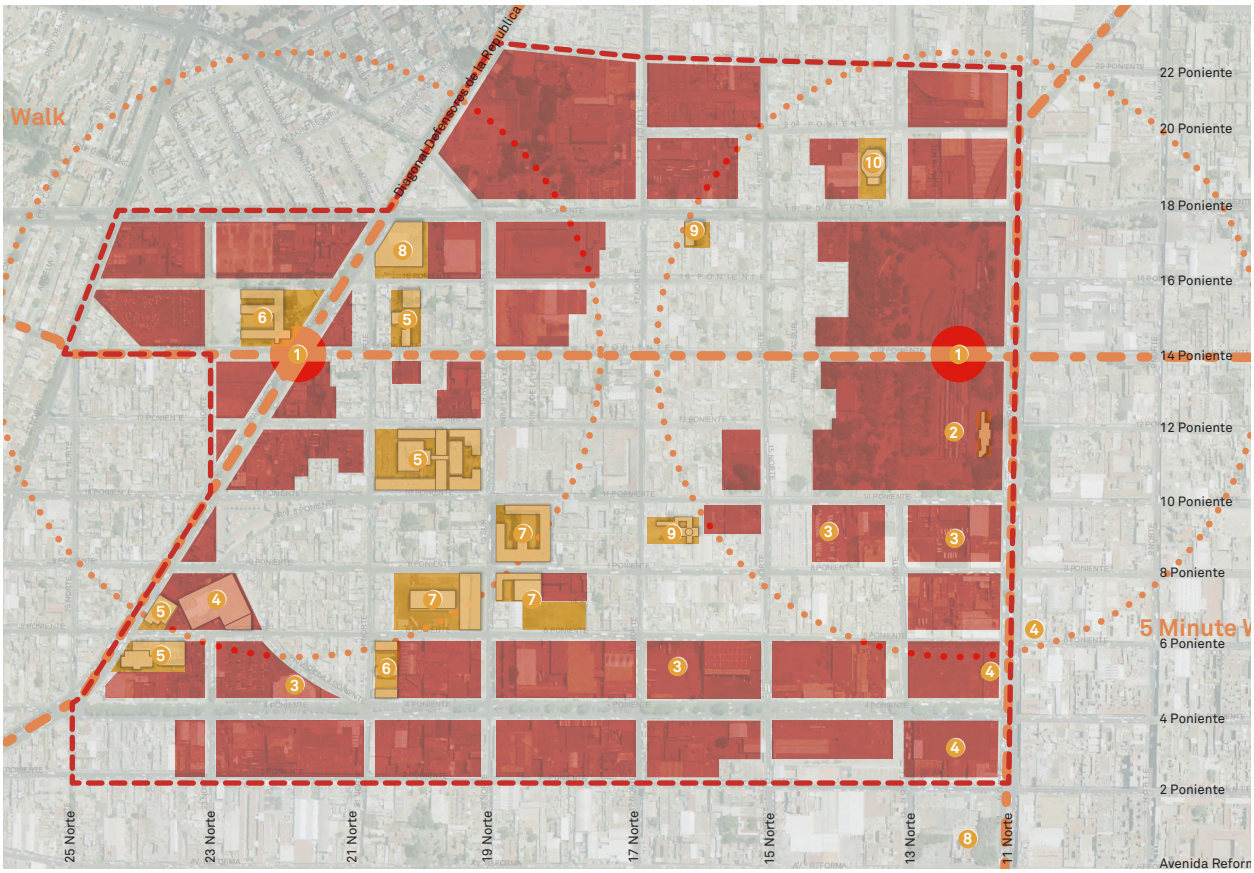
We now turn to a proposal for Ciudad del Diseño, applying the lessons developed from the New Century City case studies as design guidelines for the project in order to create an advanced industry cluster that:

1. Expands on and promotes innovation in locally and regionally established industries
2. Integrates physically with and augments the capacity of the existing urban core
3. Diversifies programmatically to cultivate a robust and resilient economic base and an ecology of innovation
4. Weaves a compelling narrative – uniting past, present and future in the collective civic memory – reified in a unique sense of place
5. Incorporates a rich, interactive physical public realm and parallel digital public realm that jointly reinforce this sense of place, and
6. Anticipates the flexible and strategic adaptation of the plan over the course of development implementation

## PROJECT VISION:

The objective of Ciudad del Diseño (City of Design) is to create a vibrant 21st century cluster to consolidate, expand, and promote innovation in Puebla's well-established design industries including fashion and textiles, automotive, mechanics, ceramics and plastic arts, graphic arts, industrial design and architecture. At the heart of this cluster, a new National Institute of Design and Production will work to foster innovation at the nexus of industrial design and manufacturing, promoting products and processes internationally. The research mission of the institute will be to identify new opportunities in designing for sustainable production, and industrial


▲ Figure 88: Photos of the study area selected for Ciudad del Diseño proposal (by author). The site lies in the San Miguelito district, adjacent to the historic city center.




▲ Figure 89: Diagram of existing civic institutions and potential opportunity sites within the study area (by author)

1. Planned BRT Transfer Station
2. Existing Train Muesuem
3. Existing Bus Station
4. Existing Public Market
5. Existing Healthcare Facility
6. Existing Primary School
7. Existing Secondary School (Priva
8. Existing Secondary School (Publi
9. Existing Church
10. Aida Palace Event Hall

Scale = 1:10000

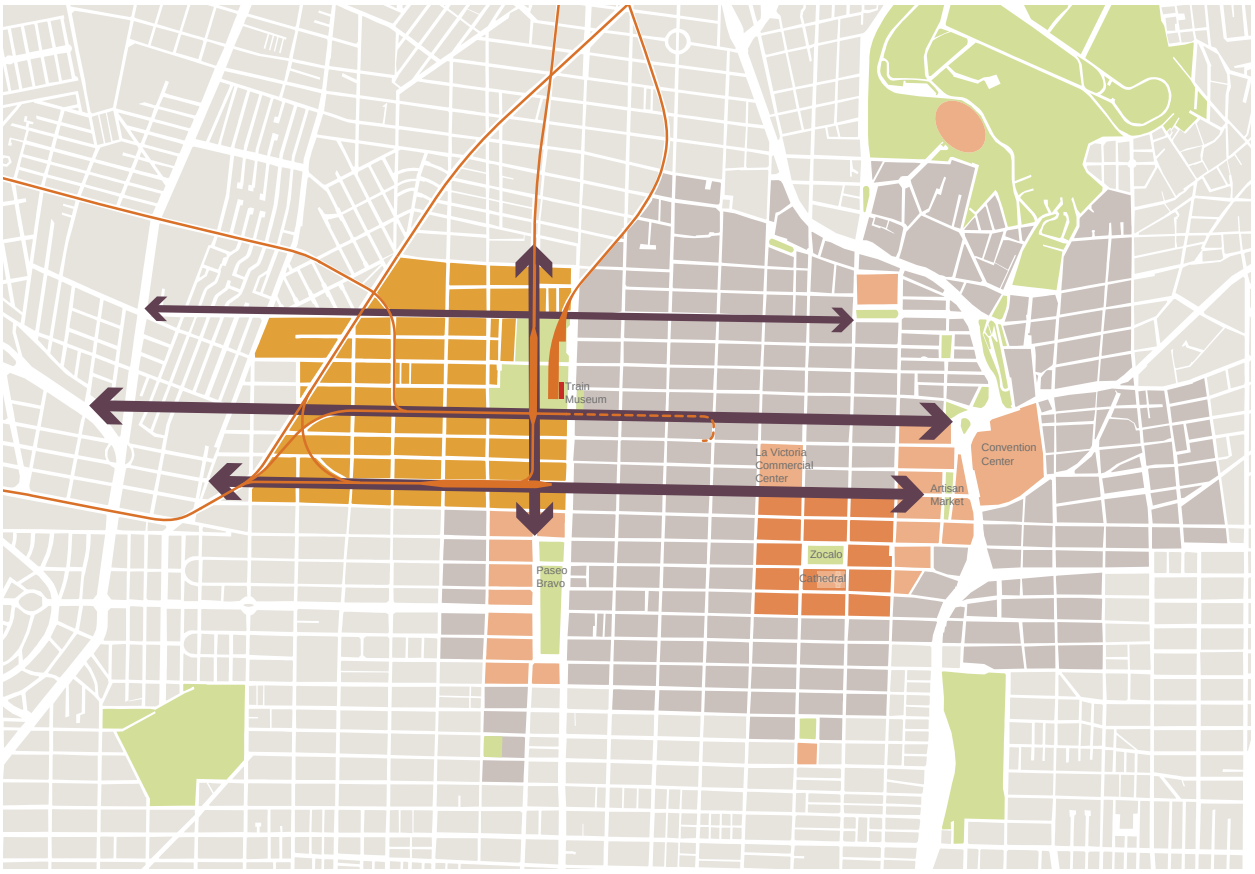
0 100 200 400m

N

symbiosis. In addition to an institutional, promotional, touristic and commercial hub, the development will focus on creating a holistic community ecosystem – providing expanded housing, amenities, public infrastructure, and education opportunities – thereby augmenting the physical, social and cultural capacity of the city.

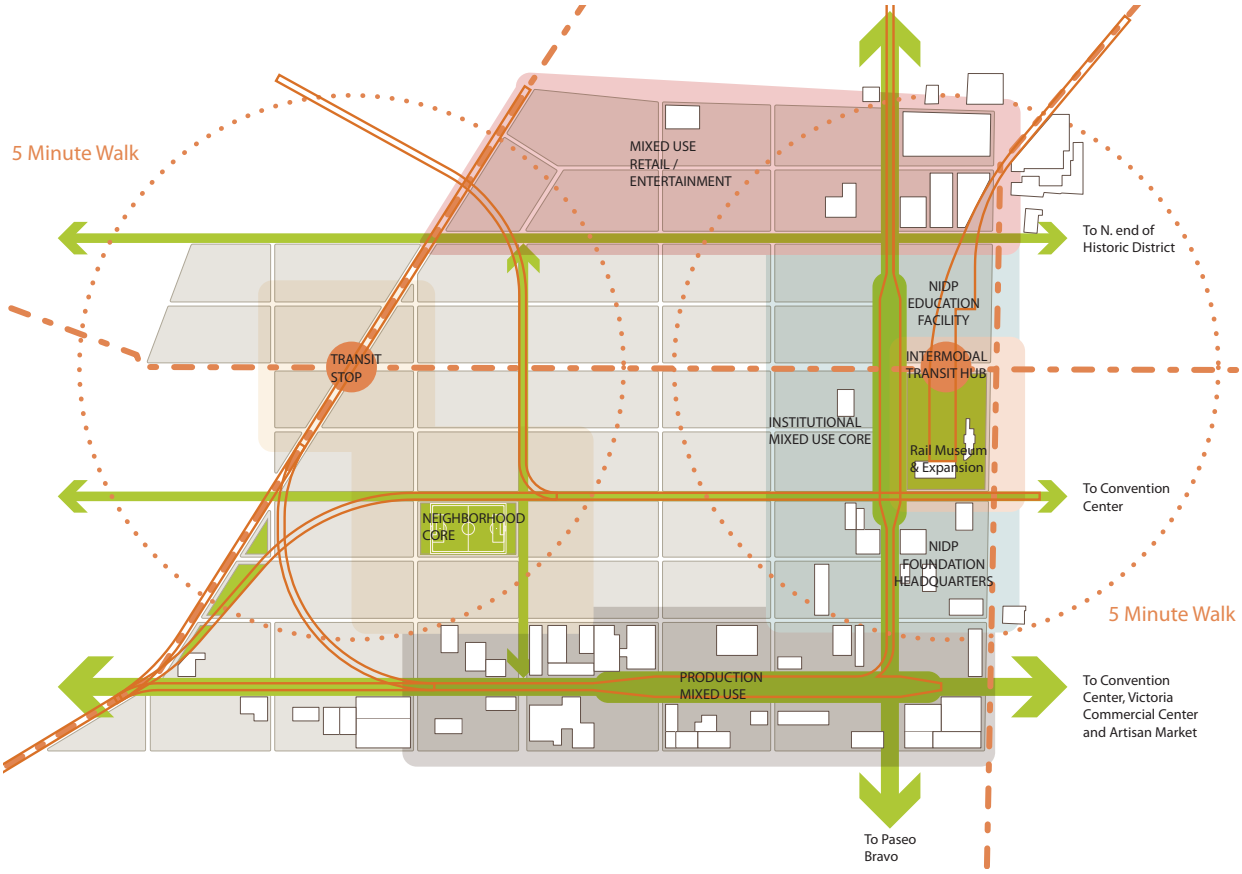
## SITE CHARACTER:

The proposed site of the development is an underutilized district on the western edge of the city, where major rail terminals once served as a locus of international trade. The area is characterized by a number of large-scale industrial-type shed buildings along the edges, with small scale mixed-use and residential filling out the interior. A number of bus stations, surface




▲ Figure 90: Civic structure of Puebla, showing major connections between the study area, landmarks within the city center to the east, and the Paseo Bravo to the South (by author).


parking lots, automotive shops, and other service-light industrial (SLI) uses give the neighborhood a gritty feel, (reminiscent of New York's meatpacking district or San Fransicso's SoMA neighborhood of days past). The area also contains a number of historic and cultural landmarks and civic facilities, including the national rail museum, primary and secondary schools, a technical college, medical centers, and a public market. Within this overall area of approximately 100 hectares, 48 hectares of underdeveloped (primarily post-industrial) sites are identified as opportunities for redevelopment with roughly 37 hectares allotted to development and 11 designated for expanded cultural facilities and improved public open space.




▲ Figure 91: Ciudad del Diseño Urban Design Partii (by author).

## CIVIC STRUCTURE AND URBAN DESIGN CONCEPT:

The plan is organized around the paths of the historic rail lines and primary axes in the city's civic structure – connecting east to the historic district and convention center, and south to the Paseo Bravo. The historic paths of the rail lines are used to organize a network of open space amenities, around which major program elements and clusters are grouped. The primary focus is on the development of an Institutional Core on a portion of the historic railyard and museum site, accessible from the city's planned new transit infrastructure. The Institutional Core is envisioned as a zone of collaboration, with shared facilities occupied by interdisciplinary groups from among Puebla's numerous existing education Institutions. Anchoring the core is a new National Institute of Design and Production with the mission to promote innovation in industrial design and manufacturing. The dual goals of the institute are:

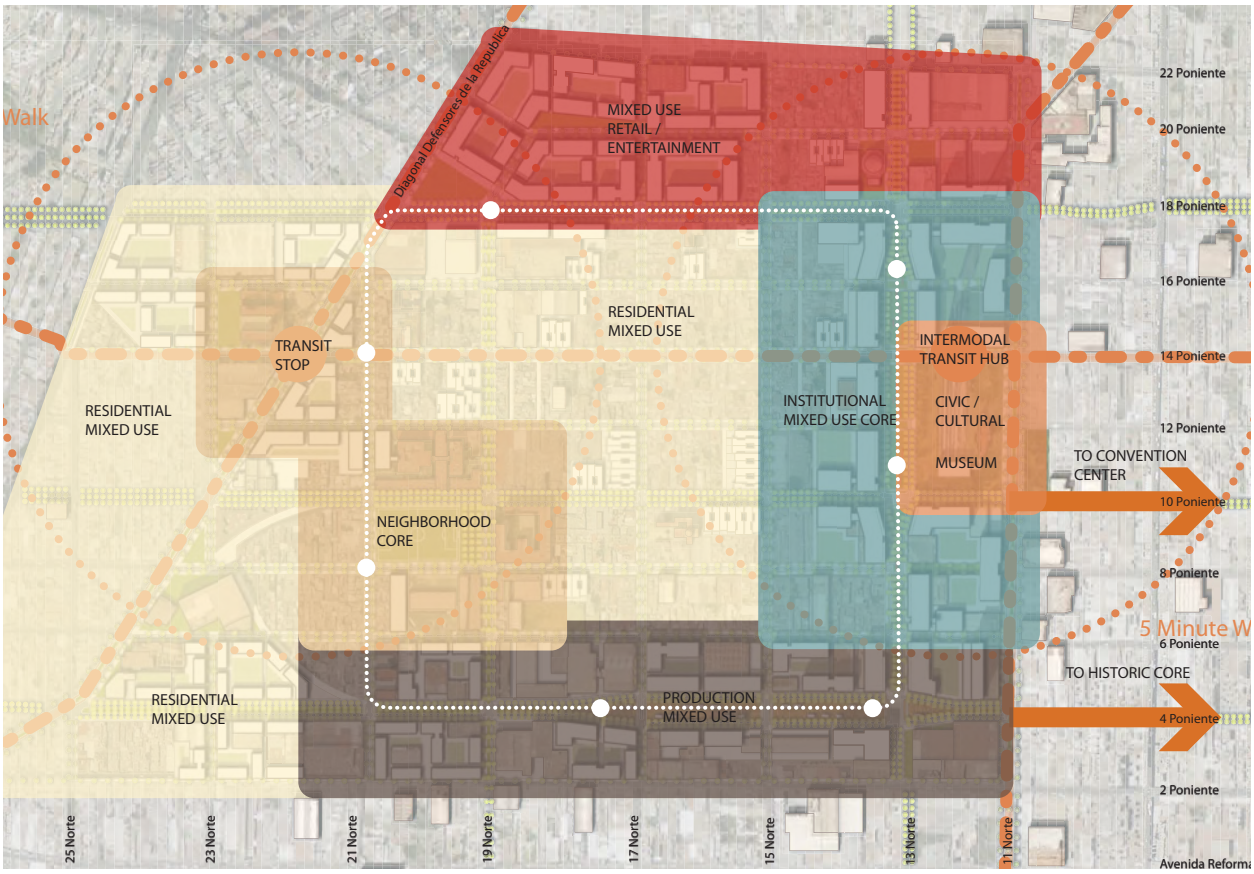
1. to discover and develop new industrial synergies, not just in form, but in material composition and manufacturing processes between industries,

2. to promote Mexican design, production, and innovation globally through product showcases, workshops, conventions, collaborative partnerships, and other marketing initiatives.

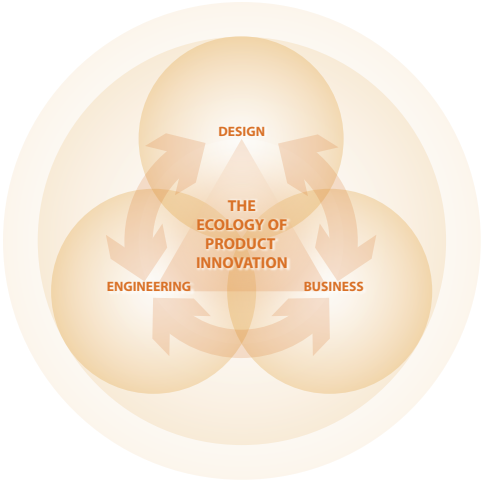
The National Institute of Design and Production consists of two major components: a Collaborative Design Lab for research and development in product design, and the Headquarters of a new

| | POTENTIAL EDUCATIONAL PARTNERS | PROGRAMS | | |
|---|---|---|---|---|
| | | ART, ARCHITECTURE & DESIGN | APPLIED ENGINEERING | BUSINESS & ENTREPRENEURSHIP |
| Major Universities | **Benemérita Universidad Autónoma de Puebla (BUAP)** (Meritorious Autonomous University of Puebla) Source: http://www.buap.mx/ | Architectural Design | Environmental Engineering | Business Administration |
| | | Architectural Technology | Materials Engineering | Finance |
| | | Aesthetics and Art | Textile Engineering | Small and Medium Business Management |
| | | Built Heritage Conservation | Industrial Engineering | |
| | | | Undergraduate program in Mechatronics | |
| | | | Undergraduate program in ICT Engineering | |
| | **Universidad Popular Autonoma del Estado de Puebla (UPAEP)** (Popular Autonomous University of Puebla) Source: http://www.upaep.mx/ | Automotive Design Engineering | | Business Administration |
| | | Architectural Design | Aotomotive and Parts Manufacturing | Management and Finance |
| | | Graphic Design | Industrial Engineering | |
| | | | Environmental Engineering | |
| | | | Integrated Manufacturing Systems | |
| | | | Mechatronics | |
| | **Universidad Tecnológica de Puebla (UTP)** (Technological University of Puebla) Source: http://www.utpuebla.edu.mx/ | | Renewable Energy and Environmental Engineering | Business Development |
| | | | Industrial Engineering | |
| | | | Mechatronics Engineering & Flexible Manufacturing Systems | |
| | | | Industrial Maintenance | |
| | | | Engineering Development and Business Innovation | |
| | **Instituto Tecnológico de Puebla (ITP)** (Technological Institute of Puebla) Source: http://www.itpuebla.edu.mx/ | | Mechanical Engineering | Business Administration |
| | | | Industrial Engineering | |
| | | | ICT Engineering | |
| | | | Engineering Business Management | |
| Design Schools | **Instituto de Estudios Superiores de Arquitectura y Diseño** (Graduate Institute of Architecture and Design) Source: http://www.iesac.edu.mx/instituto.php | Architectural Design | Industrial Engineering | |
| | | Graphic Design | | |
| | **Instituto de Artes Visuales del Estado** (State Institute of Visual Arts) Source: www.artesvisualespuebla.mx | Engineering Graphic Design | | |
| | | Plastic Arts | | |
| | | Publishing Graphic Design | | |
| | **Instituto de Arte, Decoración y Diseño** (Institute of Art, Decoration and Design) | N/A | | |
| | **Escuela Libre de Diseño y Artes Bauhaus** (Free School of Design and Bauhaus Arts) http://www.ecienciaytecnologia.gob.mx/en/contenidos/escuela-libre-de-diseno-y-arte-bauhaus-puebla-dp1.html | Plastic Arts | | |
| | | Graphic Design | | |
| | **Escuela Profesional de Diseño de Modas** (Professional School of Fashion Design) http://modapuebla.edu.mx/ | Fashion Design | | |
| | **Escuela en Diseño de Moda Revolución** (School of Fashion Design Revolution – fashion technical school near study area) | Fashion Design | | |
| Polytech | **Instituto de Estudios Superiores en Ingeniería** (Institute of Graduate Studies in Engineering) http://www.iesi.edu.mx/ | | Mechanical Engineering | |
| | | | Industrial Engineering | |
| | | | Environmental Engineering | |
| | **Universidad Politecnica Hispano Mexicana** (Mexican Hispanic Polytechnic University) http://www.uphm.edu.mx/ | | Industrial Engineering | |
| Other | **Universidad del Siglo XXI** (University of the XXI Century) http://www.uniso.edu.mx/ | Graphic Design | | Business Administration |
| | **Instituto de Estudios Superiores en Dirección de Empresas** (Institute of Advanced Studies in Management) http://www.iesde.edu.mx/ | | | Business Administration |
| | | | | Finance |
| | **Instituto de Estudios Universitarios** (Institute for University Studies – technical School in study area) http://www.sistemaieu.edu.mx | Graphic Design | ICT Engineering | Business Administration |
| | | | | Finance |

▲ Figure 92: Opportunities for Intellectual Synergy via collaboration between Business, Design, and Engineering institutions (by author).




▲ Figure 93: Organization of use concentrations within the proposal (by author).


▲ Figure 94: Cultivating Ecology of Product Innovation (by author).

promotional National Design Foundation. The institute is envisioned as a joint undertaking to foster intellectual synergies with partners from the Design, Engineering and Business institutions, as well as local and international industries. Potential major education partners include:

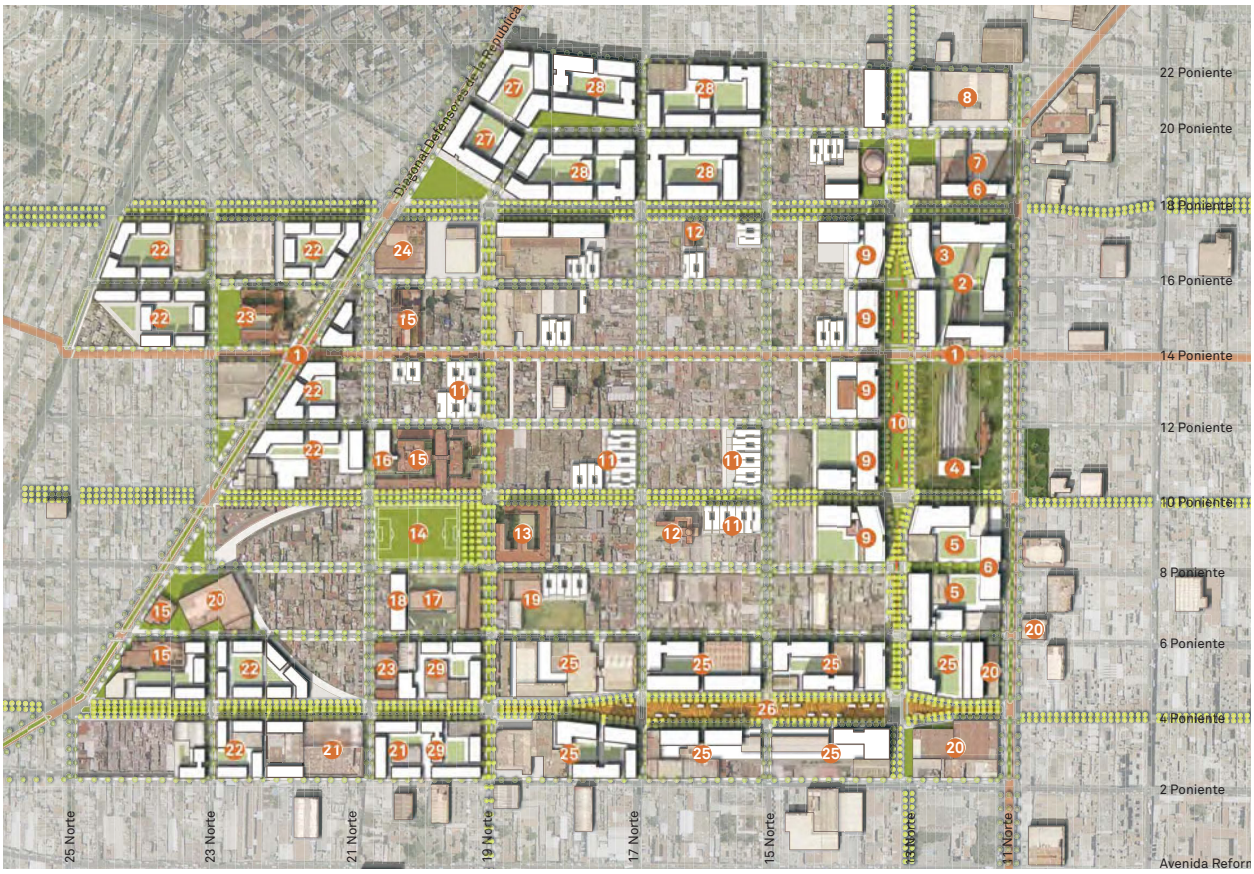
- Benemérita Universidad Autónoma de Puebla (BUAP)
- Universidad Popular Autonoma del Estado de Puebla (UPAEP)
- Universidad Tecnológica de Puebla (UTP)
- Instituto Tecnológico de Puebla (ITP)
- Instituto de Estudios Superiores de Arquitectura y Diseño, and
- Instituto de Artes Visuales del Estado


▲ Urban Design Plan, showing the organization of Streets, Public Transit, Open Space Amenities and Parcelization within the proposal (by author).

as well as other smaller design, polytechnic and technical schools in the vicinity of the site. Potential industry partners from major companies located in Puebla include Volkswagen (automotive), Bentler, Siemens, Autotek, Gedas, Sommer Allibert, and S.K.F. (auto parts), Krupp (metallurgy), Hylsa (metal mechanics), Motorola (telecommunications), Segusino (furniture), Apolo, Chemtex, Skytex, and Qualytel (textiles), as well as Mexican Fashion design companies like Taller Flora, Marvin y Quetzal, Pineda Covalin, and Paola Hernandez (www.teamnafta.com and http://fashiontribes.typepad.com/fashion/2008/05/5-mexican-fashi.html). The co-location of educational and civic institutions, along with showroom and meeting space, tourist amenities, industry offices, research and product development facilities, prototyping and small scale production workshops allow for the cultivation of vertically integrated ecologies of innovation. In addition, public spaces can be programmed to showcase the work of the district on a daily, weekly, monthly and annual basis. And coordination with industry-related events and trade shows, like the annual Fashion Week Mexico, the bi-annual Expo AMPIMM (furniture and wood), and the semi-annual Hazlo to Puebla (Arts and Handcrafts exposition), can generate additional activity.

## CONCEPT PLAN ORGANIZATION AND PROCESS:

The plan takes its main queues from the industrial heritage of the site, with public open spaces organized along rail rights-of-way, providing a network of linear

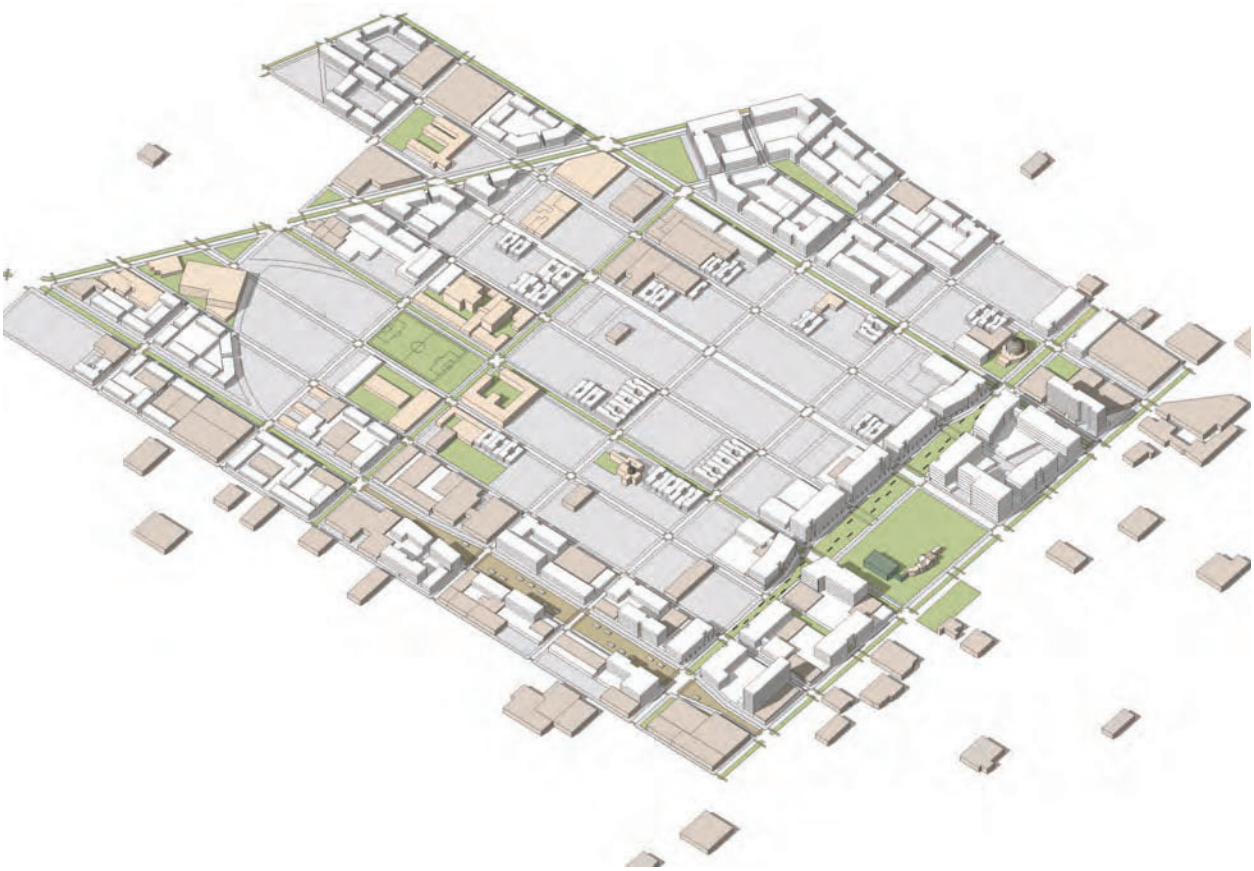



▲ Figure 96: Illustrative Site Plan (by author).

Scale = 1:10000

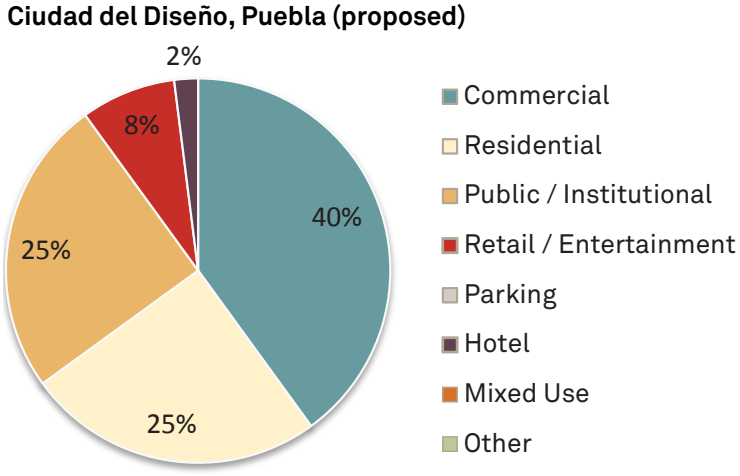
0 100 200 400m N

1. BRT Transfer Station
2. NIDP Colaborative Design / Research
3. Intermodal Transit Station
4. Museum Expansion
5. NIDP Foundation Headquarters
6. 4-5 Star Hotel
7. Hotel Amenities / Meeting Facilities
8. Concert / Performance Venue
9. Office Mixed Use
10. Plaza de Cultura
11. Small Scale Residential Infill
12. Preserved Church
13. Existing Intermediate School
14. Proposed Multi-Use Play Fields
15. Existing Healthcare Facility
16. Healthcare Facility Expansion
17. Existing Intermediate School (Private)
18. Intermediate School Expasion
19. Existing Intermediate School (Private)
20. Renovated Public Market
21. Existing Technical School
22. Mixed-Use / Multi-Family Residential
23. Existing Elementary School
24. Existing Intermediate School (Public)
25. Mixed-Use Shops / Production / Small Office
26. Plaza de Industria
27. Design-Center / Mixed-Use
28. Retail / Entertainment / Mixed-Use
29. Higher Education Facility Expansion



▲ Figure 97: Conceptual Massing Diagram (by author).

medians along the primary movement axes, and linking into the civic structure of the city. Opportunity sites are identified as previously described. In addition, buildings for preservation and potential adaptive reuse are pinpointed. This adaptive reuse potential extends outside of the study area boundary into adjacent neighborhoods; locating where flexible space is available. The opportunity sites are then in-filled around adapted industrial buildings. Density is concentrated around the Institutional Core, open space amenities, and along primary routes. The small-scale fabric on the interior of the district is left undisturbed. Tax incentives and other motivating inducements can be given for property improvement and reinvestment over time, as individual property owners desire and as market cycles allow. It should be emphasized that building footprints




▲ Figure 98: Proposed use distribution (by author).

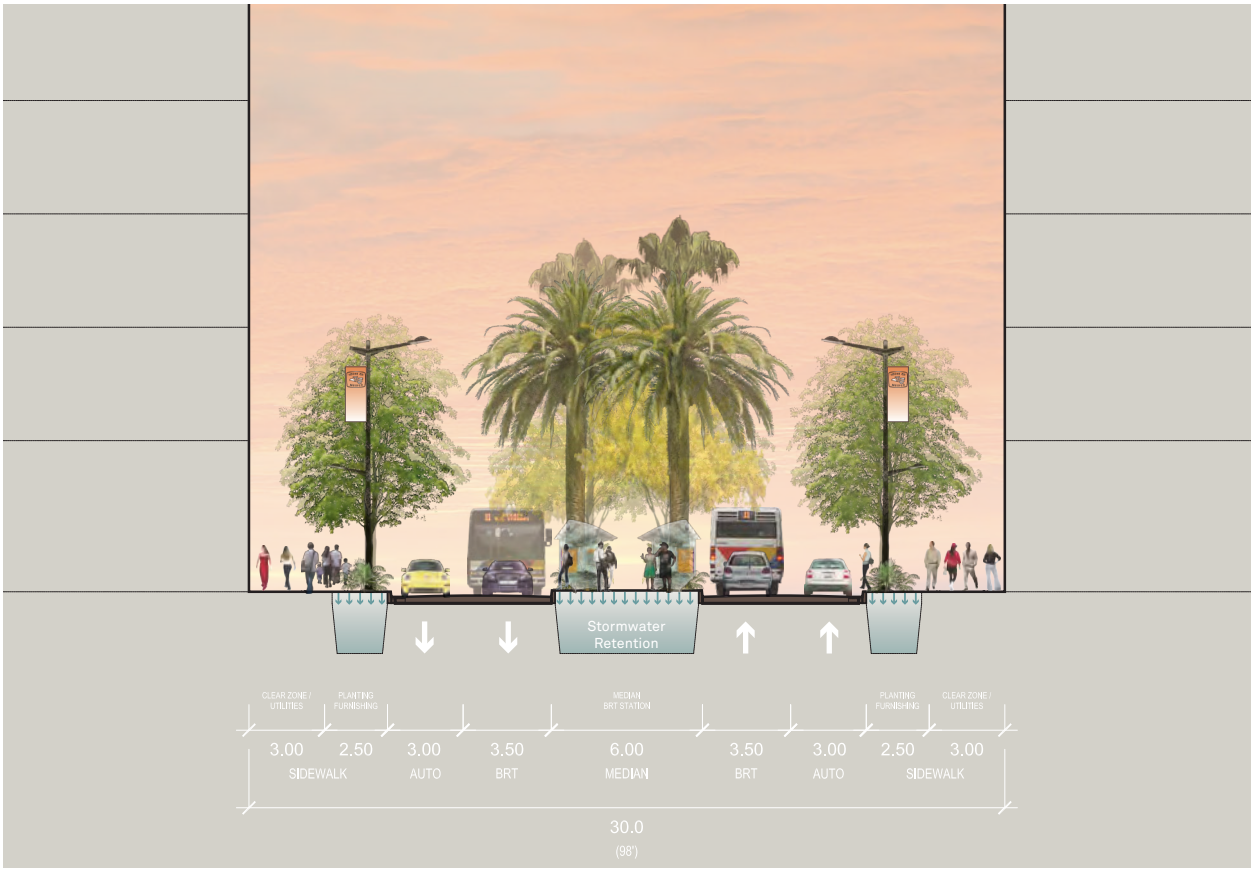
▲ Figure 99: Conceptual Massing of proposal, shown in context (by author).

shown in the illustrative site plan are intended as expressive of potential; yet the eventual plan should be tailored to property ownership realities, and should be allowed to evolve over the course of implementation, as long as the fundamental goals are maintained.

## PROGRAM COMPONENTS:

Use Distribution: The following preliminary program was developed based on the case study comparison research and project concept. Assuming a total developable site area of 40 hectares at a net Floor Area Ratio of 2.0, the gross floor area of development is targeted at 800,000 square meters. This GFA is distributed as follows:

- 40% Commercial: 360,000m2 including office, start-up incubation, lab, product research and development, prototyping, and commercial production space.
- 25% Residential: 240,000m2 with a diversity of unit types and sizes for a wide range of markets) Additional residential units are provided in the adjacent community, with tax and zoning incentives given to encourage property improvement.
- 25% Public / Institutional: 300,000m2 anchored by the new collaborative National Institute of Design and Production with a Collaborative Design Lab for research and development in product design, CAD-CAM, and rapid prototyping. The institute will also house the headquarters of the National Design Foundation with office, showroom and meeting facilities. The



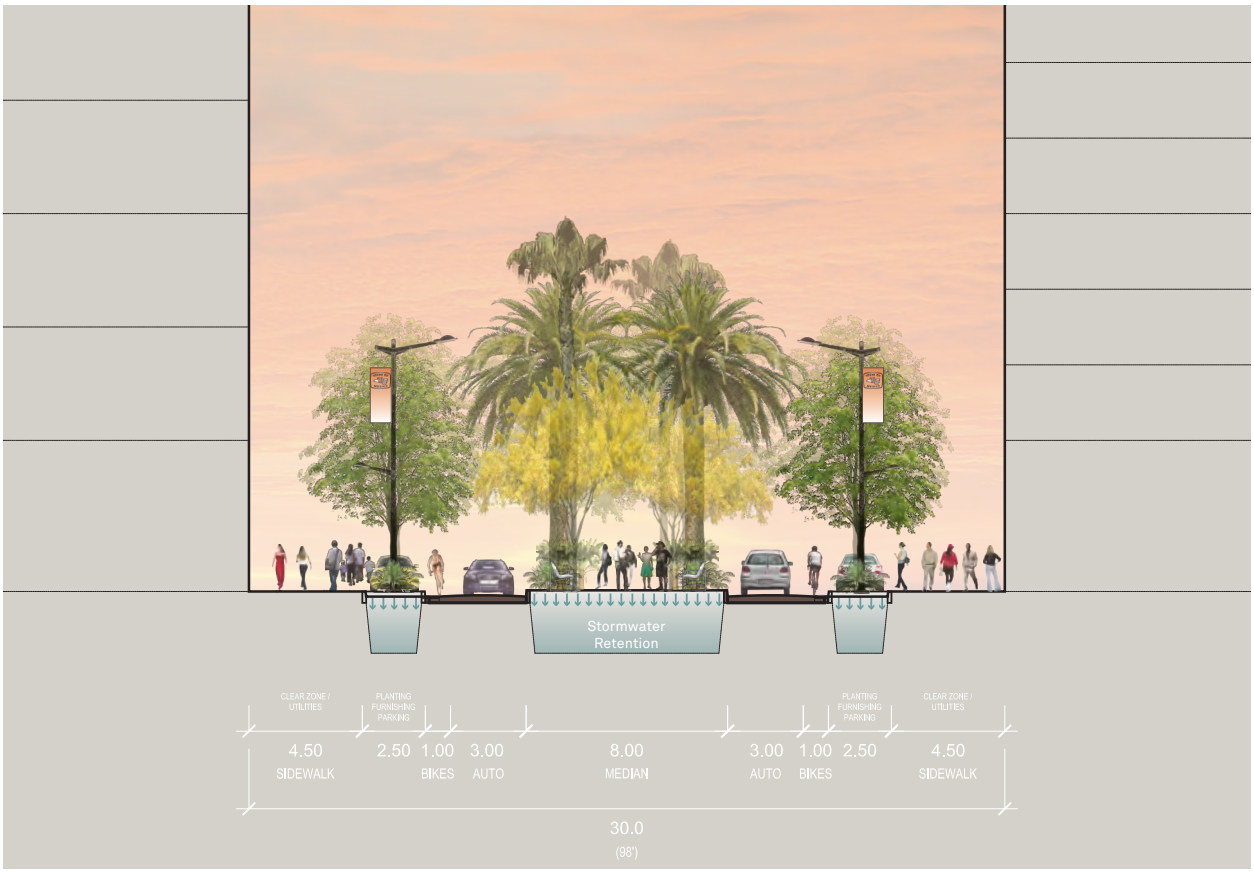

▲ Figure 100: Concept section for a 30m street with BRT (by author).

project also provides an extension of public and technical school infrastructure, and the addition of a new wing to Museo de Ferrocarril (Rail Museum).

- 8%-10% Retail / Entertainment: 80,000m2, including restaurants, gallery and design shops, a performance venue, and a regional furniture and home decor design center and industry wholesale showroom.
- 2% Hotel: 16,000m2 for one five-star and one 4 star hotel, catering to design industries, educational clients and cultural tourists.

Note: all areas are intended as mixed use; strict mono-functional zoning is to be avoided.

Public Open Spaces: The project includes an expanded public space network coordinated with major program elements and primary circulation routes; augmented with interactive technologies to amplify the unique character of the district. One full block of the existing (but underutilized) rail museum site is preserved, with the addition of a new museum wing at the head of the tracks. This major public space is surrounded by the key components of the National Institute of Design and Production, with the Collaborative Design Lab on the North end and the National Design Foundation Headquarters on the South. On the sites of the former rail yards, two wider medians provide more formal spaces, one geared toward the academic environment of the institutional core, the other toward the gritty flavor of the Mixed-Use Production District. In the Neighborhood Core, a block is




▲ Figure 101: Concept section for a 30m civic boulevard (by author).

▲ Figure 102: Landscaped medians in the Condesa neighborhood of Mexico City provide a network of linear open space amenities (photo by author).

opened up for a multi-purpose playfield on a block surrounded by the existing schools and medical facilities. Site-wide, the open space network makes use of improved rights-of-way, introducing landscaped medians to form integrated linear spaces (similar to those in the Condesa neighborhood of Mexico City) linking the key program elements.

Streetscape and Transit Infrastructure: Street rights-of way are upgraded to narrow road widths, widen sidewalks, augment landscaping and improve the overall pedestrian experience. Landscaped medians are introduced to link key program elements with linear open spaces. Continuous tree trenching is integrated with interspersed pervious on-street parking zones, providing a mechanism for sustainable localized stormwater


▲ Figure 103: Concept section for a 20m secondary street (by author):.

▲ Figure 104: Landscaped medians in the Condesa neighborhood of Mexico City provide a network of linear open space amenities (photo by author).


▲ Figure 105: Concept section for a narrow residential street of 16m (by author).

management. At the northeast corner of the study area, accessed from 18 Poniente, an intermodal transit station consolidates the three existing private bus companies into a combined regional station, co-located with the proposed city Bus Rapid Transit transfer station along 14 Poniente. A circulator shuttle or PRT system may be added in the long term, as needed, to further facilitate circulation within the district.

## PHASING:

The strategic phasing strategy begins small, working from the Rail Museum site adjacent to the historic district and expanding incrementally westward toward Diagonal Defensores de la Republica. Civic, institutional and education facilities form a core and are coupled with infrastructure upgrades, followed by expanded workshops, commercial, retail / entertainment space, and residential units. The district is in-filled and densified, gradually, with opportunities to adjust the use mix as needed.

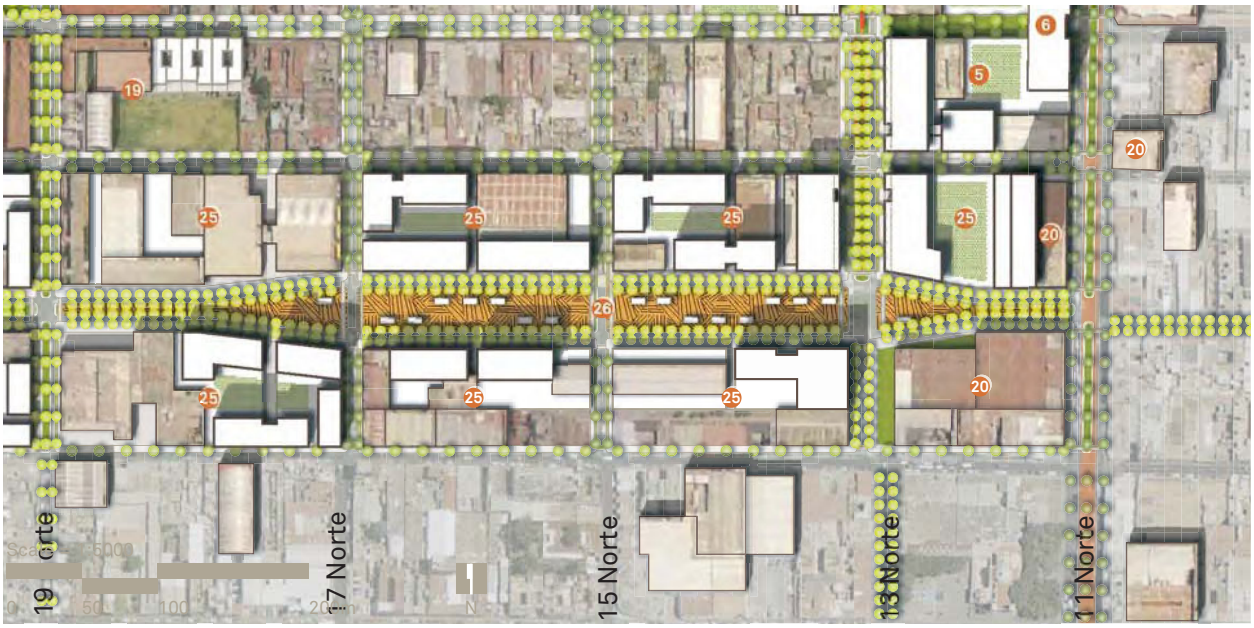
- Phase 1 (year 1): Identify properties for preservation and adaptive reuse; create incentives for building restoration and promote location of small production companies, artisans, and related businesses in the vacant or underutilized industrial spaces within and around the study area. Create a public entity or non-profit Foundation with the mission of promoting Mexican design and innovation. Rather than building additional facilities in the first phase, concentrate on retrofitting and reusing existing building stock in the area.

- Phase 2 (years 2-3): Begin building the institutional core, with shared institutional facilities, offices and showroom for the Design Foundation, as well as the intermodal transit station. Relocate the regional bus services to open up sites in the Production-Mixed Use zone.
- Phase 3 (years 4-5): Finish building the institutional core, and develop commercial office space for partner companies relocating to the district. Begin expanding infill in the Production- Mixed Use zone. Begin the Mixed-Use Retail / Entertainment Zone. Work from 11 Norte towards Diagonal Defensores de la Republica.
- Phase 4 (years 5-10): Expand civic facilities in the Neighborhood core, including primary and secondary school facilities in partnership with the National Institute of Design and Production. Renovate the existing public market. Begin circulator shuttle service. Build out Production-Mixed Use Zone. Continue Mixed-Use Retail / Entertainment Zone.
- Phase 5 (years 10-20): Build out the Mixed-Use Retail / Entertainment Zone, and infill remaining opportunity sites. Densify Residential Mixed-Use Zones.


▲ Figure 106: Illustrative Plan of the Institutional Core, National Institute of Design and Production, the National Rail Museum, and the proposed Plaza de Culture (by author).

▲ Figure 107: Illustrative Rendering of the proposed Plaza de Cultura and surrounding commercial and intuitional facilities (by author).

▲ Figure 108. Conceptual Massing of commercial and institutional buildings surrounding the Plaza de Cultura (by author).



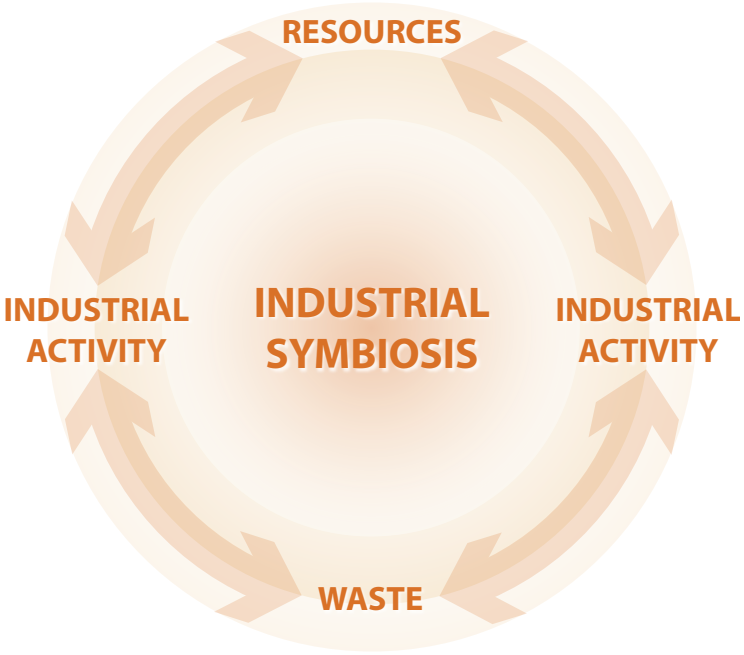

▲ Figure 109: Illustrative Plan of the proposed Plaza de Industria, and surrounding small scale production facilities (by author).


▲ Figure 110: Concept design for interactive displays in the Plaza de Cultura and Plaza de Industria (by author). Displays convey information about work occurring in the district, special events and other matters of community interest. They can also be integrated with seating, water features, lighting, and other open space elements.

▲ Figure 111: Photos of a median street market in Mexico City (by author).

▲ Figure 112: Illustrative Rendering of the proposed Plaza de Industria, and surrounding small scale production facilities (by author).

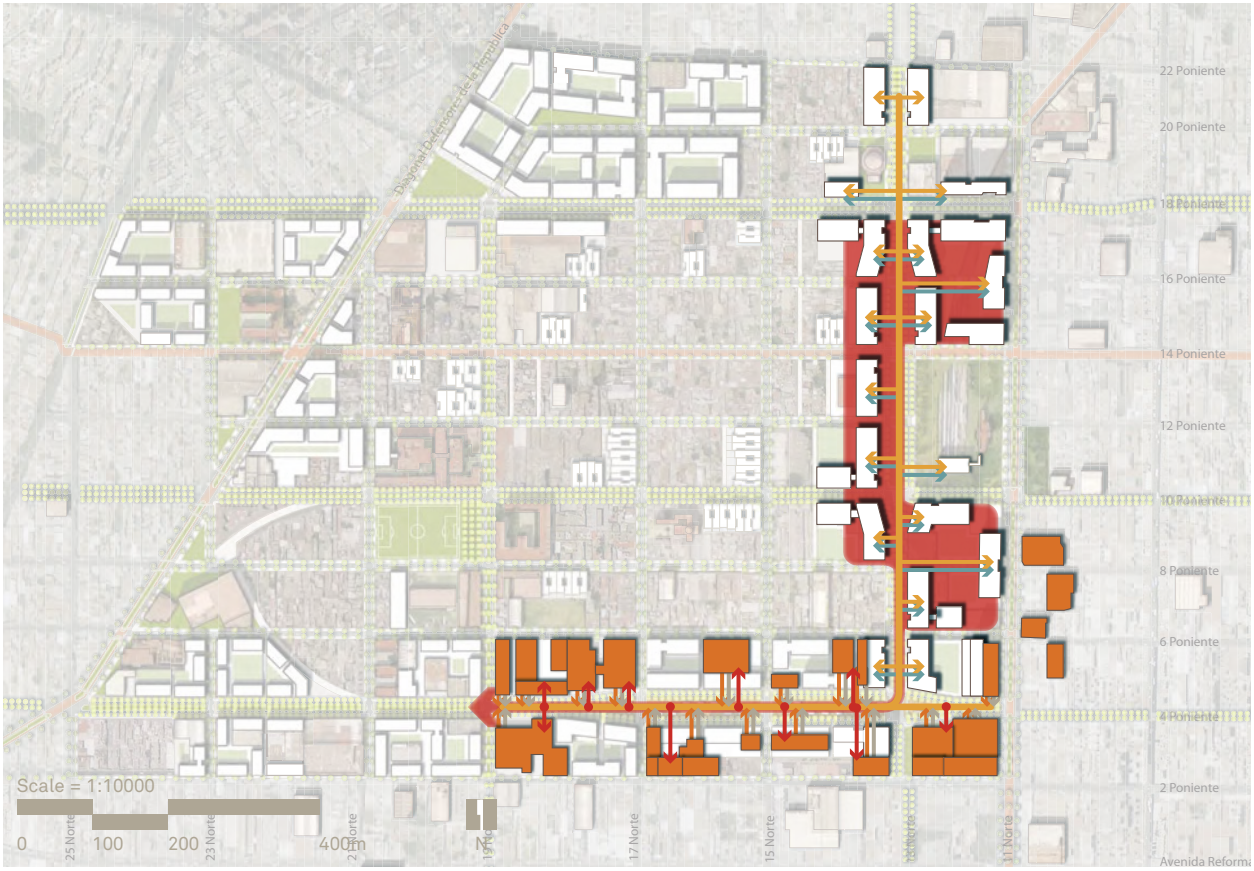
▲ Figure 113: Conceptual Massing of buildings surrounding the Plaza de Industria (by author).




▲ Figure 114: Industrial Symbiosis concept (by author). The waste product of one industrial process becomes a resource for a traditionally separate industrial process - moving toward a closed cycle. Net waste from industry is minimized.

## OPPORTUNITIES FOR INDUSTRIAL SYMBIOSIS

As a purpose-built district focused on innovation in industrial design and production of consumer goods, the development should take advantage of the unique opportunity to benefit from industrial symbiosis. As Marian Chertow (2000) describes, industrial symbiosis engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water, and/or by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity, both of which are primary components of the Ciudad del Diseño proposal.

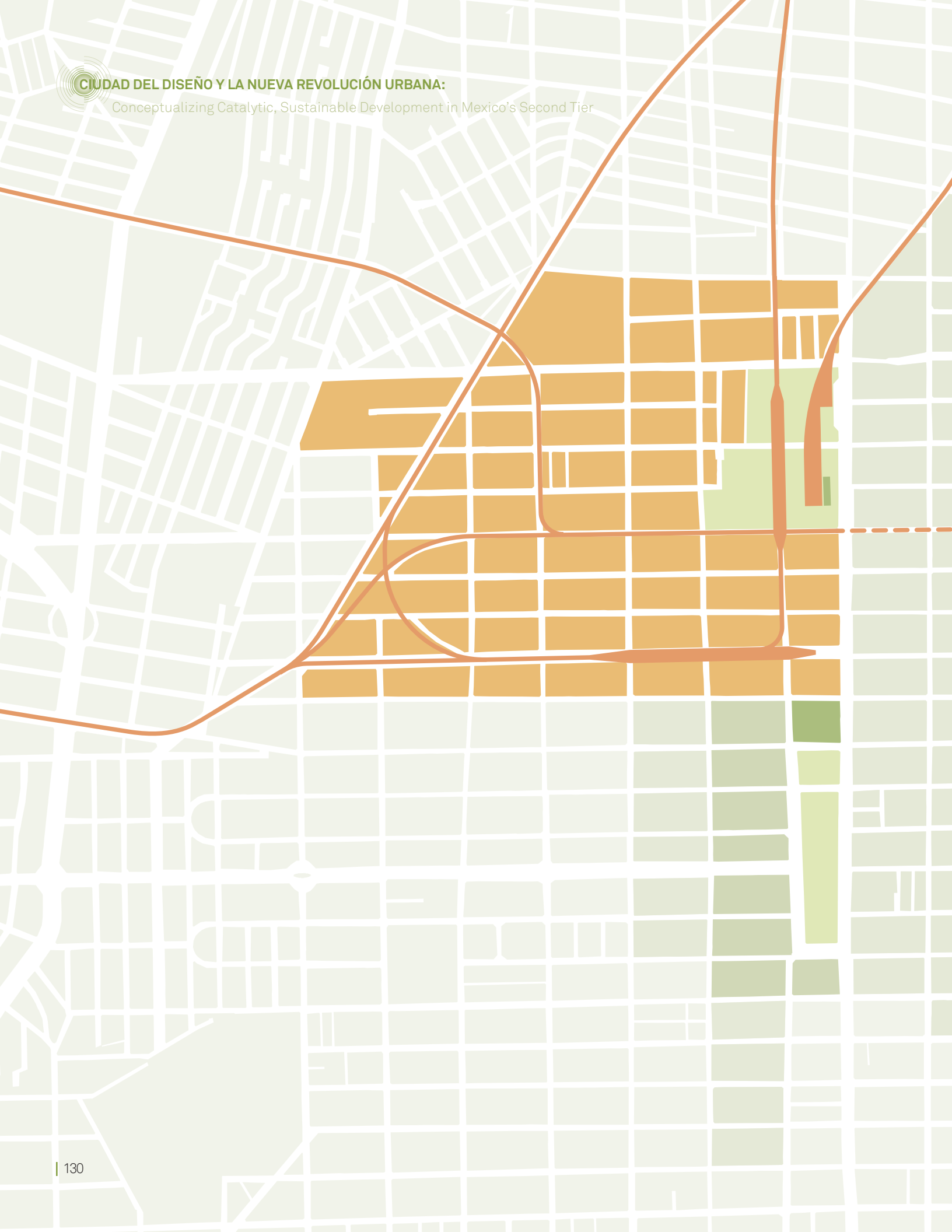


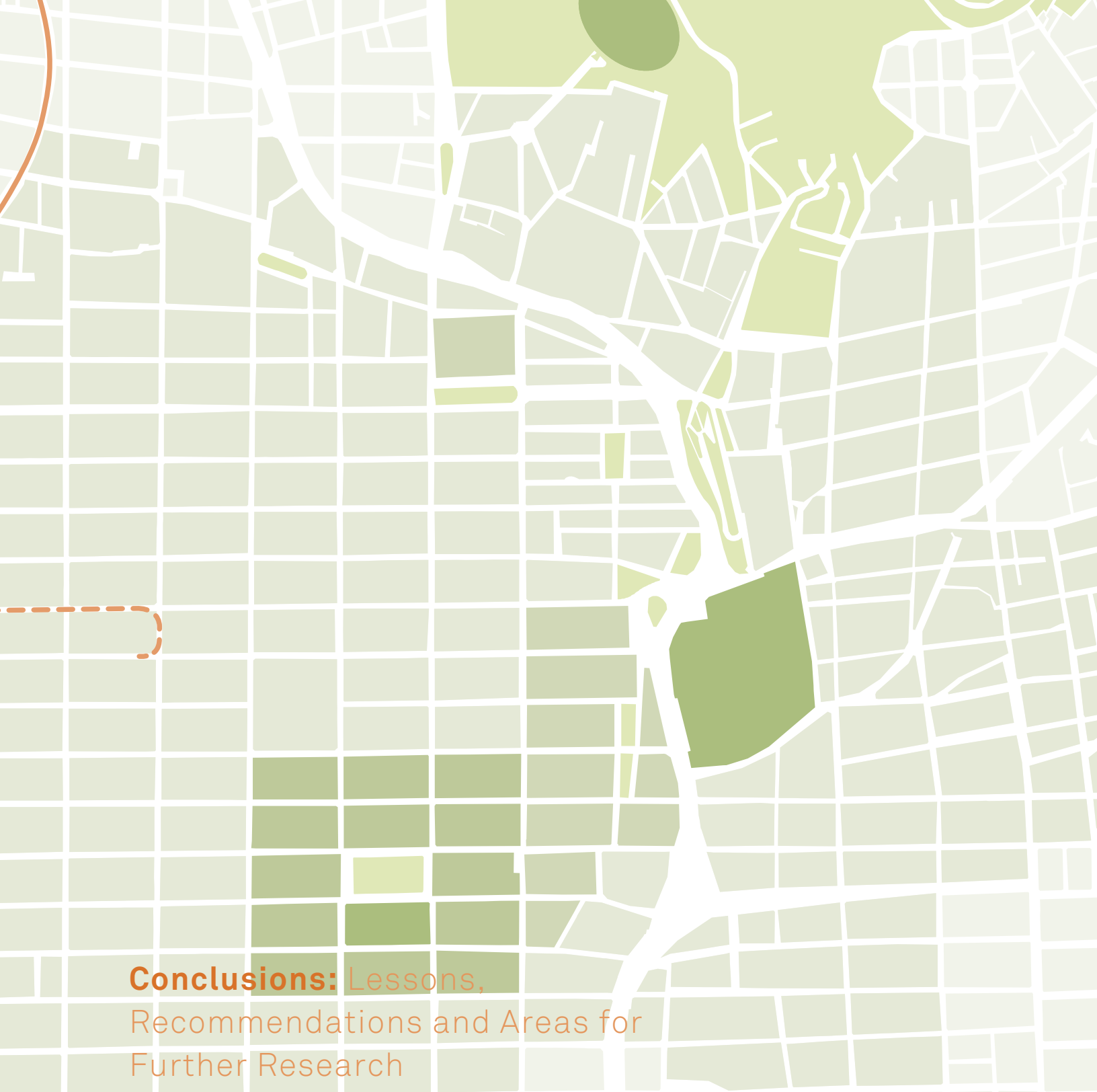

▲ Figure 115: Industrial Symbiosis conceptual opportunity plan (by author).

As the diagram above implies, the right-of-way established in the open space network can serve as a conduit for waste heat, scrap material, and industrial byproducts from the production zone to the institution core. As in the Danish city of Kalundborg (Desrochers, 2002) waste heat from the production zone might be captured and used to power a cogen or trigen plant that could help to heat and cool the commercial and institution buildings in the Institution core. Scrap materials might be transferred for recycling in lab testing or smaller scale prototyping. Industrial byproducts might also be supplied to labs researching such material as a resource for new manufacturing methods focused on "upcycleing." Knowledge and innovation from the Institutional core is then transferred back to the production cluster, transforming both the products made processes of making.

While it may prove difficult to initiate the collaborative structure necessary for industrial symbiosis to thrive, two development components offer particular assistance in this regard. First, the proposed National Institute of Design and Production is tasked with the institutional responsibility for initiating such processes. Second, a parallel online portal, like those at Arabianranta, Orestad Nord and Milla Digital can provide augmented communications infrastructure and social networking capacity – simplifying the coordination process.

In such a scenario, the potential exists to fully reconsider, re-engineer, and remake "the way we make things." (McDonough & Braungart, 2002)





# **Conclusions:** Lessons, Recommendations and Areas for Further Research

chapter **6**


▲ Figure 116: Illustrative renderings of the 798 Arts District Vision Plan, Beijing by Sasaki Associates, Inc. The development converted a former munitions factory and surrounding industrial land into a new district for art and design. (http://www.sasaki.com/project/36/).

# Conclusions

As this study has attempted to illustrate, cities in the contemporary era confront innumerable challenges to establish and maintain economic viability in the face of unrelenting global economic competition. The situation presents even greater challenges for cities in the developing world, struggling to overcome the enduring legacy of colonial exploitation, to 'catch-up' to Western world. No matter one's politics or positions on the relative (in) equity of the global economic structure, or the appropriateness of the modernization thrust, the propensity toward development after the western model is pervasive. And yet, historically, this thrust towards development lies in direct conflict with notions of urban sustainability. Indeed, no city in the history of the world has achieved sustainability within its boundaries; the constant expansion of urbanity met with a coincident expansion of the hinterland needed to support it – the cumulative global consumption footprint now totaling an annual draw of resources greater than the productive capacity of the earth (World Wildlife Federation, 2010).

Yet in the wake of these daunting challenges, technical change in urban ICT offers both new potential to face challenges and new opportunities for economic development – via clusters dedicated to high-value 21st century industries. Thus cities and governments are turning once again to technology, manifested in the techno-city – as ideology, as industry, and as methodology – to combat new obstacles and maintain or improve competitive advantage on the global stage.

Towards this effort, this investigation offers

six principles, derived from the New Century City prototype, as a model for catalytic, sustainable development. The six principles, or guidelines, are:

1. Focus on augmenting locally or regionally-established industries;
2. Integrate the development physically, social and culturally with the existing city, adaptively reusing buildings where desirable, and infilling compatibly with context;
3. Diversify the use mix, including industry and commerce with a range of residential, civic institutional and educational facilities to create a holistic urban ecosystem;
4. Weave a compelling narrative that unites past, present and future in a durable and actionable vision;
5. Incorporate a rich and interactive public realm that reinforces the development narrative and sense of place paralleled with the supporting capabilities of a corresponding digital public realm; and
6. Design for the flexible evolution of the plan over time, balancing commitment to the overall vision with strategic adaptation to the development context over time.

The catalytic development model is not inteded as a universal solution. But for those cities choosing this approach, the guidelines enumerated above provide a mechanism by which cities can consolidate development efforts, maximize development resources and leverage industry in support of overall urban vitality.

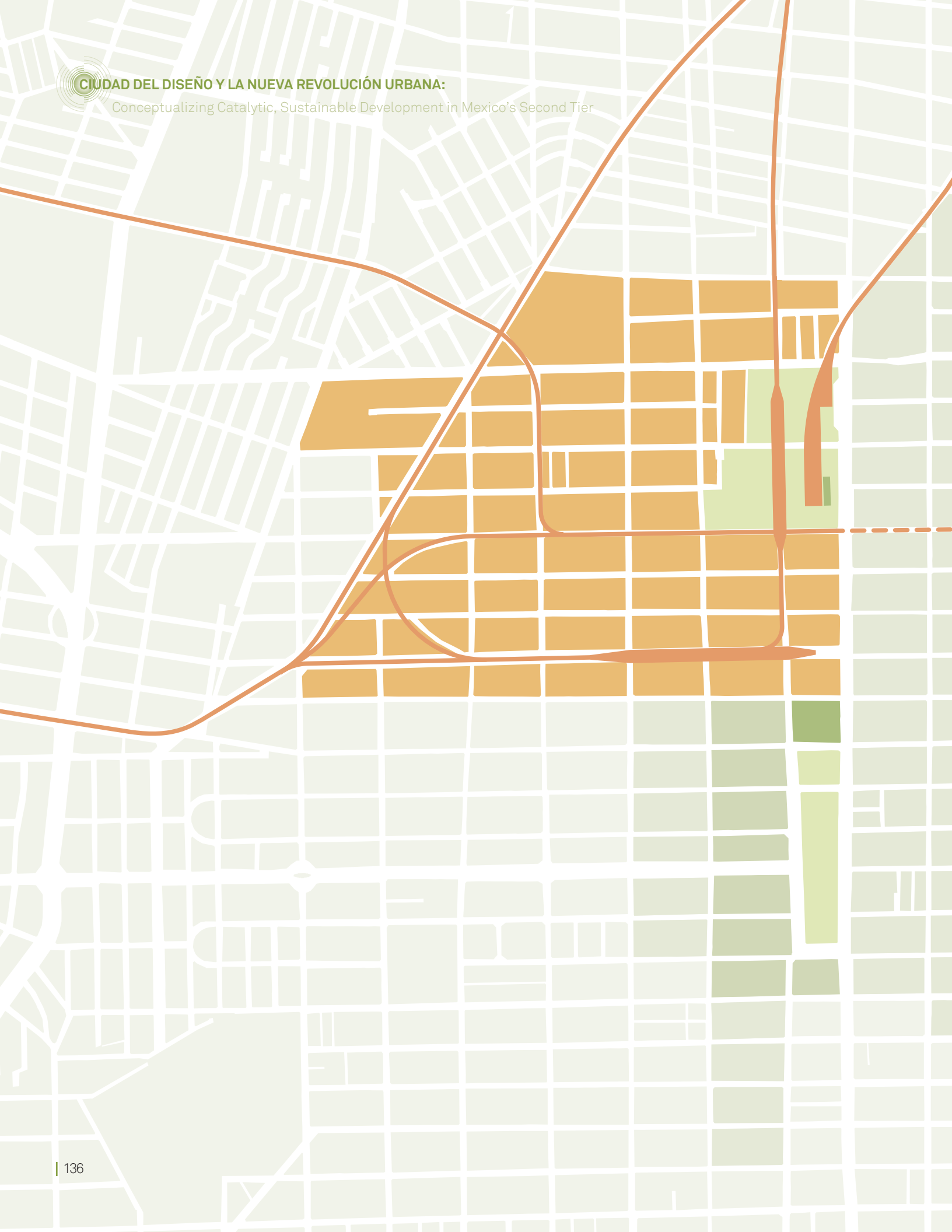
The design proposal in the previous chapter illustrates these six principles via a flexible twenty-year plan to improve Puebla's competitive advantage globally, prepare for the city's 500th birthday in 2031-2032, and set the stage for the next 500 years. But additionally, we can further imagine this model adaptively applied to industry cluster development in cities like Monterrey, Tijuana and Juarez – the combined total resulting in a new industrial and economic

structure for country and relieving development stress on the capital city.

It should be noted as well that this study represents the vision of a single individual, working remotely, and without ready access to local knowledge. To take this proposal to the next level of advancement would require coordination with local officials, industry leaders and citizens in a collaborative visioning and design process – the product of which would result in a plan better tailored to the realities, needs, and aspirations of Poblanos.

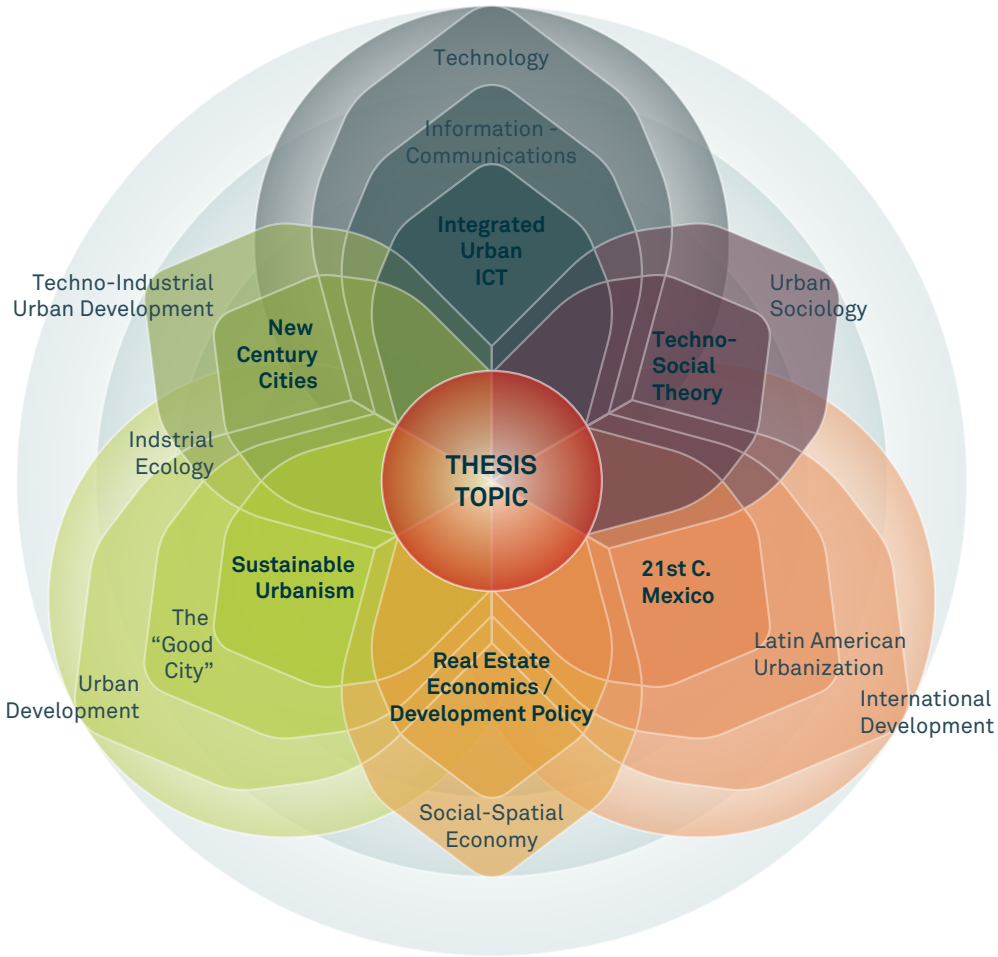
Since the Enlightenment, every generation and subsequent era of city-building imagines a future urban utopia, variously more productive, efficient, cleaner, healthier, and amenable than the city as it is. City-builders, eternal optimists, look to technical change as a means to realizing tomorrows' cities of tomorrow. Thus, Technocities generally, as defined and described by Kargon and Molella (2008), have at their core a deep structural tension arising from a techno-rational attempt to bind the seemingly opposed ideals of progress through modern technology with a simultaneous instinctual regression to an imagined pre-industrial Eden, engendered in what they term an apparent "techno-nostalgia" (149).

Every generation of city-building wrestles with this tension in new ways, attempting to resolve the apparent cognitive dissonance. New Century Cities are no different in this regard; they too invoke technological optimism, reified in built form, to pave a way toward smarter cities as engines of sustainable growth and purveyors of a greater equity and a higher quality of life for their citizenry. It remains to be seen then whether the New Century City, in its more evolved, integrated, context-sensitive, and flexible form, can advance beyond the simplistic singular utopianism of past prototypes to support a rich urban multiplicity, with all the ideological, social and consequent physical dissonance of the contemporary pluralist city.



# Literature Review, References & List of Figures

# Literature Review:




▲ Figure 117: Reference Topics (by author).

## REFERENCE TOPICS:

Key reference topics for this investigation include: Urban Development broadly; The "Good City; Sustainable Urbanism; Real Estate Economics and Development Policy; International Development (particularly Latin America and Mexico); Urban Sociology and the emerging role of Information Technology in urban social theory; Integrated Urban ICT; Techno-Industrial Development; "New Centruy Cities"; Industrial Ecology and Urban Metabolism.

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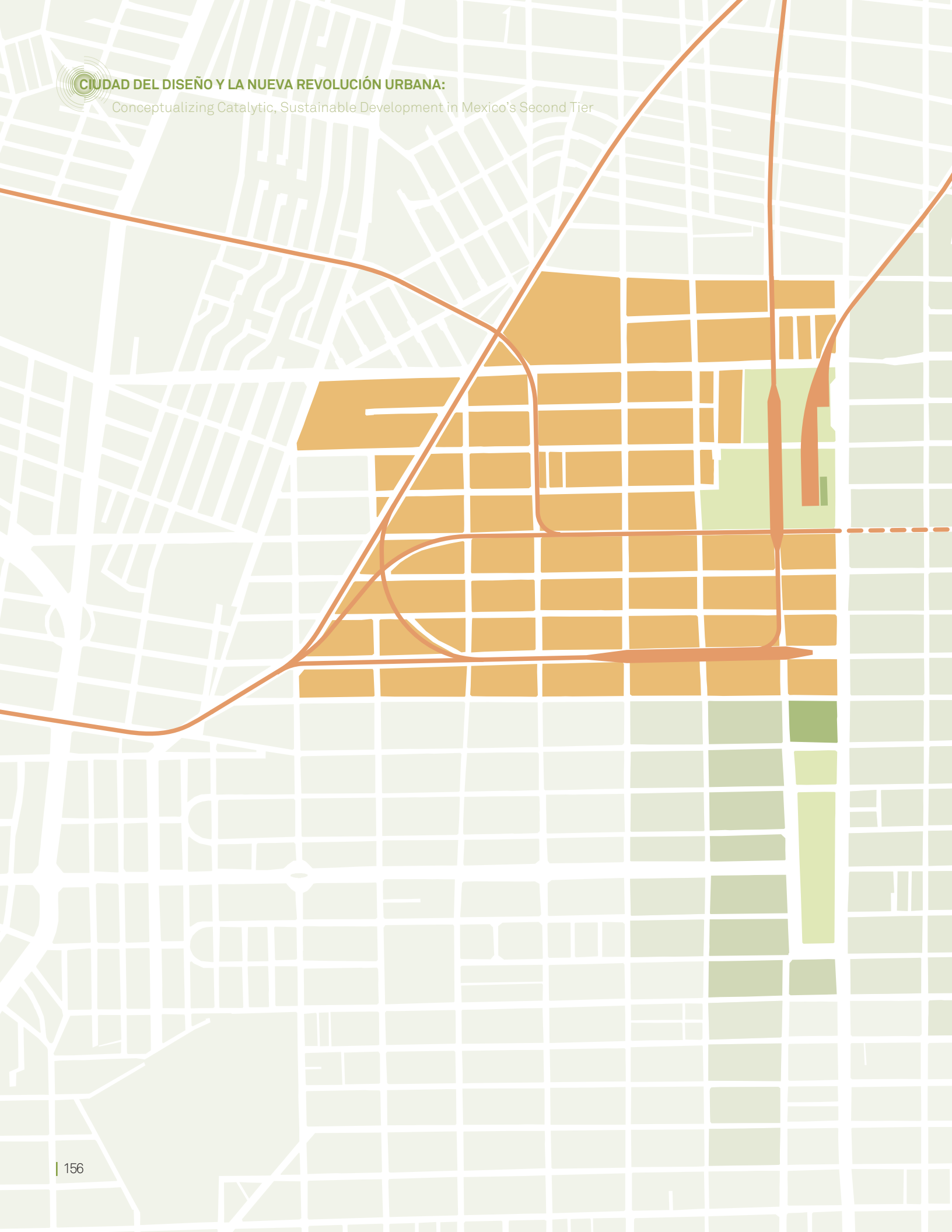


# Appendix: New Century City Case Studies

# Ørestad Nord

Location: Copenhagen, Denmark

Timeframe: 1994 - 2025 (nearing completion)

Industry Focus: Innovation in Communication, Media, Culture and Lifestyle

Development Partners: Ørestad Development Corp. and Ørestad Nord Grupen with development by landowners and other private ventures

Planning Area: 310 hectares (765 acres)

Site: 45 hectares (110 acres)

GFA: 328,500m$^2$ completed or underway (additional 120,000m2 possible)

FAR: 1.00

Major Program Elements: 9,500m2 Commercial; 136,000m2 Cultural / Broadcasting (DBC); 95,000m2 Housing (mixed housing typologies); 18,000m2 mixed-use; 70,000m2 Institutional (Faculty of Humanities at Copenhagen University and the IT University of Copenhagen)

Transit: New Vestamager Metro, local bus and Bike lanes

Virtual Public Realm: Ørestad.Net


# Arabianranta

Location: Helsinki, Finland

Timeframe: 1994 - 2013 (nearing completion)

Industry Focus: City of Innovation in Art, Culture and Design

Development Partners: City of Helsinki with Art and Design City Helsinki (ADC) Ltd.

Site: 85 hectares (210 acres)

GFA: 575,000m2

FAR: 0.68

Major Program Elements: 315,000m2 Commercial including the Helsinki Living Lab, Hub for Creative Industries and 6 Educational Institutions; 260,000m2 Housing; Reuse of the arabia Ceramics and Glassware factory

Transit: Helsinki Tram lines 6 and 8; frequent bus service:

Virtual Public Realm: Helsinki Virtual Village


# Digital Media City

Location: Seoul, South Korea

Timeframe: 1999 - 2014 or 2015

Industry Focus: Digital Media and Enternatinment Production and Distribution

Development Partners: Seoul Metro Government, Seoul Housing Authority, and the Seoul Metropolitan Development Corporation

Planning Area: DMC is part of the larger Sangnam New Millennium Town development site of approximately 480 hectares (1200 acres)

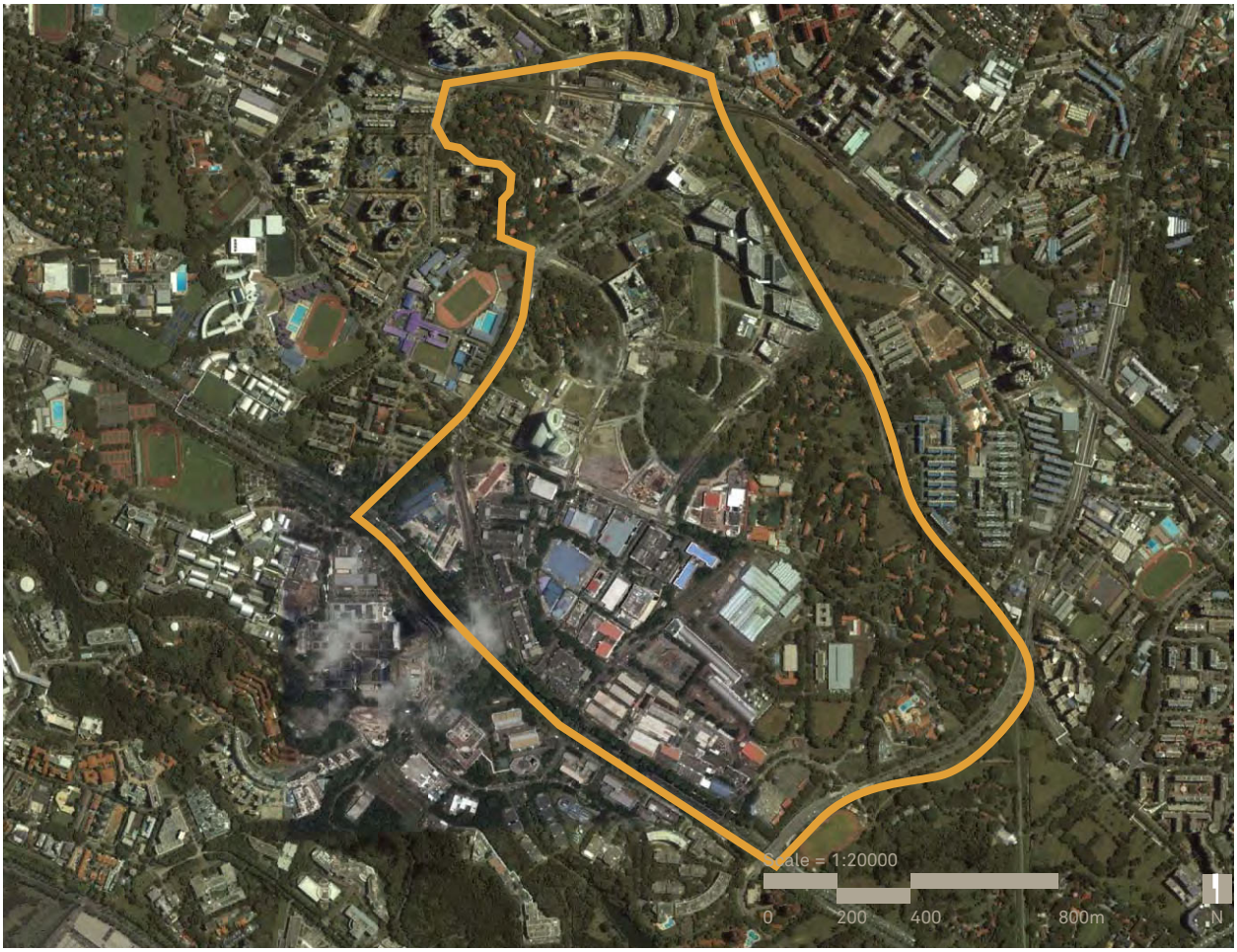
Site: 57 hectares (141 acres)

GFA: Approx. 3,000,000m$^2$

FAR: 5.15

Program Elements: 1,800,000m2 Comercial; 110,000m2 Incubator; 200,000m2 R&D; 30,500m2 rental Housing; 24,000m2 Hotel; 580,000m2 Mixed Use; 192,000m2 Institutional (2 international high schools, a gallery, a digital content center and the municipal IT offices)

Transit: Digital Media City Station, with subway and regional rail connections.




# One North

Location: Buona Vista, Singapore

Timeframe: 2001 - 2021

Industry Focus: Multiple Industry Cluster Developments

Development Partners: Science Hub Development Group (SHDG), Jurong Town Corporation (JTC)

Planning Area: N/A

Site: 200 hectares (490 acres)

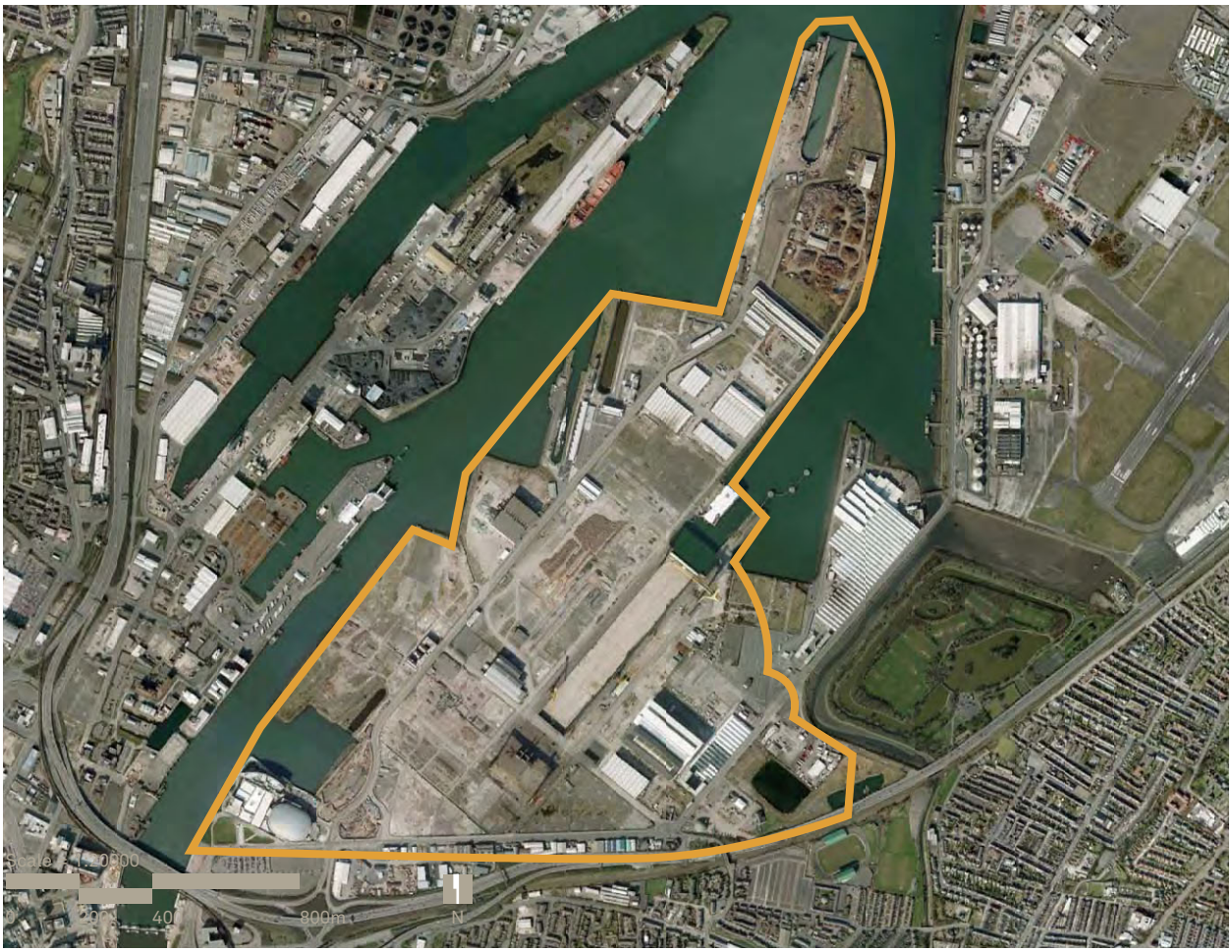
GFA: Approx. 5,000,000m$^2$

FAR: 2.5

Program Elements: Multiple commercial industry clusters, including Biopolis: research facilities for Biomedical Sciences; Fusionopolis: Hub for ICT, Media, Physical Sciences and Engineering; and Mediapolis: media hub for incubation and R&D, content production, distribution and playout.

Vista Xchange: business center, residential and entertainment hub.

Note: One-North focused on the developing a community centered on knowledge-industries. A mixed-use approach incorporates multiple clusters interconnected by housing, live-work, retail spaces, and parks.




# Titanic Quarter

Location: Belfast, United Kingdom

Timeframe: 2004 - 2023

Industry Focus: Maritime / Industrial Waterfront Regeneration; N. Ireland Science Park

Development Partners: Titanic Quarter Limited – a subsidiary of Harcourt Developments, Dublin.

Planning Area: 200 hectares (490 acres)

Site: 75 hectares (185 acres)

GFA: 1,500,000m$^2$ (estimate)

FAR: 2.0 (estimate)

Major Program Elements:

- Northern Ireland Science Park (NISP) including 70 companies. Offices for a range of industries including construction, hospitality, IT, financial services, retail, and creative industries. The Titanic Belfast signature building.
- 5,000 housing units, including affordable housing
- Campus of Belfast Metropolitan College
- Multiple public spaces.

# Milla Digital

Location: Zaragoza, Spain

Timeframe: 2005 – onward (private development currently stalled due to European financial crisis)

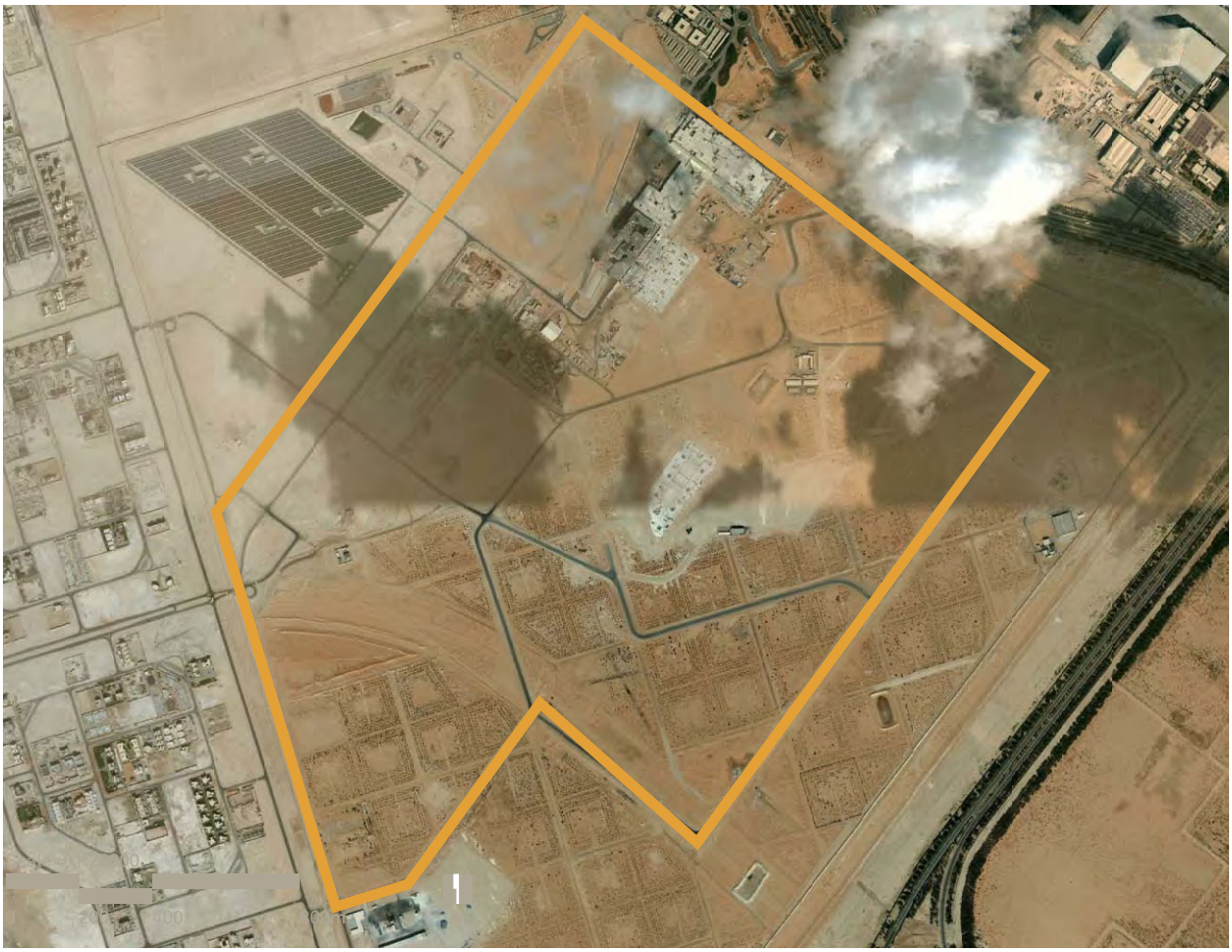
Industry Focus: Digital City (Knowledge and Innovation in the Arts

Development Partners: Zaragoza Alta Velocidad with planning by the City of Zaragoza

Site: 108 hectares (264 acres)

Program Elements: Expo 2008 Facilities, Hotel, a Convention Center and a Health center, Commercial Offices, Some residential included in plan with additional residential development on adjacent sites; Public Institutional facilities include the Digital Water Pavilion and the Center of Art and Technology (CAT); Interactive public spaces incorporating water and light

Transit: Zaragoza Delicias Intermodal Station, with High Speed and Regional Rail service, as well as bus service.



# Masdar

Location: Abu Dhabi, UAE

Timeframe: 2007 - 2025 (or later)

Industry Focus: City as Eco-Laboratory; R&D in Energy and Urban Sustainability

Development Partners: Masdar / Mubadala Development Company

Planning Area: 600 ha (1480 acres)

Site: 300 hectares / 740 acres (estimate)

Major Program Elements:

- The Masdar Institute of Science & Technology
- Masdar corporate headquarters
- Commercial Office
- R&D Facilities
- Residential
- Retail and Entertainment
- PRT System
- Attempting to develop the city as a living laboratory for sustainability

Note: Target for 100% renewable energy, zero carbon emissions and zero waste. Planned for 80% of water recycled. Solar energy infrastructure provides 200 MW of PV (10 MW field + 190 MW rooftop).


# MediaCityUK

Location: Salford (Manchester), UK

Timeframe: 2007 - 2030

Industry Focus: Global M&E Production, Distribution & Innovation Hub

Development Partners: Peel Holdings, Ltd./ Peel Media, Ltd

Planning Area: 81 hectares (200 acres)

Site Area: Phase 1= 15 ha. Proposed later phases =10 ha. Total 25 ha.

GFA: 692,000m$^2$ (estimate)

FAR: 2.75

Major Program Elements:

- 280,000m$^2$ Commercial
- 18,000m$^2$ Retail and Entertainment
- 142,500m$^2$ Residential (estimate)
- 36,000m$^2$ (est.) includes a 218 bed Holiday Inn, plus an additional 24,000m$^2$ planned.
- 192,000m$^2$ Parking (estimate)
- 23,500m$^2$ Production Studio
- Public space includes a 5000 person piazza and a potential pedestrian loop around Dock 9

# Ciudad Creativa Digital

Location: Guadalajara, Mexico

Timeframe: 2011-

Industry Focus: Global hub for Spanish Language Media & Entertainment Production and Distribution

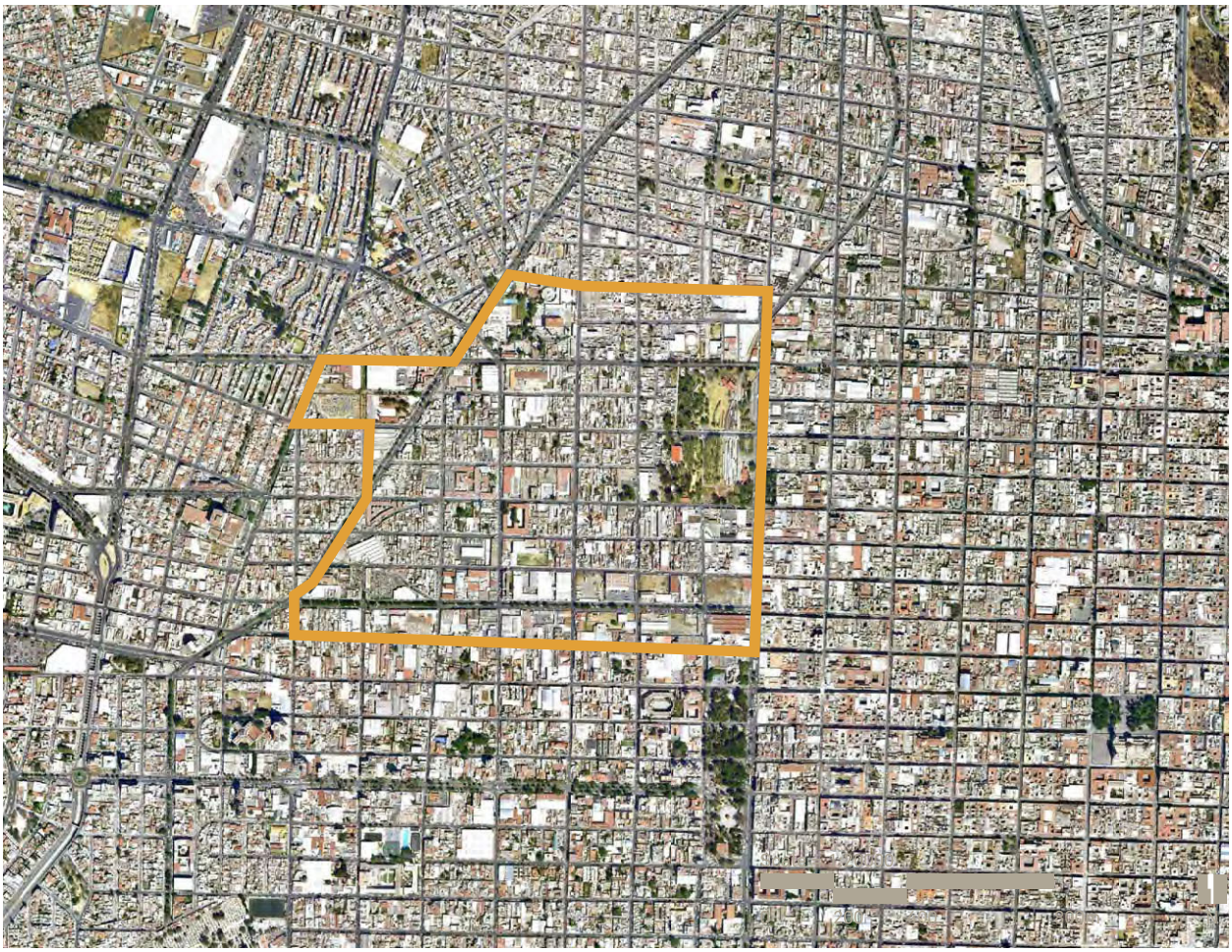
Development Partners: ProMexico, State of Jalisco, City of Guadalajara, MIT, CRA

Planning Area: 65 ha (estimate)

Site Area: 27ha

Major Program Elements:

- Food Market
- Outdoor Theatre
- Digital Arts Institute Campus
- Digital Arts Elementary School
- Reuse of a hospital for Incubator space
- Sports Facilities
- A Museum of Mexican Media and marketing center
- Augmented pedestrian infrastructure and neighborhood open spaces



# Ciudad del Diseño (proposal)

Location: Puebla, Mexico

Timeframe: 2012-

Industry Focus: Innovation in Design and Production

Development Partners: ProMexico, State of Puebla, City of Puebla, local industry leaders, artisans, community leaders in partnership with one or more developers.

Planning Area: 100 ha

Site Area: 40-50ha

Major Program Elements:

- Commercial: 360,000m2 including office, start-up incubation, lab, product research and development, prototyping, and commercial production space.
- 25% Residential: 240,000m2
- 25% Public / Institutional: 300,000m2 anchored by the new collaborative National Institute of Design and Production, and the headquarters of the National Design Foundation
- extension of public and technical school infrastructure, and addition of a new wing to Museo de Ferrocarril.
- 8% Retail / Entertainment: 80,000m2
- 2% Hotel: 16,000m2