IIT College of Architecture
ILLINOIS INSTITUTE OF TECHNOLOGY

WITH THE ASSISTANCE OF

Council on Tall Buildings and Urban Habitat

Gensler

Sustainable Vertical Urbanism: Towards 2050

A collaborative design studio undertaken by IIT College of Architecture with assistance from the Council on Tall Buildings and Urban Habitat, and Gensler

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Abstract
The year is 2050 and, after five decades of attempting to adapt cities to cope with "natural" disasters of increasing frequency and severity in the face of accelerating climate change, humanity has come to accept a simple truth: that the continued viability of our cities is now governed by the inherent sustainability of their location, rather than the increasingly desperate attempt to superimpose more resilient infrastructure on existing urban centers, which typified urban development in the first half of the 21st century. As we stand at the onset of 2050, cities have become soulless and undemocratic, vertical but largely homogenized, and reeling from one climate-change-induced disaster to another. The United Nations has thus established a task force, whose mission is to seek the most viable locations for new 100-million-inhabitant cities and suggest what these cities might become in physical, urban, social, political, economic, infrastructural and human terms.

The cloud studio will be based on the above scenario, conducting research in order to recommend where these new cities would be best located, relative both to current population masses and to the inherent climatic and resource sustainability of a given location. The project will also propose the most viable form for these cities in terms of urban planning, buildings and infrastructure.

Image Above: Shibam is widely considered as "the oldest skyscraper city in the world" or "the Manhattan of the desert", and is one of the oldest and perhaps best examples of a high rise "vernacular harmony".

1. Introduction

The year is 2050 and, after five decades of attempting to adapt cities to cope with “natural” disasters of increasing frequency and severity in the face of accelerating climate change, humanity has come to accept a simple truth: that the continued viability of our cities is now governed by the inherent sustainability of their *location*, rather than the increasingly desperate attempt to superimpose more resilient infrastructure on existing urban centers, which typified urban development in the first half of the 21st century. Rapidly rising sea levels, combined with intensifying hurricanes and typhoons, has rendered almost all significant coastal cities across the globe indefensible (see Figure 1). Significant flooding and other weather-induced mishaps are an almost monthly occurrence. Earthquakes of increasing regularity and severity, linked to pressure changes on the earth’s crust caused by the melting of polar ice sheets, has rendered cities in seismic zones unviable. Increasing temperatures and solar radiation has made desert-based cities all but indefensible, with the same being true of those in cold climates at the other extreme. In conjunction with all this, cities without proximity to critical natural resources – primarily fresh water and agriculture – are increasingly struggling. Though the truth is disturbing, the reality is generally becoming accepted that most existing cities – even those with many hundreds of years of history – can no longer cope with these conditions. As these cities evolved in a previous period with a different set of priorities and challenges, the social and economic cost of the repair of almost continual ravage and disaster is now too great to justify continuing to sustain them.

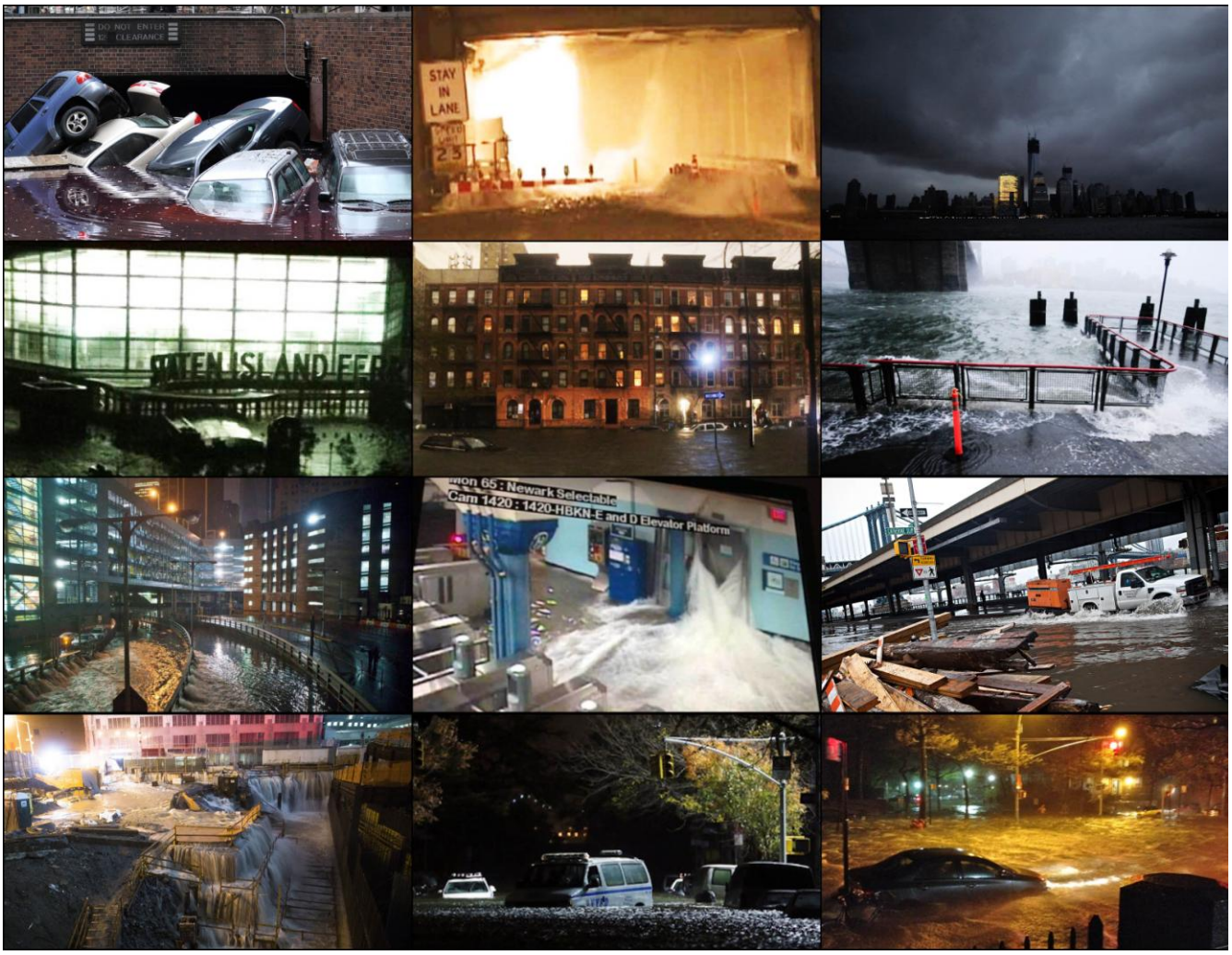

Figure 1: New York City suffered from continual floods and other “natural” disasters during the first few decades of the 21st Century. Image from: New York City Vision for "Rebuild by Design" by Bjarke Ingels Group.

Coupled with this, the accelerated population growth and urbanization witnessed over the last 100 years has resulted in a global population of 9.7 billion[1], 70% of which is urbanized[2], with most cities far exceeding capacity. The era of the 100-million-inhabitant city is now upon us, with the infrastructure in most – physical, social, cultural and economic – severely insufficient. Though the global population has now stabilized at 9.7 billion, myriad other, often conflicting, socio-economic factors are putting significant strains on our cities: declining birth rates, increasing longevity, the large-scale ageing of populations, and drug-resistant health epidemics, to name but a few. The flow of capital and human resources is now almost completely unregulated, which has put massive strain on certain cities at the expense of others, due to the lack of equality in the distribution of population growth and urbanization. But this pales in comparison to the problems caused by extreme income inequality. With 1% of the global population now holding more than 99% of global wealth, widespread human dissatisfaction is leading to daily conflict and death through acts of terrorism is now the single largest cause of global deaths.

Further, the complete homogenization of cities across the globe is now largely complete; with this comes a tremendous cultural and psychological impact (see Figure 2). Though historical architecture still exists in these cities, vernacular architecture that evolved through the consideration of local conditions – climatically, socially and culturally – has become lost in the import / export of a global template for architecture without regard for local influences. This has resulted in an alarming aesthetic homogeneity across almost all urban centers. Though the movement towards a more energy-conscious architecture in the first two decades of the twenty-first century had some notable successes, the large-scale sustainable evolution of our built fabric lost out to commercialism, the decline of political systems, and a lack of common consensus. Though the concentration of people in denser cities — with citizens sharing space, infrastructure, facilities, and consuming less energy per capita than those in an expanded horizontal city – was recognized as a positive strategy, this movement towards density and concentrated cities has left the problems noted above largely unaddressed. As we stand at the onset of 2050, cities have become soulless and undemocratic, vertical but largely homogenized, and reeling from one climate-change-induced disaster to another.

The United Nations has recognized that this situation now threatens humanity's very existence. The status quo is no longer acceptable and many believe there should be a wide-scale abandonment of indefensible cities, and that new cities should be constructed to address the problems noted above. The United Nations has thus established a task force, whose mission is to seek the most viable locations for new 100-million-inhabitant cities and suggest what these cities might become in physical, urban, social, political, economic, infrastructural and human terms. The project will thus recommend exactly where these cities would be best located, relative both to current population masses and to the inherent climatic and resource sustainability of a given location. The project will also propose the most viable form for these cities in terms of urban planning, buildings and infrastructure (see Figure 3). The future of humanity depends on the findings of this research.

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[1] United Nations, Department of Economic and Social Affairs, Population Division, (2015). World Population Prospects, The 2015 Revision: Key Findings. [online] Available at: https://esa.un.org/unpd/wpp/Publications/Files/Key_Findings_WPP_2015.pdf [Accessed 6 Jul. 2016]

[2] United Nations, Department of Economic and Social Affairs, Population Division, (2014). World Urbanization Prospects: The 2014 Revision. [online] Available at: https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Report.pdf [Accessed 6 Jul. 2016]

Figure 2: Cities of the world have become culturally and aesthetically homogenized, with skylines that become synonymous with the place, but are not necessarily related to the culture or climate. Skylines from top: Warsaw, Miami, Melbourne. (images copyright Filip Bramorski, UpstateNYer, Cazz).

2. The Task

This two-semester studio is based on evolving a response to the above scenario. Semester 1 will be largely research-based, focused on a study of both appropriate and inappropriate models of architecture, urban planning, infrastructure, technologies and socio-economic systems, relative to the climate zones listed below, as recognized by the Köppen climate classification system:

1. Tropical/megathermal climates
    - Tropical rainforest climate (e.g., Singapore)
    - Tropical monsoon climate (e.g., Miami, U.S.A.)
    - Tropical wet and dry or savanna climate (e.g., Ho Chi Minh City, Vietnam; Rio de Janeiro, Brazil)

2. Dry (arid and semiarid) climates
    - Arid (e.g., Phoenix, U.S.A.)
    - Semiarid (e.g., Denver. U.S.A.)
3. Temperate/mesothermal climates
    - Mediterranean climates (e.g., Rome, Italy)
    - Humid subtropical climates (e.g., Shanghai, China)
    - Oceanic climates (e.g., Berlin, Germany)
    - Highland climate (e.g., Mexico City)
4. Continental/microthermal climates
    - Hot summer continental climates (e.g., Chicago, U.S.A.)
    - Warm summer continental or hemiboreal climates (e.g., Quebec City, Canada)
    - Subarctic or boreal climates (e.g., Murmansk, Russia)
5. Polar and alpine climates (e.g., Nord, Greenland)

The output for semester 1 will embrace two scales:

1. **GLOBAL.** Students will work in pairs to create a viability plan for cities in certain regions, pertaining to the climate zones above – determining which existing cities are non-defensible in those regions, which are viable and expandable into the future, and which new cities are required. In the case of the new cities, the pair will determine where they are best located, based on the factors studied.
2. **URBAN.** Students will continue in the same pairs to research the challenges and opportunities of the climate zone to come up with an urban vision for a part of the new 100-million-inhabitant city in that climate zone. Though the urban vision should embrace the incorporation of infrastructure and space in the two- and three-dimensional settings, the overriding output of this stage of the project will be the creation of a series of images and 3D models that portray the essence of the new city. This essence should be based around a new harmonious high-rise "vernacular" for the city, based on the opportunities of the climate and place, and thus not be a "menagerie" of competing high-rise icons that typify many cities today.

As part of the studio, students will have the opportunity to travel to the Pearl River Delta region including Shenzhen and Hong Kong in October 2016, as part of the **CTBUH 2016 International Conference** "Cities to Megacities: Shaping Dense Vertical Urbanism." This field trip provides unprecedented opportunities to participate in lectures, workshops, and urban and tall building tours in a region that offers a global example of the competing pressures highlighted in this course – massive growth, verticalization, and urbanization over a relatively short period of time, with many examples of good urban planning, infrastructure, and tall building design, along with many examples that are inadequate. Students will present the initial findings from their studies to senior staff members from Gensler and other leaders in the industry in a "special session" of the conference. **All students taking the course over the two semesters will be given a $1,000 bursary to help with the costs of this trip**.

Students will continue working in their pairs during semester 2 to develop the urban vision in more detail (i.e., at a community/block scale), and specifically to develop the design of one tall building within the vision to an advanced level.

Note:

1. Students who undertake this Cloud Studio are highly encouraged to also enrol on the corredponding seminar course delivered by the same studio professors: **"ARCH 570: Talking TALL I"** in the Fall semester.
2. Funding for students to visit Shanghai has been kindly provided by Gensler, via the "Gold + Design Research Sponsorship Package" at the CTBUH 2016 International Conference.

3. Project Aims & Objectives

The aims of the project are:

a) To explore and resolve the synergistic relationship of considering a city in a unique environmental setting.
b) To explore how that city can be inspired by the local cultural, physical, and environmental conditions.
c) To determine the programmatic brief for that city/area based on micro and macro urban studies.
d) To understand the issues involved with designing an urban area containing multiple functions.

e) To understand how considerations of history, culture, economy, environment, infrastructure, program, etc. are as vital to the success of the architecture as place, function, form, etc.
f) To develop the design of the city and building in some detail in order to properly investigate and understand the relationship between the design and the making of spaces and places.
g) To explore appropriate oral and graphic presentation skills through the duration of the project so as to communicate ideas to their maximum potential.

4. Schedule

- Week of Aug 21: Introduction and determining pair allocations & working climate zones
- Week of Aug 28: Research existing major cities in the selected climate zones in terms of climate and resources
- Week of Sept 4: Research existing major cities in the selected climate zones in terms of history and culture
- Week of Sept 11: Research existing major cities in the selected climate zones in terms of physical urban form
- Week of Sept 18: Determining the location for the proposed new 100-million-inhabitant cities
- Week of Sept 25: Determining the scale of the "new" cities, including the whole footprint, density, program, etc.
- Week of Oct 2: Create "new" city vision drafts
- **Week of Oct 9: Midterm Review**
- Week of Oct 16: Revise the city plan based on the critiques received in the midterm review
- Week of Oct 23: explore block-scale urban planning and design
- Week of Oct 30: design determined blocks
- Week of Nov 6: design determined blocks in details
- Week of Nov 13: design determined blocks in details
- Week of Nov 20: work on physical models and drawings
- **Week of Nov 27: Final Review**
- **Week of Nov 4: Submission**

5. Final Submission Requirements

Further Guidance will be given on the final submission requirements well in advance of the midterm and final reviews. As well as needing to produce the necessary diagrams, plans, sections, etc., to explain your urban design in detail, you will also be expected to produce final physical models (scale TBD) and renders of urban visions. Advanced computer skills are thus beneficial for this studio.

As well as the completed Graphic Presentation of your design presented at the final review, you will be expected to submit a CD or DVD of all digital work which will be hosted and publicized on the CTBUH website and in other mediums. Specific guidelines on how this material should be formatted will be provided at a later date.

6. CTBUH International Student Competition

The students' work would be encouraged to be submitted to the CTBUH 2017 International Student Design Competition. See the corresponding 2016 competition here

7. Useful Resources/Suggested Reading

One of your main resources for this project will be the CTBUH website (www.ctbuh.org) which, in itself, contains links to many other tall building-related websites. You will be given a thorough orientation of the CTBUH website (as well as the physical CTBUH Resource Center) during the project introduction, including a recommended reading list.

8. Americans with Disabilities Act (ADA) Policy Statement

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must go through the Center for Disability Resources office. The Center for Disability Resources (CDR) is located in Life Sciences Room 218, telephone 312 567.5744 or disabilities@iit.edu.