POWERSTRUCTURES
THE URBAN FORM OF REGULATION
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POWER STRUCTURES
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BY ARIEL NOYMAN

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE ON MAY 21, 2015
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ABSTRACT

This thesis aims to explore the relationship between urban form and law, regulation and policy in the built environment. It depicts the roots, the necessity and exponential growth of regulations across the urbanized world and portrays their effects on urban design and architecture. Through several contemporary case studies, this thesis investigates the power and flux of regulation on the formation of modern cities. It focuses on the hidden mechanisms that construct or dissemble cities, setting the argument for lawmaking as an act of design.

Moreover, this thesis depict the design, deployment and operation of a Tangible Regulation Platform, a physical-technological apparatus made for the distillation of regulations. The platform is set to exemplify the effects of regulations on a designated territory, allowing planners, designers, stakeholders and community members a common ground for discussion and decision making. An accessible and self-explanatory tool, this platform illustrates the relationship between urban form and regulations, offering a seamless and transparent process of regulation-based urban design.

Lastly, projecting on the foreseen future of law and urbanism, this thesis proposes an alternative data and performance-based approach for the making of new regulations. Beyond excelling the processes of design under regulations, this platform and other new tools are offered to help facilitate a discussion on the way future regulations will be devised, improving both the design processes and their final outcome.

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Head of City Design and Development Group

THESIS READER | prof. Eran Ben-Joseph | Professor
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to Roni.

for making it all possible.
POWER STRUCTURES
THE URBAN FORM OF REGULATION

THESIS | ARIEL NOYMAN | SMARCHS IN ARCHITECTURE AND URBAN DESIGN
MASSACHUSETTS INSTITUTE OF TECHNOLOGY | 2015
"The most formidable restraint yet placed upon the rank growth of American building is, without doubt, the Zoning Laws

From the point of view of Design, it is interesting to recall that the Zoning movement... was not at all inspired by concern for its possible effects on Architectural Design. The recollection is interesting because the actual effect of the law was to introduce what is often spoken of as no less than a new era in American Architecture. The whole procedure constitutes another example of the fact that the larger movements of Architecture occur not as the result of some individual designer's stimulus but in response to some practical general condition."

Hugh Ferriss, Metropolis of Tomorrow, 1929
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Prof. Ryan is an Associate Professor of Urban Design and Public Policy in MIT’s Department of Urban Studies and Planning. His research focuses on the aesthetics and policies of contemporary urban design, particularly in postindustrial cities and neighborhoods. His work involves the investigation of innovative approaches in contemporary planning and urban design, as reflected in the spring 2013 Singapore Workshop: ‘Parametric Urbanism’ and his yearly seminar ‘Urban Design Ideals and Actions’. In the context of this thesis, Prof. Ryan’s work involves examination of new techniques and methods for the betterment of planning processes and a profound research on the challenges of policy and design in contemporary cities.

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“Evolution of the Setback Building, First Stage” (1922)

Hugh Ferriss’ architectural sketches, 1915-1961
Introduction

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POWER STRUCTURES: THE URBAN FORM OF REGULATIONS

“Rules do not act, but they do remain in force. It is not rules themselves that are productive, but instead those who adhere to them. Because of this inherent passivity, regulations initially lead a shadow existence within discussions of the urban will-to-form and the will-to-change.”

Regulating the development of cities is one of the latest developments in urbanism. While historically, building codes and general land use division existed, a non-imposing equilibrium was kept between the public needs and the development pressures. Yet a comprehensive top-down approach towards the form and shape of entire cities is a new phenomena. The necessity of regulations is strictly tied to the modernity of cities and the nature of their development. While historical regulation were set to enunciate the authority of a local ruler or the social rights of the individual, the modernized city demanded much clearer solutions to its density, hazards and operation. For over a century, untamed development of cities has been incrementally restrained by the limiting forces of law, policy and regulations. Amidst the eruption of the capital economy in the 19th century and the fast track modernization of eastern urban centers, the pressure for new development overcame the cities' delicate balancing mechanisms, thus provoking the creation of regulatory frameworks. The technological advancements of the past century allowed an almost indefinite maximization of the potential ingrained in a real-estate property: The elevator, the steel frame and the reintroduction of concrete, supported boundless multiplications of the parcel's extents. Modernization also introduced unconventional land uses. Cities began to incorporate large industry and production facilities within residential areas. What before was small-scale production for local use, has turned to massive factories and manufacturing facilities, attracting hazardous materials, noise and pollution. While these new economies and technological advancements promoted higher, bigger and faster developments than ever before, the quality of life in these cities started to gradually deteriorate. Major cities become uninhabitable or sometimes deadly places to live in. This uncontrolled developments and intermixed land uses have physically
effected both their near and far urban surroundings: They blocked daylight and direct sun, consumed sidewalks and congested pedestrian movement. The Standard State Zoning Enabling Act (1921) and the New-York City Zoning Laws (1916), originated from the lack of an organizing mechanism that could balance the development pressure and the public needs. These laws were the first manifestation of an urban form that did not only reflect financial resources, construction technology or the building’s program, but rather a set of intangible rules and regulations designated to protect the public needs. Ever since early regulations and zoning were introduced, the creation of new urban forms involved policy and law makers as active participants in the design discourse. While the combination of law and design emerged in order to correct historical inequalities, the influences of these legal mechanisms grew exponentially throughout the years.

In the past decades, the accumulating effect of policy and regulation on the shape of the urban form, shifted from a compact set of civic guidelines to a monumental legal expressions of the city’s character. Today, modern law, policy and regulation have dramatic implications on design outcomes, crossing all projects’ scales and usages. These laws span from general definitions, such as conventional land use division, to highly specified interventions, such as the building form, desired architectural details and finishing materials.

While these rules ultimately dictates the form and shape of the urban realm, they emerge from numerous sources and unrelated processes. The nature of modern city planning invites long and cumbersome procedures which may take years or even decades before a plan or a project could be realized. During that time, a massive body of legal documentation is being established, with or without relations to the on-going development. Plans and studies are being examined by various permitting bodies (local and federal governance, design reviewers and the public) while at the same time, zoning amendments are being approved, regulations change and new administrations are being elected. This modus operandi leads to a flux of legal sources and to the creation of unmanageable regulatory database. Despite the perception that this information is supposed to be accessible by law, the accumulation of laws, regulations, policies, guidelines and amendments demands massive efforts and resources, rendering its comprehension nearly impossible.

Yet the accessibility to this information...
is crucial. A fundamental phase in the creation of an urban plan or an architectural intervention is the superimposition of codes, zoning, regulation and local policy in order to illustrate their limiting bounds. These rules, conceived by different civic authorities, are ‘carving’ through the real-estate property, creating a virtual envelope for potential development. The design and architectural process bounds itself to these envelopes, reacting with shapes, forms and materials. Understating these virtual envelopes is an imperative step in the conception of form making in modern cities, as well as the characterization of contemporary architecture and design.

**METHODOLOGY**

This thesis hypothesizes that all contemporary city design resides within these confines, predefined by a flux of limiting forces. This thesis focuses not on a deliberate act of design as the conveyor of urban form, but rather on the exploration of these legal envelopes which passively allow for design to evolve. Specifically, this thesis explores the margins bonding law, regulation and policy with design and architecture, as an critical point in urban form making.

Through the authority of law and regulatory power, predetermined form-making is deeply embedded within early stages of planning processes, long before ‘deliberate’ act of design takes place. However, while ‘design’ tends to be a linear process (commonly in the form of research, concept, test and outcome) regulatory-based-forms are the accumulation of numerous legal layers, originating from different sources and sometimes spanning over various historical periods. Effectively, what is commonly apprehended as ‘design’, is the final step in the end of a long sequence, by which form follows regulations.

In the core of this thesis are a series of arguments, distilled from contemporary process of urban form-making:

1. The city is being developed in accordance to predetermined sets of rules, controlling its physical limitations and functional definitions.
2. Different cities and urban concentrations employ unique methods and degrees of limitations, defining their distinctive approach to design within their premise. Yet despite the differences in locality and governance, contemporary city planning processes often possess similar structure, concluding with the establishment of the planning
proposal in law, policy and regulations and its communication to the general public.

3. The segregation between different regions, their rules and legal frameworks produces hurdles in the effort to comprehend the outcome of these limitations.

4. Obtaining this information involves interaction with numerous governmental bodies, municipalities, public officials and stakeholders.

5. Even when obtained, the incoherency and vastness of this information demands immense efforts to render concrete results of it.

6. While parts of this information encompasses legal definitions which may not be related to physical and formal aspects, a growing segment of modern regulations discusses physical terms.

7. The representation of these laws may not determine the building’s definitive shape and form. The accumulation of these rules can create a visual envelope that acts as the base for design, authorizing architecture to act within its boundaries.

8. The density and complexity of these envelopes may vary, thus reflecting the unique authority regulation has on form in different places.

9. Exploring these differentiations can result with better understating on the way an urban form is conceived, ultimately pointing back at the role and motivation of law in city design.

Building on these assumptions, the thesis seeks for a technological remedy that could elucidate the impact of regulation on cities. This solutions, a proof-of-concept platform for spatial design under the constrains of law, is tested in the broader context of design processes, regulations and planing.

 OBJECTIVES AND STRUCTURE

This thesis correlates two corresponding streams of research and practical experimentation. The first is an exploration of urban law, policy and regulation, and their effect on form in the built environment. It follows the emergence of regulation-based-forms, through the analysis of historical and contemporary case studies. This part aims to highlight different methodologies of urban form-making, thus exposing the motivations and incentives that stimulated these mechanisms. The presented case studies offer a
perspective on a planning initiative which yielded a mutation of the existing regulatory framework. These alterations could emerge from a response to new market demands, response to natural disasters or the reemergence of a decaying segment of the city. Commonly, the rules and regulations that were utilized to govern these areas lost their relevancy due to inevitable changes, thus requiring new legal and formal attention.

The second stream offers a practical examination of tools and methods for discussing and communicating the effects of regulation on urban form. It presents an overview of relevant precedence and the evolution of technological tools for interaction. It also assesses contemporary methods for community engagement, questioning their long and short-term effects. Eventually, this part proposes a platform for policy and regulation-based-form making, depicting its design, operation and potential effects. At last, and through this platform, the thesis concludes by questioning the way existing regulations are being devised and imposed on cities: Could such tools impact not only the process of design-under-regulations but also the creation of new regulations? This twofold research structure consist of three chapters:

1. THE WAY WE DESIGN OUR CITIES

The first part will depict the ways and motives through which contemporary cities are being planned and designed, demonstrating how urban form emerges from regulatory procedures. It will illustrate the evolution of urban design through the perspective of regulatory-based-form, setting the discussion on the balance between control and anarchy. This part will try to question existing planning processes, focusing on the relationship between the emergence of urban form through legal framework and its response to the public needs.

This chapter will locate the thesis in between the last two phases of most planning procedures: the establishment of a legal framework for the proposed plan and the communication of these decisions back to the public. While early planning processes which define the ‘problem’ (the basic motivation for change) are crucial to the success of the planning proposal, these final steps ultimately shape the actual response to the issue. In other words, contemporary planning processes lacking either a strong legal backbone or supporting communities, will face difficulties in progressing and implementing their visions, as just and relevant they might
This part will compare the early days of regulations with the formation of this processes today. It will argue that while in the past, these phases originated from the public's desire to maintain health and quality of living in their cities, today these two phases are far apart. The processes of reviewing and permitting plans, even for relatively small projects, and the time gap until these decisions are being communicated publicly, foster uninformed society. The tactile future of the city, the potential for development or the physical changes about to come, are all undisclosed and vaguely broadcasted.

This chapter will confront current planning processes and will question the degree of public involvement and transparency they offer. It will highlight the margins between the regulatory and legal incorporation of proposed plans and the degree of engagement offered to the public.

2. REGULATION AND THE PROCESS OF FORM MAKING: URBAN CASE STUDIES

Through several contemporary urban case studies, the second chapter will explore the mechanisms of policy and regulation as form making devices. It will focus on sectors of major urban concentrations: NYC Midtown East, and the ‘Old North’ (districts 3 and 4) of Tel-Aviv, Israel. These case studies were chosen due to a unique change that is currently altering their urban form through regulatory amendments. For example, the city of Tel-Aviv’s is undergoing a massive urban redevelopment, as part of the response of the Israeli government to potential massive earthquakes in this region. These actions yielded a national plan (National Outline Plan no.38) by which building-rights and other incentives encourage developers to reinforce dangerous structures. This plan will eventually redefine the skyline of vast areas of the city, thus challenging the existing building rights, zoning laws and regulations.

While regulatory tools may appear similar in their physical terminology (setbacks, height limits, street level formation, etc.) the goal of this chapter is to recognize how these elements react to the special question each case study represents. This section will aim to expose the motivation behind the regulation amendments in these locations and explore their dissimilarities. This chapter will offer a visual repository of the defining regulation, as a preliminary effort to distill their effects and agency over city form.
3. TOWARDS TANGIBLE REGULATION

This chapter will investigate the accessibility and readability of regulatory urban information. Through a critical overview on existing informative channels and the practicalities of communicating urban changes, this section will question the effectiveness of contemporary methods for urban data distribution in the age of Big Data and information-intensive society. This chapter will highlight the difference between the various mediums of design and regulatory communication. As a starting point, tools and methods such as hardware and software and computational tools will be analyzed for their effectiveness in depicting law and regulation. This chapter will offer an brief historical overview on methods of law visualization, their degree of accuracy, relevancy and predictability of future development.

The historical transformation of communicating urban data will be investigated here. From the revolutionary work of Hugh Ferris in the early 1920’s, through the 1961 zoning amendment, to the 2011 New-York City Zoning Handbook, this part will critically illustrate the evolution of regulation and zoning documentation, public engagement and the streams connecting the two.

This chapter will propose a platform for collaborative design, public engagement and tangible regulations. It will investigate innovative and experimental endeavors such as advanced TUI’s, augmented reality platforms, smart-models, civic data web systems and others. This chapter will feature an on-going project and research done in collaboration with the Changing Places group at the MIT Media Lab.

The project was developed as a full-scale operable prototype, offers a computer-based, tangible urban planning platform. This chapter will illustrate the design process of this platform, technologies involved and experiments preformed. Although devised as a collaborative design tool, this platform allows a critical overview on the current state of regulatory mechanisms in cities. Concluding this thesis, this chapter will underline the need for translucent and accessible regulations, as a crucial starting point for contemporary urban design. It will aim to set the questions: How should city form continue to be affected by the ever-growing body of regulation and laws? Could cities rethink their dependency in endless and inaccessible design and building regulation? Are there alternatives to current data channels that will allow an

Figure 3. Baugespann, zürich

One of the zoning provisions in this area demands simulating the form and bulk of a new tower by a mockup, made out of steel frames and cables. This allows the public to share their opinions regarding the development.

http://www.baugespanne.ch/sites/news.php

Chapter 1

THE WAY WE DESIGN OUR CITIES
1.1 Regulations as a primal need
1.2 Prehistoric Rules
1.3 Modern Regulations
1.4 A Reality Check
1.5 Regulations: role and Challenges
1.6 An Opportunity For A Change
1. THE WAY WE DESIGN OUR CITIES

1.1 REGULATIONS AS A PRIMAL NEED

Throughout the course of history, urbanized parts of the world developed systems and mechanisms to maintain a desirable balance between urban development and the public needs. While these mechanisms spearheaded to most modern cities and became a prevailing instrument for devising urbanism, the public 'needs' were never broadly agreed upon. The unique conditions classifying each urban scenario and the variety of cultural and political settings demand these mechanisms to produce dissimilar outcomes.

Proactive regulations were structured as independent legal systems during the last centuries, reflecting a change in quality of life in cities. The inherent inability to control and protect heavily congested urban concentrations against natural disasters or the deed of men, motivated communities to devise and sustain regulatory frameworks.

Knox sees in the emergence of regulation and codes a response to a series of urban-related crises: health concerns in the form of epidemics, social disorders such as riots and strikes and natural catastrophes such as fires, floods or earthquake.

The congregation of humanity in cities and urban centers holds an inherent duality: It attracts commerce but spread diseases, it provides culture and leisure but also more prone to be attacked. As a victim of major and ongoing catastrophes, such perspective on the future requires an imposing framework that could promise the city's continuation and success. Individualism of property and action is set aside for the greater good of the city; an holistic approach towards urbanization must be advocated.

The need for regulations that could provide a road map for the future of entire cities or even larger regions, dramatically developed over the past century. While early motivation for centralized planning and law-making initiated from the fear and urgency of disaster and crises, the past century grew these devices exponentially. From simple and straightforward rules, urban laws and regulations grew to control much wider aspects of urban growth.

As such, questions regarding land values, city form or local economy,
encouraged policy makers to propose a coherent division of the city’s usages. Karkkain finds the roots of these deeds in the effort to defend land and properties values:

“...zoning advocates suggest that zoning is necessary to protect or enhance property values, particularly the values of residential properties (and especially single-family homes).”\(^\text{16}\)

The last century positioned zoning as a broad instrument for achieving city-wide planning goals. This approach follows similar logic to crisis-driven regulations, yet its application were much wider.

“This rationale has some intuitive appeal, based on the real or imagined horrors of entirely unregulated development.”\(^\text{17}\)

Continuing the humanization of cities, Karkkainen compares amounting need for regulations to the way humanity advanced: After addressing immediate human concerns and life-threatening issues, the urbanized world moved to regulate itself endlessly.

The progression in cities’ health and crisis management, as well as their ability to construct responsive mechanisms against natural disasters, could eventually render regulations irrelevant. If these laws only set to protect and maintain cities, modernity excelled these notable endeavors to autonomously eradicated:

“What allows modern regulations to continue dictate the formation and development of cities, was rooted in the wish to conduct better place-making. But where the eradication of danger might be addressed by elementary acts, the betterment of the urban realm is a constant task. As long as regulatory devices have to respond to constant changes and sporadic fluctuations, regulations - spearheaded by zoning laws - will remain a prominent element in the process of city making. Once the answer for urgent concerns is now a wide set of tools for the betterment and beautification of cities. At last, regulations, policy and law were engraved as major players in city design. Yet while perilous conditions demanded clear and bold reactions, subjects such as ‘standard-of-living’ are far less clear and much more site specific. The evolution of urban regulations


\(^{17}\) Ibid, p. 5

\(^{18}\) Ibid, p. 7

\(^{19}\) TOLL, supra note 9, at 178-80, 279
broadened the legal framework, aiming to resolve this ambiguity behind 'public needs'.

Regulating and subdivision of land were bounded by different interpretations and agendas. The mandate given to governing bodies over private and public properties rests on cumulative agreement and a strong belief in a greater good. These perceptions stand to a test when different interest groups dispute the proper usage of land and the authority of different governmental institutes. Law and regulations are the main forces operating in these cases, but never the less politics, economy and public opinion. This chapter illustrates the evolution and shift regulation went through in the past century. It focuses on the unbounded growth of regulations and law in American cities, illustrating its effect on urban form. It depicts the cornerstones in the development of urban laws and aims to address the conditions which brought regulations to its current state.

1.2 PREHISTORIC RULES

Building codes and norms regarding construction or building maintenance already appeared in prehistoric texts. Talen exemplifies some of these early codes and the motivation that led to their creation:

"Islamic codes, for example, are rooted in principles governing the acceptable use of land... The Ancient Romans enacted laws to keep industry out of certain areas, and in the middle Ages, noxious industries like tanning establishments were kept out of the city center." 22

Laws concerning the right for urban privacy or regulations regarding buildings' safety are already found in the old-testament:

"When thou buildest a new house, then thou shalt make a parapet for thy roof, that thou bring not blood upon thy house, if any man fall from thence..." 23

These different cultures and geographical edifices shared a similar desire to convey better society through spatial organization of their cities. While these tools helped shaping and maintaining order, they were not apprehended as an independent legal framework and were not established through a separated governing authority. Most historical and cultural urban laws were part of larger civic decree


22. Ibid, p. 526

that was set to maintain ordinary life in cities. These laws and guidelines were different from contemporary regulations since they were set as a delicate balancing system, determent to solve territorial junctions in peace; in cases where this system failed, specific ordinance were issued by a governing ruler.

As these historical sources show, the responsibilities for the safety and wellbeing of the buildings' tenants was issued upon the builder or the landowner. Similar rules demanded the establishment of barriers and walls between properties to provide privacy and clear spatial distinction between landowners. Other rules discussed the proper location of windows in mirroring facades, so that no direct eye contact will occur between one neighbor to another. The Code of Hammurabi is the earliest known building regulation, dated circa 1772 BC:

"If a builder build a house for someone and complete it, he shall give him a fee of two shekels in money for each sar (a unit) of surface. If a builder build a house for someone, and does not construct it properly, and the house which he built fall in and kill its owner, then that builder shall be put to death. If it kill the son of the owner the son of that builder shall be put to death. If it kill a slave of the owner, then he shall pay slave for slave to the owner of the house. If it ruin goods, he shall make compensation for all that has been ruined, and inasmuch as he did not construct properly this house which he built and it fell, he shall re-erect the house from his own means. If a builder build a house for someone, even though he has not yet completed it; if then the walls seem toppling, the builder must make the walls solid from his own means."

In these ancient cultures, the appearance of codes and laws was commonly contextualized by a wider daily-life decree. The development of ancient building regulations was largely maintained by these self-governed mechanisms, similarly to ancient laws of commerce, social behavior or good public conduct. Only centuries later, when the majority of rural Europe began to congregate in cities once again, regulations and codes started to amount, forming standalone legal frameworks.

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1.3 MODERN REGULATIONS

One of the attributes of modern cities is their role as organizing mechanisms. They control markets and economies, balance different political forces and offer spatial organization for countless activities. When modern cities grow or develop, they do not only change their physical scale but also the way different usages find their place in between the urban fabric.

This constant change is firmly tied with proliferation of city regulations and laws. Maintaining an organizing mechanism that allows for cities to prosper requires a legal framework that is tailored to the city’s specific needs. Uncontrolled growth or inter-mixture of different land uses will also affect the city’s capacity to thrive and will have direct impact on its residents, through health, economy of safety concerns. It is therefore that the modern era, which brought modernization to cities in unprecedented magnitudes, also spurred a new wave of corresponding regulations.

1.3.1 PRE-MODERN CITY LAWS

The limited extents of laws and regulation in ancient cities could be explained by the existence of balancing devices, independently controlling growth patterns and spatial organization. Massive construction efforts and entrepreneurial spirit were very limited prior to the industrial revolution and large urban projects could only be carried out by the governing regimes, rulers or kings. Projects of substantial scale where rare enough to be motivated by facilitators who did not answer to legal constraints, but their own.

The reemergence of cities as economic and cultural centers promoted the establishment of more precise laws and regulations in cities. Yet until the 20th century, when Urban Planning became the main regulator of city form, the relationships between law and urban development was commonly in the form of cause-and-effect. Although cities were perceived as confined entities, the legal framework devising their expansion was based on sporadic rulings and retroactive regulations.

In 1666, the Great Fire of London threatened to demolish the entire city which was densely build of wooden houses. Drawn by Sir Matthew Hale, the Rebuilding of London Act regulated the rehabilitation of the city. As part of its authority, the act required housing to have fire resistance capacity, authorized the City of London


28. In the US, the first national conference on city planning was held in Washington D.C., 1909


30. Ibid

Corporation to widen roads and allowed rescue brigades open pathways. The first building standards that were issued on a national scale were established along with the London Building Act of 1844.\(^{32}\) The law demanded builders to give the district surveyor two days' notice before building, so inspection could be performed on site. It also regulated the width of walls, height of rooms, the materials used in repairs, the dividing of existing buildings and the placing and design of chimneys, fireplaces and drains. In the city scale, homeowners were required to setback their property lines, so that streets could be wide enough\(^{33}\) for transportation, commerce and rescue needs.

As one of the first regulating entities, The Metropolitan Buildings Office\(^{34}\) was formed in 1845 to oversee the construction and usage of buildings throughout the city of London. Surveyors were empowered to enforce building regulations, which sought to improve the standard of houses and businesses and to regulate activities that could threaten public health. Haussmann's\(^{35}\) renovation of Paris, under the reconstruction of much of the city during the Second Empire (1852–70) introduced not only intimate changes, but also new sets of urban regulations geared towards future development. Among other changes, the plan promoted the construction of large apartment building blocks, streets were widen and traffic was policed. In terms of future projects, the plan devised laws to control the height of new buildings, limiting them to five or six stories at most while requiring minimal facades' variations. While the design of the buildings' interior and layout was left for the owners to decide, the streets' facades were strictly regulated, ensuring that the same height, color, material, and general design will be maintained\(^{36}\).

1.3.2 ZONING AND THE CITY

The expansion of Western cities during the first part of the 20th century was tied to rapid industrialization and emergence of new technologies. This era brought fortune and prosperity to many cities, but also introduced hazardous activities, siding residential quarters. In an effort to preserve property values and achieve operational efficiency in the structure and arrangement of the city, policy makers used laws and regulations to sort-out different land uses. These laws helped to expel incompatible activities, set limitations on building sizes and bulk and protect established areas from despoilment.

Zoning regulations, first instituted in
the early decades of the 20th century, were the principal means for achieving these goals. They set maximums for building breadth and height and designated acceptable configurations of structures within demarcated areas (zones). One of the major effects of zoning on urban development is the segregation of particular uses of urban land. Housing, manufacturing, and retail activities, which historically intermixed together, were set apart. Although zoning protected residents from adjacent harmful uses, it had a less-desirable effect of forcing long trips to work and increasing routine travel. With the emergence of the car-urbanism after the World War II, stiff zoning contributed to traffic congestion and to amassing infrastructure. The distinction of the city to tracts by their usage also limited activity in different parts of the city to different times, causing certain areas to be neglected or unoccupied.

Another tool by which modern cities controlled urban growth was the development of subdivision controls. Where zoning meant to dictate the manner by which a land should be developed, subdivision controls subjected the initial arrangement of vacant land to public regulations. These regulations affected the design of new developments and specified new streets, public spaces and land for infrastructure. Some subdivision ordinances even required property developers to provide the land needed for streets, playgrounds, or schools and to pay the cost of building these facilities, as a compensation for the right to exhaust the regulations.

Together with zoning, these two tools became the prevailing method for cities all across the US and Europe to control land, usages, development and public needs.

1.3.3 REGULATING THE UNITED STATES

Since zoning laws were first employed, they were commonly conceived through a plan, a product of spatial definitions aimed to respond to multiple concerns through a just subdivision of land. But while land division was utilized to control urbanized and rural lands alike, the last century pedestalized zoning as one of the most influential methods for controlling urban development. The earliest form of modern zoning was introduced in European cities toward the end of the 19th century. In harmony with deep-rooted municipal power, German and Swedish cities applied zoning regulations around 1875 to newly urbanized lands around old cities' cores. These cities enforced

Figure 5.

Los-Angeles Zoning Code documents


Figure 6.

Seattle city clerk, the city’s Engineering Archive

The clerk in the city’s old Engineering Vault attends to its records. Seattle Municipal Archives, negative is dated Jan. 30, 1936.
and widespread these laws at the
time of major building activity growing
out of the Industrial Revolution, thus
shielding from the effects of intermixed
land uses42. Much of the uniformity of
these cities today and the consistent
quality of their buildings is due to the
early establishment of detailed zoning
regulations.
Modern zoning ordinances in the US,
were motivated by
the need to location
commercial and industrial activities.
Early 20th century metro areas started
to grow in exponential rates. Population
density and flux of land uses rendered
parts of these urbanized metropolitans
unlivable. Concerns regarding the right
to fresh air and direct sunlight, as well
as housing shortages and contradicting
land usages43 brought New-York City to
compose the first Zoning Resolution of
191644. This set of laws and guidelines
was later anchored in a federal law
known as the Standard State Zoning
Enabling Act (SZEA, 1921)45, by
then Secretary of Commerce and later
President Herbert Hoover. Before
1916, New-York struggled for years
with untamed development. The
city, a major industrial hub and a
national gate to millions of immigrants,
became crowded and over congested
long before other world cities. But
it was a single structure, a landmark
for concentric school of thought, that
changed New-York's and other future
cities' development forever.

1.3.4 42 STORIES

The domain regulation has on the
urban environment is potentially best
described through its evolution in New-
York City. It is nearly unimaginable
that one of the most formally
predefined pieces of urbanism has
only been regulated less than a century
ago. Like many other modern cities,
the physical transformation of New-
York was hand-in-hand related to
technological advancements, financial
growth and the establishment of a firm
regulatory framework.
It was however, a single building that
symbolized the commencement of
contemporary design restrictions more
than anything else. The Equitable
Building, a 538ft neoclassical office
building in the Financial District
on Downtown Manhattan, was the
main cause for New-York City's early
adoption of zoning regulations. In
1915, the building was constructed as
the headquarters of The Equitable Life
Assurance Society. When Equitable's
previous headquarters were demolished
in a fire in 1912, this site, a commonly
shaped lot in Downtown Manhattan,
was chosen as the new location of
the company's headquarters, brining it

42. "Zoning (land
Use) -- Britannica
Online Encyclopedia." Accessed February 10,
eb.com/EBchecked/
topic/657885/zoning.
43. for example, a
hospital next to a power
plant that was built in
Chicago in 1905
44. Bressi, Todd W.
Planning and Zoning
New-York City: Yesterday,
Today, and Tomorrow.
Center for Urban Policy
Research, 1993.
45. "The Standard
State Zoning Enabling
Act." Wikipedia, the
en.wikipedia.org/w/index.
php?title=The_Standard_ State_Zoning_Enabling_ Act&oldid=633577061.
closer to other financial institutes. Exploiting the parcel limits, the Equitable Building was designed as a single massive extrusion, with only single shaft dividing the frontal facade above the street level. This massive form offered an FAR close to 30 and 75% GFA, making it the world's largest building (in total floor area) at time of construction. The building's bulky form, mounting to block direct sunlight and fresh air, was casting a seven-acre shadow over neighboring buildings, affecting their value and livability.

What eventually limited the Equitable height, originated not in law or policy. The building was originally intended to withstand 46 stories, but it was reduced by four floors, following the advice of a consulting engineer who determined the lower height as optimal for the elevators system. During the pre-regulated era of the city, monetary limitations and technical constraints were the main barriers for these types of developments.

Soon after the building's completion, public hearings and meetings were convened with the goal of creating an enforceable regulation that would prevent a building as such from occurring again.
1.3.5 NEW-YORK ZONING REVOLUTION

By 1910, New-York City had 4.7 million residents. It hosted the nation's corporate headquarters, busiest port and the largest manufacturing center in the East Coast. The bulk of this activity was crammed into lower Manhattan. Cases like the Equitable Building and the garment sweatshops popping in the 5th avenue, brought the public to demand policing power and a strict regulation system.

The ordinance that emerged from these occurrences represented a use of municipal authority on a grand scale. As adopted by the city's Board of Estimate and Apportionment on July 25, 1916, the ordinance subjected every piece of real estate in the greater city of New-York, spanning over properties valued over eight billion dollars.

The city's ordinance was composed of three major definitions. First, it divided the city into three use districts: residential, business, and unrestricted. Second, the ordinance designated five height districts, each establishing a relationship between street width and building height. The ordinance also required the upper portions of tall buildings to be setback from the street line. Third, the ordinance created five area districts, (from “A” to “E”) mandating open spaces at the rear and sides of tall structures and preventing residential buildings from covering their entire parcels. Together, these regulation responded to most annoyances presented by the public and could marginalize edge conditions for further municipal investigation.

Revel mention the amplitude of these ordinance:

"Taken together, these regulations represented a very ambitious use of the police power, giving municipal officials a significantly expanded array of regulatory controls over private property."

1.3.6 FOUR DIAGRAMS, AN ENTIRE CITY DESIGN

A year after the completion of the Equitable Building, New-York City passed revolutionar zoning laws that regulated and limited the mass and bulk of buildings according to strict mathematical formulas. In 1922, the skyscraper architect Harvey Wiley Corbett commissioned Hugh Ferriss to draw a series of four ‘evolution’ perspectives demonstrating the architectural consequences of the 1916 Regulations and Zoning laws. Ferris, an architect and an architectural draftsman, created these drawings in order to

56. Ibid
The Equitable Building by 'Shorpy'

While not the most prominent structure in the New-York City at the time, the bulkiness and massive profile of this 1916 building, crowned it as a notorious act of urban design.

communicate the textual narrative of the law, making it more accessible to architects for implementing in their designs. By doing so, Ferriss created an exceptional set of drawings that was not intended to illustrate a finite design idea or the developer wishes. Instead, these perspectives were a visualization of the law, substituting the complex textual format into readable diagrams. Beyond the artistic qualities of these illustrations, Ferris used an innovative technique to domesticate the stiffness of the law's language. The four drawings are essentially four different 'layers', allowing the viewers an accumulating, step-by-step understating of the law. Despite the unique rendering style, including shadows and bright lights, theatrical angles and mysterious backgrounds, Ferriss was not portraying 'buildings' but rather 'building envelopes'.

These four drawings were later featured in Ferriss's book 'The Metropolis of Tomorrow' 59, a vision of a futuristic metropolitan, occupied by gigantic skyscrapers and massive megastructures. With a Babylonian guise, Ferris imagined a shadowy and monolithic urbanism, where his structures are dramatically poised and lighten. The four diagrams, a byproduct of mathematical formulas and geometrical calculations, contradicted what Ferris saw as an act of design: "The most formidable restraint yet placed upon the rank growth of American building is...the Zoning Laws which, from their experimental beginnings something over ten years ago, have already been adopted in over three hundred American municipalities....From the point of view of Design, it is interesting to recall that the Zoning movement...was not at all inspired by concern for its possible effects on Architectural Design. The recollection is interesting because the actual effect of the law was to introduce what is often spoken of as no less than a new era in American Architecture. The whole procedure constitutes another example of the fact that the larger movements of Architecture occur not as the result of some individual designer's stimulus but in response to some practical general condition." 60

What Ferris understood, decades before other architects and planners realized, was that a clear understating of the law, both in its physical outcomes and performative attributes, is by itself a major part of design. None of his four diagrams could simply be structured: They lack architectural...
detailing, economic feasibility or structural proficiency. Similar to other laws, this envelope diagrams are only the threshold for design. The carved forms are the results of various and sometimes conflicting forces, aiming to protect quality of life but also to optimize revenues. These drawings represented an incremental conversion from law to reality, in a clear and straightforward way. Beyond clarifying complex policies, Ferris's work illustrates the need in supplementary apparatuses for communicating regulatory resolutions. In that sense, Ferris's work was not only pioneering in its understating of New-York's internal zoning laws but also in the integration of explanatory medias, connecting the textual narrative and the physical realm.

1.3.7 A ZONING PARADE

During the decade following the first iteration of zoning regulations in New-York City, many other cities and municipalities in the US implemented similar laws. Spreading this ideas all across North America was a one-men's job. Edward Murray Bassett (1863–1948) the chairman of the Heights of Buildings Commission in New-York City, was one of main contributors to the first Zoning Resolution in 1916. Since it was the first city to have such document, Bassett, a lawyer and a prolific writer, composed most of the text anew. Bassett was known as "The Father of American Zoning"61, for his role in leading the effort to implement solid regulatory frameworks in every major city across the US. He also took upon himself to educate the local authorities on these planning principles, conducting seminars and site-visits during the 1920's. For Bassett, an attorney and a man of law-and-order, cities were chaotic structures in urgent need for administrative organization. In 1913, a few years before he manifested New-York's code, he wrote:

"We must reckon first with the fact that Americans take for granted their right to do on their own property anything they please regardless of their neighbors"62.

After implementing his work in the juridical system of New-York, Bassett went on a persuasive journey across the US, including Chicago, San-Francisco, Boston and Los-Angels. He convinced authorities to adopt this approach and taught them how to cope with challenges, similar to the those New-York went through. By 1926, 68 cities were already zoned and regulated63. By


“The Four Stages” or “Evolution of the Set-back Building” are some of the most iconic and influential architectural images of the 1920’s. Widely exhibited and published, they inspired other architects to understand the rules of New-York’s 1916 zoning law, not as a restriction, but as a form-giving principle for a new, modern skyscraper.
the 1940's most large cities and many medium-sized urban concentrations had adopted Bassett concepts, an effort that was later named: 'The Great American Zoning Parade.'

For Bassett, this effort was not only a private endeavor to distribute his legal ideas. New-York City, as the first municipality to endure city-wide regulations, had to maintain this status while the rest of the US was yet unregulated. While the benefits of regulations became clear to the residence of New-York, a minority of citizens, mostly developers and business owner, opposed the new restrictions. The sudden inability to exhaust rights on parcels or the imposing laws on street width that ‘carved’ into private properties, caused disputes and sometimes revolts. Bassett took upon himself to convince other cities that this laws were a constructive addition to their municipal system. Creating this large alliance would eventually convey agreement amongst the public and will ease the distribution of city and state wide regulations. Yet while Bassett’s ideas about standardization and centralized planning were a major step in the modernization of cities, the degree of acceptance among different cities varied considerably. The manner by which cities around the US adopted Bassett’s radical ideas is responsible for many of the urban planning concerns these cities have to endure today. In some places, mainly in rural towns, issues of density and congestion were less relevant, causing the new regulation system to be only partially implemented. In such cases, new regulations were employed in city sections more prone to friction between landowners or the public. But as for other sections of these towns, matters of building rights and land use continued to be settled independently, through the existing local courts and without establishing superimposing principles.

This partial implementation is deeply rooted in the verity of regulatory structures featured in different cities all across the US. Today, most acts of zoning and regulating are being processed through the local government, allowing each municipality to act on behalf of its residents. This approach originates in the sensitivity of proper land utilization, demanding close acquaintance with the properties in question. But it also has to do with the way these cities historically accepted the authority of law and regulations.

1.4 A REALITY CHECK

The idea that private and public 64. Fischel, William A. Ibid
land alike are forced to be developed according to a predetermined set of rules, fueled heated debates when zoning regulations started expending all across the US. The Village of Euclid, Ohio vs. Ambler Realty, a 1926 Supreme Court landmark case, illustrates the obstacles which fronted zoning in its early adoption phases. Ambler Realty owned 68 acres in the village of Euclid, a suburb area in Cleveland, Ohio. The village, in an attempt to prevent the industrial zone of Cleveland from sprawling into the land of Euclid, developed a dedicated zoning ordinance. The fear of changing the character of the village brought its residents and their constituents to self-develop their own properties' rules and land uses, in an effort to limit unrestrained and intermixed development. The Euclid zoning ordinance included 6 classes of land uses, 3 classes of height limit and 4 classes of maximum area. Through these laws, the property in question was divided into three uses, as well as various height and area classes, thereby hindering Ambler Realty from developing the land for industry as initially planned.

In response, Ambler Realty sued the village, arguing that the zoning ordinance had substantially reduced the value of the land, without their ability to confront the regulatory decisions in advance. In the bases of their claim, Ambler argued that the procedure of regulating land, especially in relatively small towns, should be an open discussion between the relevant stakeholders.

Initially, the State Lower Court denied Euclid's motion and decided in favor of Ambler Realty. The courts ruled that the town's zoning ordinance did in fact constitute a 'taking' of Ambler's property and therefore was unconstitutional. Ambler Realty appealed to the US Supreme Court in order to reverse the Lower Court Decision. While the Supreme Court initially agreed with the previous denial of the motion, it overturned the result and sided with the Village of Euclid. The Court believed that the zoning ordinance was not an unreasonable extension of the village's authority and police power and thus it was not unconstitutional as Ambler Realty sought.

Urban Planner and lawyer Alfred Bettman, supported by the Ohio Planning Conference, submitted a brief to support Euclid, arguing that zoning is a form of 'nuisance control' and therefore a reasonable measure of the town's policing power. This argument basically asked to consider zoning as a proactive mean of control, similar to the one given to local police.

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or fire department. This argument repositioned zoning as a shield for cities against depreciation in quality of urban living, moreso than the way it was used by the City of New-York in 1916. The Supreme Court ruled that Zoning ordinances, regulations and laws must find their justification in serving the public welfare. What exactly are the benefits for the public welfare should be determined in connection with the circumstances, the conditions and the locality of the case. Therefore, zoning becomes an extremely site-specifies device, potentially irrelevant if utilized in another location.

The importance of this court decision is that it found Euclid’s zoning ordinance to have a rational basis, even if the future outcomes of these laws are yet unknown. At the time of this case, zoning was relatively a new concept, sometimes conceived as an unreasonable intrusion into private property rights. In finding that there was valid government interest in maintaining the character of a neighborhood and in regulating where certain land uses should take place, the court supported the distribution of zoning ordinances across the country. Cities started to understand the power given to them through a proper usage of zoning, allowing them to ultimately ‘design’ with law. The Village of Euclid case formed the basis for zoning law to prevail planning and city design for decades to come.

Several other specific cases also helped issuing better regulations and assisted in the perfection of zoning where it already existed. The overall benefits of this system were summarized by Revell:

“The development of zoning as a legal tool for local government created another public benefit to bargain over: real estate groups looking to protect property values, neighborhood associations anxious to keep out undesirables, planning enthusiasts eager to implement their ideas, municipal reformers ready to apply expertise to the great urban problems of the day, and local government officials interested in dispensing “legal” patronage, all magnified the impact of Bassett’s ideas.”

Beyond the intimidate effect of zoning on the design of a city, an inscribed law also promoted a fertile feedback loop. Like other municipal procedures, zoning allowed interest groups to easily responded to issued ordinance, voicing their opinions beforehand.

“zoning boards could parcel

out residential restrictions to this neighborhood association or building-height limits to that merchant group in return for their support for a city-wide ordinance that achieved other goals. In this sense, the portability and ease of application of the comprehensiveness rationale insured the rapid diffusion of feedback effects.”

1.5 REGULATIONS: ROLE AND CHALLENGES

In less than a century, urban planning and design regulations dominated nearly every city, town and village across the US. This rapid expansion also created many challenges for different stakeholders involved. Questions such as the limitations of law, enforcement of jurisdiction and private rights are often heard in that matter. Other concerns regard the design outcome that results when following or avoiding the imposed laws. More issues are related to the capacity and cumbersomeness of contemporary regulations, pointing the unrestrained growth of legal documentation. The depth and formation by which regulations are being used today, hinders a collective regeneration of this legal system. Aiming to address regulations and codes concerns using a single argument is irrelevant as prospering a single masterplan to prevail all cities across the US. The form by which regulations were adapted, require an intimate understating of the site, the population and their needs. While these issues are debated in the national level, they could only be addressed through the local scale. Such duality was represented by Vermilya already in 1941:

“Although building regulation is a national problem in many of its aspects, it does not yield easily to a national solution, a factor which is at the core of the difficulty. No solution which does not effectively treat with this phase can produce desired results.”

Amongst the many issues affecting contemporary regulation, it is possible to recognize several topics which cross scales and localities. This part aims to portray some of these questions, setting the argument for a change in practice and for advocating for a different approach in future regulations.

1.5.1 TERMINOLOGICAL AMBIGUITY

The uneven way regulations and zoning laws spread across the US overburden
the illustration of a comprehensive planning process. Generalization is needed to encompass the verity of different practices, yet by reducing site and culture-specific attributes, it is possible to learn how public needs are formulated into urban rules. The role of regulations within these processes is varying in correspondence to the specific needs of the public and changing in accordance to the various stages of the planning procedures. In reality, each development process is different thus its phases do not always follow a straight sequence. Nevertheless, it is valuable to consider regulations and development processes together in order to understand how they effect the final design outcome.

In contemporary planning, local authorities channels their policing power on urban design through zoning, design review, historic preservation ordinances, or subdivision controls. Each of these legal sections could be defined differently, in accordance to the given locale, government or municipality. These sections are also affected by their degree of legal imposition. The range of regulatory intervention in planning processes resulted with proliferation of design guidance and in multiplications of terminologies. These could consist of: Policies, laws, regulations, codes, standards, design protocols, design guidelines, design strategies, design frameworks, briefs, development standards, spatial master plans and others. The different dialects used to describe different roles of and action conveyed by law, portray the challenge facing modern regulations:

“These terms are often confusing, poorly defined and over-lapping, and despite attempts to classify them in relation to one another their sheer variety only helps to illustrate the ambiguity of design guidance as a design/ development tool, and the confusion that can too easily result from its use.”

1.5.2 THE LIMITATION OF POWER

In the US, planning and urban design regulations are defined through a complex system of legislation, judicial opinions, constitutions, and private agreements that together guide the physical layout and operational hypothesis of a built environment. The mandate to enforce these laws and regulations is commonly by the hands of local governances: municipalities, districts, cities, neighborhood task forces or self-declared communities. Their decisions, delivered in written

74. Ibid. p. 287
75. Ibid. p. 288
zoning documents, drawings or simulations, become the ‘law of the land’ for these localities.

The court of law has an important role in balancing the police power of each of these regulating entities. While ideally the hierarchy by which regulations are imposed should hinder overlapping authorities, effectively, in many cases more than a single regulatory entity is involved in the creation of law. As in the case of Euclid, courts are acting as mediators, announcing whether a governmental body have exceeded its legal boundaries or, more fundamentally, whether the ordinances, statutes, and accompanying decisions themselves have offended the constitutional rights of individuals.

The complexity of modern regulations many times exceeds the capacity of the local planning authorities to mitigate their policing power over the individual’s rights. This junction is a source of friction between imposed regulation and private interests:

“The dynamic tension between government power...and individual rights...has provided much of the excitement in the evolution of urban design law. The evolving challenge...provided and managed by private actors will require adaptation of prevailing legal norms and invention of new ones.”

This approach sees in regulations a dynamic process, more than a stiff decree. In that sense, it advocates for further regulation and for the establishment of a firm legal system to triumph urban planning as a whole. While local governance will still hold major policing power, a wider umbrella will act as a balancing mechanism to service, sort and mediate these laws.

This perspective appears to be held by both lawmakers and designers alike. From both sides of the regulation fence, policy makers and developers struggle to comprehend, follow and amend design regulations. The way each local government enforces its particular legal framework places additional burden on the shoulders of designers and their clients. The ambiguity surrounding the sources of rules, laws, policies and regulations is yet to be standardized under “prevailing legal norms”. Kayden even go further to propose a manifest for ‘good urban design law’, in which regulations are accessible, prudent and extensive as possible:

“The more express authorization by state legislation, the better. The stronger the inherent or carefully documented evidence of aesthetic values or goals, the better. The
### Design processes
Codes for design are tools to set the detailed urban design parameters of projects across the different scales of design intervention, from street and block sizes and layouts to landscape and architectural concerns, towards a coordinated vision of place.

### Adoption processes
Design codes have a role in the legal adoption by the state of highways, open space, drainage and other infrastructure. They enable these processes to be coordinated with design, development and planning matters at an early stage, thereby avoiding possible conflicts later in the development process.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Interests</th>
<th>Stakeholders</th>
<th>Prime motivations</th>
<th>Prime motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding team</td>
<td>Land interests</td>
<td>Landowner</td>
<td>To get the land developed and make a profit</td>
<td>Establishing aspirations from the start for design quality, using freehold rights throughout to guarantee delivery against the design code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Master developer</td>
<td>To maximize site potential and thereby long-term profit</td>
<td>Initiating the site-based vision and code design process through appointment of designers, and subsequently assessing parcel development proposals against the code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Funding agency</td>
<td>To deliver a return on public investment</td>
<td>Using landownership and funding powers to deliver the requisite skills, resources and know-how for a high quality coding process, and effective assessment and enforcement</td>
</tr>
<tr>
<td>Design interests</td>
<td></td>
<td>Master planner/framework designer</td>
<td>Within client objectives to deliver a coordinating design vision</td>
<td>Preparing the masterplan or development framework as a strong vision for the long-term development of a site(s), reflecting any existing policy and guidance, local consensus on the vision and the client’s brief</td>
</tr>
<tr>
<td></td>
<td>Code designer</td>
<td>To make the design vision deliverable</td>
<td>Coordinating different interests as a basis to prepare the design code as a means to implement the essential principles contained in the masterplan/vision</td>
<td></td>
</tr>
<tr>
<td>Development interests</td>
<td>Parcel developers</td>
<td>To maximize site potential and thereby profit</td>
<td>Developing proposals and achieving consents to deliver on site a development parcel within the master plan/vision</td>
<td></td>
</tr>
</tbody>
</table>

*These tables illustrate the roles and motivations of key stakeholders within a typical regulating and zoning process.*

<table>
<thead>
<tr>
<th>Stakeholder Groups</th>
<th>Role and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered social landlords (RSLs) and Parcel designers</td>
<td>To house social tenants within client objectives to deliver a viable design solution. To house social tenants within client objectives to deliver a viable design solution.</td>
</tr>
<tr>
<td>Public interest – Planning authority</td>
<td>To protect and deliver complex economic, social and environmental public interest objectives. To protect and deliver complex economic, social and environmental public interest objectives.</td>
</tr>
<tr>
<td>Highways authority/ agency</td>
<td>To deliver a safe and efficient movement network. To deliver a safe and efficient movement network.</td>
</tr>
<tr>
<td>Environment Agency</td>
<td>To protect local environmental resources. To protect local environmental resources.</td>
</tr>
<tr>
<td>Building control</td>
<td>To satisfy technical Building regulations. To satisfy technical Building regulations.</td>
</tr>
<tr>
<td>Wider interests – Private interests (including water)</td>
<td>To establish an efficient and profitable utilities network. To establish an efficient and profitable utilities network.</td>
</tr>
<tr>
<td>Local councilsors</td>
<td>To satisfy statutory obligations whilst protecting local voter interests. To satisfy statutory obligations whilst protecting local voter interests.</td>
</tr>
<tr>
<td>Community interests – Existing community</td>
<td>To protect and enhance local amenities (and often property values). To protect and enhance local amenities (and often property values).</td>
</tr>
<tr>
<td>Future occupiers</td>
<td>To meet future community needs. To meet future community needs.</td>
</tr>
</tbody>
</table>

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more detailed the standards guiding the exercise of discretion, the better. The more an average person would understand the rules, the better. The more the process — notice, hearing, record, written decision — the better.

The less "final" decision-making authority delegated to a non-legislative body, the better. The less deprivation of all economically viable use of the entire property, the better.

The less a regulation places a disproportionate regulatory burden on one property owner, when such burden is more properly borne by the public as a whole, the better.

The less a regulation directly or indirectly limits freedom of expression, the better.”

Further specifying the points where regulated standards intertwine with design, Carmona suggest to confront the need for applicable legal framework through the extensive coding of planning processes. Particularizing these phases, he argues for design guidance as a multitude of devices that together improve development processes:

“At its most basic, design guidance can be defined as a generic term for a range of tools that set out design parameters with the intention of better directing the design of development.”

1.5.3 THE EXTENTS OF REGULATIONS

One of the major changes in the role and practice of regulations today, relates to its core effect on the well-being of society. While early regulations erected as defense mechanism against tangible issues, including health, social equality and environmental hazards, today some of these key factors dissolved or got substituted.

The immanent subjects which fueled the constitution of early regulatory frameworks were successfully answered during the early decades of their implementation. In many cities, health concerns and mortality rates plunged when zoning displaced hazardous land uses from residential districts. More particular regulations such as fire safety, day light appropriation or street language were already engraved within the city's code, setting a common ground for any future development.

Yet while regulations have successfully filled their role as the safeguards for an urbanized world, they never seized to evolve. Regulations and zoning laws sprawled into many adjacent aspects of planning and development, distancing

81. Ibid
82. Ibid
from their initial purpose. Studies\textsuperscript{83} made amongst developers over the course of 25 years, denounce the over-imposing authority of contemporary regulations. Developers and investors voiced their dissatisfaction of the fact that -

"...regulatory agencies exceed their authority to practice social engineering, architecture and micromanagement."\textsuperscript{84}

The question of the extents of policing power was in the heart of a debate even before the Euclid case. The concern is not just about the extents of the law, but also on its irrelevancy to express immanent question. For example, in architectural project a building is commonly designed to answer a certain need (manifested through the project's program) and formulated in accordance to certain themes, fashion, zeitgeist or style. Law, on the other hand, never addresses short sighted issues. Successful laws are designed to have long life span, endure changes and react to new challenges. A law which is cumbersome and suffers from over-specificity would not be relevant and could not be enforced effectively when needed.

One of the main concern of landowners or developers is that an unknown historical regulation or a newly conceived legal amendment will suddenly subtract a portion of their land or will hinder them from proposing certain type of development. Different form their relatively fast-paced projects, the law has its own pace, by-product of politics, economy, social structures and bureaucracy.

"The biggest problem... is when regulations... are changed after a project has been approved... What hurt us are the inconsistent approval times and regulation changes after the approval of the preliminary plat...The biggest problem that we see with regulations is not the regulations themselves, but the various interpretations by staff and zoning officials."\textsuperscript{85}

1.5.4 PRIVATE AGENDAS

Despite their origination in the noble cause of "harm prevention"\textsuperscript{86} regulations have been tinted with subjectivity. The legal backbone supporting the enforcement of regulations in the US, time and time again opted to favor questionable resolutions, not nearly as concrete as the historical motivations were. In the case of Penn Central vs. the City of New-York\textsuperscript{87}, the regulator - the Supreme
Court and the City - ruled in favor of what can be interpreted as preservation of zoning, on behalf of aesthetics and "designation as a landmark."88 Penn Station owners, aiming to increase their property profits, held an extensive lawsuit against the New-York City for interfering with their rights to utilize air rights and development potential of 50-story office building over the historical building. The U.S. Supreme Court found that the owners could not establish a case for 'taking' merely by showing that they had been denied the right to exploit the property airspace. The court also suggested that the fact that the law affected some landowners more severely than others did not by itself resulted in a case of 'taking'. As well, it held that the law did not interfere with owners' present use or prevent it from realizing a reasonable return on its investment.

This case, which became a landmark of Regulatory Takings89, set the stage for future situations in which the policing power of regulation will favor form or style over the owners return on investment. Similar to Tel-Aviv's NOP38 and the UNESCO Quarter plan, the question of what motivates regulatory decision making has become more complicated than historical act of utilitarianism. In "where regulation fails?", Szold91 offers his perspective on regulations problematic evolution. "What is the extent of the 'failure' here?.. changing the method of how standards... are calculated, can make a great difference in shaping the future of built form... it is necessary to understand how all elements of regulation are likely to be expressed."92

According to Szold, what consists of 'good' regulatory framework and standards is the ability to posthumously imagine there effect on the built form. It is, however, not suggested that the law will become the form itself; such transformation, which is occurring all across the regulated world deflated regulations, shortening their lifespan and hurting their ability to be enforced and maintained. New forms of regulations, driven by performance and motivated through fertile discourse could offer such change.

1.5.5 HOARDING REGULATIONS

"There is no record of the exact number of... codes that are in effect. Estimates of the number of communities so controlled place the number as between 1600 and 1800. According to the 1940 Census there

88. Ibid, Section C
90. Chapter 2
91. Regulating Place. p. 362
92. Ibid p.363
Figure 10.

New-York City zoning regulation explosion:

Between 1916 and 2011, the city population grew moderately from 5 to more than 8 million. But the city’s regulation document grew exponentially. Through a 12 pager booklet, the city defined only 50 land uses in 1916 which grew to more than 600 today. The city regulations book grew to 3700 pages document.
are some 3,500 urban communities having a population of 2,500 and over. Many of these communities no doubt have ordinances controlling building which are not strictly classified as building codes.”

Inconsistency and multiplication of regulatory information is one of the major issues concerning effective governance and law-abiding communities. The structure of contemporary legal frameworks, such as the those featured in city planning or urban design, tends to reproduce and amass throughout the years. Acting as the cornerstones of modern society, laws, policies, codes, standards and regulations are commonly treated in such a way that even when their relevancy is lost, they will still occupy the legal documentation, creating a ‘regulatory memory’.

The accumulation of regulatory information over time is not only an archival challenge. Early zoning regulations in the US tended to encompass large tracts of the city’s municipal boundaries. This method helped to determine the appropriate land uses for extensive areas which also created continuity in terms of appearance and land usage. Early zoning maps were simple enough so that projections on land value, potential development and city form could be made in ease.

With the rapid expansion of cities, especially after the World War II and with the emergence of suburbia, the minimalism of zoning was substituted with complex particularities and spot-zoning. Major cities and metropolitans featuring significant historical cores, began to dissect zoning areas into smaller pieces, sometimes to the size of a single parcel. Land uses went through similar subdivision, mounting to accommodate numerous and sometimes odd practices.

As such, the city of San-Diego depicts land uses for military tanks, snake commerce and ultralight-planes landing sites. Even if some of those hundreds of usages share a similar urban form and bulk, it is undeniable that addressing so many instances of the law is nearly impossible.

Other cities went through a similar way: between 1916 and 1961, New-York City increased its permitted land uses from 50 to around 650. While these numbers may represent the modus operandi of modern cities development, it also portrays the complexity and cumbersomeness by which they are being conceived and planned.

The specificity of urban regulations behaves as a ‘second designer’, determining form ad-hoc instead of planning...


of setting well-thought and flexible envelopes for design to take place. If a modern city endures the multiplication of numerous zones and land uses and accepts endless subdivisions of these zones, it will predictably suffer from a physical and legal chaos, similar to an unregulated territory.

1.5.6 MOVING AWAY FROM FORM

"The narrow application of zoning codes that lacks spatially informed, big picture thinking results in sprawl, car-dependency and social segregation...the purposes of regulation range from making the land and property development process in itself more efficient and effective, to safeguarding valued environments and sites from land and property development operations and promoting particular qualities of places."

The early form of urban planning was devoted to the formulation and depiction of city form. It initially employed practices and methods borrowed from design of smaller scales as architecture and landscaping. Consequently, these methods allowed a streamlined translation into the domain of legal terms and regulatory decisions. This relationship formed continuity between the planner, the plan and the legal language, defining clear objectives and goals.

Yet after the WWII and during the mid century, planning practices began concerning social and economic functions more than with the architectural and place-making challenges. These change could be associated with the position presented by the public against key projects and redevelopment initiatives during the 50’s and 60’s. As such, urban activism efforts were directed by Jane Jacobs, voicing her criticism against projects led by New-York City Planning Department and its head, Robert Moses. Jacobs’s pointed the top-down approach, a relic of modernistic planning, which did not address social, political and local issues. Jacob’s point of view was that planning must construct a discourse regarding the ‘street level’ in the broader context, incorporating political, social and economic concerns as crucial component of the city’s operation. These efforts sprawled into the heart of the planing profession, changing much of the focus for both the practice and the academy. Planners were not dealing solely with questions of city development, design and infrastructure any more, but as Saarinen (1943)
described the nature of the profession, planning became "the aureole of insipidity"\textsuperscript{102}. Moving away from acting as the conveyor of city form, this approach created a physical void. The margin between long term planning and local reaction to short-phased projects extended as planners opted out form engagement with urban form and place making\textsuperscript{103}.

"In parallel, the technical discourse of place making ... has been dislodged. This was first undermined by the traditions of rational-technical policy analysis which distracted attention from the cultural understanding of the qualities of place, and from policy processes as efforts in collective social construction of frames of reference. It was further undermined by the differences in views about place which emerged as different stakeholders began to get a voice in planning processes."

This void was filled by ad-hoc tools of immediate planning, namely spot-zoning and site-specific urban codes. The lack of overlaying plans for short and medium terms reinforced regulatory mechanisms to become the prevailing tools for city organization. The lack of comprehensive planning solutions brought many cities to trust custom-made zoning to replace long-term planning. Even the terms 'zoning' and 'planning' were used interchangeably, emphasizing the confusion for legal experts, planners and designers. The outcome of this erroneous usage of regulatory instruments in lieu of broad planning efforts had clear spatial implications:

"...this division between zoning and planning has had very negative effects...American cities lack an appropriate definition of space, resulting in an American spatial pattern that is disorganized and often illegible."\textsuperscript{104}

Effectively, when the planning community shifted from a form-based discussion to engage with the broader social, political and behavioral aspects, their cities began losing battles to inequality, segregation and anti-social acts. The dismissal of the 'plan' - the city's physical and tangible tool for devising its needs, in the favor of an hypothetic discourse, allowed other forces to fill the gap created by the lack of physical planning.

"As a result, the purpose of planning as promoting qualities of places has tended to decay into the conflict mediation approach. It is in this..."
context that both a more systematic form of the performance criteria approach and more collaborative approaches to strategic, multi-party place making are emerging.¹⁰⁵

“we must test the potential effects of urban-planning regulation in space and on site, in other words, to perfect form-based normative codes instead of the traditional zoning systems. More in general, we certainly need an adequate “design code”... to place the territorial transformations in the physical and spatial context. The issue of the urban project is undoubtedly fundamental to the conception and realisation of important urban transformations, however, it should respect a double-barrelled requirement, which is often neglected. On one hand, the emerging projects must be well-rooted within a spatial development framework in order to find coherence and validation. Furthermore, it seems indispensable that the programming visions must not be merely indicative, i.e. too abstract or vague.¹⁰⁶
"But let us be clear: codes are necessary.

Within the last half-century, some thirty million buildings have degraded cities and destroyed landscapes. We have tolerated this comprehensive disaster in exchange for the (perhaps) two thousand masterpieces that rampant architects have produced.

A century ago, city planners knew this power and exploited it fully, wisely embedding codes in the political and legal process. Under codes, the profit motive was capable of building the best places we still have. Those who are charged with designing, supervising, and building urbanism might tend to avoid education and exhortation, but they are accustomed to following rules."

1.6 AN OPPORTUNITY FOR A CHANGE

The way regulations evolved since firstly introduced around a century ago, created many caveats in their successful incorporation. Still, and as shown before, regulations has strong holding in most of civilized urban concentrations making it nearly impossible to reinvent it all again. Legal systems move slowly, even more so than long planning processes. Only in rare cases, as the un-zoned city of Houston\textsuperscript{107} and the ReCode\textsuperscript{108} initiative of San-Fransisco, could cities question the basic foundations of laws and regulations as the dominant forces shaping their urban realm.

In most other cases, a change must emerge from within the existing system. Cities that have adopted broken or unfitting regulations may not be able to completely reformat their city planning mechanisms, but they could engage in a more fertile discussion about change with stakeholders and communities.

1.6.1 LIFE WITHOUT REGULATIONS

After spreading across the US during the 3rd decade of the 20th century, zoning and building regulations became the prominent vehicle to impact urban form and law. The acceptance of this approach was so wide, that today, the only major city in the US that is not being developed through a system of zoning laws is the City of Houston, Texas\textsuperscript{109}.

What allows Houston to intentionally neglect these planning methods was the automatic separation of land uses by economic forces. An industrial city, filled with factories and oil refineries, Houston was always self directing its land uses in accordance to its industries, manifesting self-defining land distribution. While, for example, it is theoretically possible for a petrochemical refinery to locate next to a housing development, it is unlikely that profit-maximizing real-estate developers will allow this to happen. This self-balancing mechanism, tinted with extreme neo-liberal conception, brought the city to allow unzoned development, only bounded by minimal restrictions.

Yet for some investors, the lack of clearly defined rules, created a challenge when projecting revenues for new projects. The lack of preset mechanism questioned the capacity of allowed development, prior to the acceptance of permits. These concerns, particularly in suburban markets, were answered with the production of planned business and industrial parks.


\textsuperscript{109} http://www.businessweek.com/the_thread/hotproperty/archives/2007/10/how_houston_gets_along_without_zoning.html
that have rigorous covenants and deed restrictions. Effectively, this 'special areas' are yet another iteration of spot-zoning, in which no overall plan was issued, but these specific zones. In that sense, while Houston proudly presents its liberal position against legal enforcement, many specific areas of the city are indeed locally regulated. Acting as Gated Communities, these areas follow even-stricter regulations, designed and enforced by local governance. But the city of Houston cannot be serve as an advocate for deregulation of the rest of the urbanized world. Crowded cities, costly lands or intermixing land-uses all require supporting legal framework to allow their coexistence, while maintaining suitable standard of living.

### 1.6.2 PROCESS INSTEAD OF LIMITATIONS

One of the emerging approaches towards better standardization of planning process shifts the responsibilities from the lawmakers to professional Design Reviewers. This method combines existing regulations with the 'personal touch' of a board of design professionals. In effect, the procedure take place after significant amount of design and study was made by the designers, but prior to the municipality's permitting process. In a research conducted by Schuster, designers from different streams (architects, urban designers, urban planners and landscapers) voiced a positive reception to the reviewing of their projects by governmental representatives. In some cases, these design professionals even acknowledged improved design outcomes as a result of these reviews. Design reviews included a wide range of professionals, all invested in the improvement of the designers' proposal. For designers, the nature of these discussions was familiar and intimidating, as it resembled a studio-like atmosphere. While this process bares potential legal outcomes (approval or disapproval by the board or requirement for further alterations or revisions) this form of discussion helps designer to adjust to the public needs and the ambiguous regulations.

Design Reviews were exemplified in practice through the role of Boston's Design Review Committee, an agglomeration of stakeholders and planning officials including the BRA and the Chamber of Commerce. The BCDC, a "watchdogs to monitor architects" reviewed many proposed projects and was set to overview multiple parameters, from intangible social aspects to architectural details. As such, the Commission had the

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110. Kaplan, Barry J. Ibid.


113. The Boston Civic Design Commission, BCDC

114. Ibid p. 347
power to veto projects and to send designer to revise their proposals. While most project eventually received a green-light to proceed, the Commission aimed not only to act as a ‘court’ for design cases. For them, an educational purpose would establish a more fertile discourse, where governance, designers and the community could come together to find resolutions. This dialog, according to Schuster, might substitute the current regulatory-based intervention that dictates the fate of design proposal by law. Schuster sees in this model an opportunity to improve the complex relationships between the reviewing bodies, the designers and the community.

But while the combination of regulation and discussion based interventions might offer an educational dialog, it is yet to provide a faster or more effective process that could substitute contemporary regulations. What reinforces the mandate of the reviewing body to act as law makers? How should regulatory violations be discussed through this process? But above all, what is the public's benefit from the usage of such method instead of the old regulatory system? These concerns are relevant especially when the review is based on the existing law and is only added as a refinement layer. While design reviews became common practice in many places, they yet to offer a significant alternative to the existing mechanisms. They might help designers to better understand the constrains of the law, but the overall design and approval process is not getting shorter or less complex in the long run.

1.6.3 REGULATION THAT PERFORM

A major concern regarding the way regulations are being dictated and deployed is the level of examination and depth of testing they endure while being issued. Today, when a city is in the process of permitting a new development project, the developers must provide sufficient analysis and approved research to support their proposals. They are required to evaluate their projects on multiple aspects, some of which are international evaluation standards. Their results allow the city to examine the long-term impacts of the development proposal and to focus their reaction to resolve the issues.

"...planning processes should be interactive and that they will involve many of those with a stake in changes in locations... there has been little consideration of the regulatory relationships..."
surrounding land and property development and place making. This is partly because of the lack of attention to place and space in public policy. But it is also because of the enormous complexity of the relationship." 115

But when it comes to new regulatory resolutions such effort is rarely pursued. The cumbersome nature of legal frameworks and the extensive amount of new rules amassing each year, render the effort of analyzing and studying them nearly impossible116. The main reason such investigation is so complex to perform is the fact that the law is not 'handed' to the public as a single edifice. While specific projects, even if large in scale, are being conveyed as a single entity, law is slowly accumulating, adding, amending and developing over decades. In order to be able to fully comprehend the effects of a single law it is necessary to amount adjacent and paralleling laws along with. This is commonly a tedious process, demanding relentless archival work and deep understanding of the legal constrains. One approach that could ease the accumulation of laws in favor of studying their effects, is the parameterization of legal systems. Exemplifying it on the LEED 'Green Building' standard, Ben-Joseph set the argument for a performance-based-coding:

"The (LEED) ranking system not only accommodates existing and known energy and environmental principles but also looks at emerging concepts. This is partly due to its unique integration of all segments of the building industry and its openness to public scrutiny. Because it is a ranking system, different levels of green building certification are awarded based on the total credits earned, thus often resulting in a higher development standard through incentives rather than compliance.117”

The LEED standard, beyond offering incentives to the developers in order to motivate participation is also location and situation agnostic. In other words, it allows a parametric depiction of virtually any building around the world, based on a predefined set of measurements. This approach created not only a positive competition between developers to obtain the prestigious LEED certification, but it also rigged a world-wide analysis mechanism for building performance. Utilization of unbiased, statistical and finite parameters allows the creation of a comparable mechanism for

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regulations. If, similarly to the LEED standard, efficiency of a certain land use or the effects of a given FAR could be impartially analyzed, cities could learn form the vast experience of others.

"An important task... is to translate policy principles into criteria to be used in regulating land and property development rights. The performance criteria approach... provides helpful groundwork on which to build this translational emphasizes argumentation around policy principles."\textsuperscript{118}

This translation will require an alteration of the narrative by which regulations are defined to become much clearer and specific. It will derive both planners and law makers to discuss practicalities in much greater respects, confronting questions of form, place making and design.

"...But these principles cannot merely be articulated into abstract norms and criteria. Because of the variety of manifestations of spatial change, their social meaning and relevance have to be constructed and interpreted in the context of concrete places and the lives of real people and companies. They have then to be translated not merely into legal administrative terms but into the way stakeholders are thinking."\textsuperscript{119}

1.6.4 TOWARDS COLLABORATION

In the past few decades, public engagement became a popular device for collaborating different parties in agreement seeking efforts. After decades of superimposed decisions and top-down planning processes, it became clear to developers, politicians and stakeholders, that disregarding the public’s opinion will result in a failure or a significant delay to the execution of such endeavors\textsuperscript{120}.

Still, the idea of encouraging multiple parties to join and steer together a planning process, is not always easy to digest. Extensive academic training and professional experience usually defend the right of planners and designers to maintain autonomy in their own premise. Public engagement, if occurs, is sometimes a by-product of the law, forcing the developers to share their ideas and designs and to be open to discussion. It is no secret that behind closed doors, these engagements are sometimes considered as hurdles in the progression of otherwise a successful endeavor. Although in the past, planners and designers successfully evaded


\textsuperscript{119} Ibid

public opinion or managed to keep it to minimum, today the law and policy are siding the public. Modern cities’ population is much more knowledgeable, capable of learning on initiatives and projects beforehand. The accessibility to information along with the rise of platforms for its distribution, created significant vantage points for the public. It is not uncommon to learn about communities, neighborhoods or even private residents that rise against initiatives impairing their quality of life. Capital markets cannot stand still amidst these reactions. Cities and their developers started to acknowledge the power communities have in accepting or disapproving their projects. These changes were not the result of noble reemergence of social justice amongst profit driven individuals: for them, the public’s reaction might be their greatest challenge, even if their projects are supported by government officials or local constituents. Communities have ever growing power to react fast and swift to undesired changes in their premises.121

But constructing such discourse most create also a concise narrative that could act as vehicle for sharing this information. The effectiveness of such discussion will be measured not by the amount of agreeing parties but by the depth of understating they share:

“Strategic place making undertaken in a collaborative way helps to articulate a shared language which can relate the concrete realities of lived experiences to general principles and organizing ideas and then translate them back into arguments to be used in framing investment and regulatory decisions. Such a style of place making develops into a framework which serves to shape and coordinate the actions and attitudes of many stakeholders.”122

121. Avaroatio, and Loukaitou-Sideris. p.661
Chapter 2

URBAN CASE STUDIES
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2. URBAN CASE STUDIES

Two main components impact mostly on the effects regulation has on urban form: the given urban scenario (city, suburb or an undeveloped territory) and the regulatory framework operating on this area. While the interface between the two is unique to the specificities of place and time, it is possible to distill reoccurring issues, common to the fiction of law and urban form.

The first chapter dealt with the general characteristics of urban regulation and their historical affects on urban form. This chapter explores several contemporary urban conditions through the perspective of law, regulation and policy. It aims to expose the effects these legal frameworks have on their built environment. For that reason, the cases where not chosen because of their unique urban typologies or special form, but because they feature an exceptional legal framework devising their formation.

The law and regulations were the apparatus through which these cases are examined: instead of evaluating form, functions or urban schemes first, the analyzing device here is the regulatory mechanisms. Illustrating the taxonomy of regulation for these case studies offers an overview on the motivations that steer modern city development.

This chapter aims to focus on those laws that were created or modified to actively answer distinctive changes or amendments. In other words, out of the generic laws and codes defining each case study, some section of the regulations outshines. The different cases depict verity of regulations and policies, emerging from different, sometimes unexpected sources. The case of New-York City follows the long and profound process aimed to revitalized the city's Midtown area. The changes proposed modified zoning and regulations for the Midtown Subdistrict, hoping to spur development amidst other rapidly developing CBD's. The changes to city form are manifested through the significant increase in FAR and GFA and through lifted limitations on Air-Rights transfers. But less tactile factors of this plan, such as revitalization of the Midtown's crumbling infrastructure and public transportation were not fully addressed in this initiative. This case is a depiction of the way capital economy meets the public opinion and the brick-and-mortar outcomes of this confrontation.

In the case of Tel-Aviv, Israel, different motivations brought major parts of the city to a development standstill.
A national plan for earthquake reinforcement and a UN plan (through its UNESCO subcommittee) for preservation of modernistic landmarks, stumbled upon the fiscal reality of homeownership and privatized funds. While both plans advocated for 'good urban form' as their main objectives, they also lacked well-rounded performance based analysis of their wider implication. This case shows how an unplanned condition infiltrate the city's legal foundations and confronting with an already over-bureaucratic planning system.

The assumption behind the comparison of different territories and their legal backgrounds it that the common ways by which laws and regulations form the city, can become a sophisticated design tool when responding to emerging forces. As such, GFA limitations or height limits could act as economic push or balancing mechanisms, beyond their immediate role in shaping the form of the city. Other mechanisms, such as financial compensations and legal reliefs also have intrinsic effect on city form. Overlaying these laws and understanding the deeper reasoning behind their establishment, could shed light on the way contemporary cities are being developed.

The selected sites share similarity in terms of density and urbanization. They represent major parts in their cities, centralized and surrounded by a dense scenery. The scales of the sites is not equal and is driven by their legal bounding and physical limitations defined by their local municipalities. For example, the 3rd and 4th districts in the city of Tel-Aviv are not standalone units in terms of urban planning but they have specific attributes regarding building heights and density. Similarly, Midtown East in New-York was not always a standalone district, but it became as such when planned under the greater Midtown area Rezoning Plan.

In the background of these case studies lay several key questions: What is the legal authority to design and formulate cities? How deep is the impact of regulation on the finite urban form? How could the public, stakeholders or investors apprehend these effects in advance? And above all, in the end of a century of urban regulations, did lawmaking have become just another form of design?
NYC
MIDTOWN EAST

Zoning in the name of
2.1 NEW-YORK CITY: ZONING IN THE NAME OF

It is impossible to discuss the origins and implications of regulation on the built environment without firstly confront the birthplace of contemporary zoning. The city of New-York, beyond being crowned as one of the world's most important urban centers, is also one of the most regulated and predesigned cities in history. While it grew to become a city in the 17th century, its regulatory infrastructure is only a century old, emerging from a few pages document in 1916. Since then, both the city and its urban regulations grew exponentially.

2.1.1 THE LIFE AND DEATH OF GREAT AMERICAN ZONING

While historically, the commencement of urban regulations followed critical concerns, in current days New-York the discussion over regulations is mostly a financial one: A few additional square feet or a couple of more stories per parcel would be crucial to the success or failure of development projects. The city's regulatory frameworks and relentless development efforts become the two prominent forces shaping New-York. Manhattan's limited territory and the ever-growing demand for new development position New-York as a petri-dish for regulatory experimentation.

This case-study aims to deconstruct a proposed rezoning plan, sought for Midtown East sub-area. The site, one of the busiest pieces of real-estate in the world, shown signs of economic fatigue and deterioration. While its real-estate values are still the highest in the East Coast, the emergence of many new CBD's and financial hubs in newer metropolitans required Midtown East to reemerge in order to keep its lead.

By proposing a significant rezoning plan for this area, the city believed that not only new and lavishing skyscrapers will return to decorate the notable skyline, but also much-needed retrofitting of infrastructure and civic amenities will be offered. Like other initiatives for rezoning and regulation amendments, this case involves many different stakeholders: The city, the public, real-estate developers, conservation advocates, local residents and infrequent users. In the heart of this on-going debate is the question of what such rezoning means to this prominent piece of urbanism.

The objectives behind the analysis of this case study are to deconstruct the motivations that were brought together to shape the city, illuminating on the usage of zoning, regulation, law


124. See Chapter 1.

126. The introduction to Building Zones, a handbook published in 1916 by the Lawyers’ Mortgage Co. of New York, which presented in a practical format the text of the law and simple diagrams illustrating the restrictions on the height and bulk of buildings allowed under the new legislation; it was compiled by George B. Ford, consultant to the city’s committee on zoning and chief architect of the zoning-envelope regulations.


128. The History of the Skyscraper Paris and New-York, 1929/1930, P1. CXXIV

and policy as apparatuses to derive particular agendas. In that sense, this case represents the changes regulatory tools have endured throughout the past century, in which a concentric school-of-thought reemerged to formulate New-York’s skyline once again.

2.1.2 FORM FOLLOWS ZONING

“To stabilize and conserve property values, to relieve the rapidly increasing congestion in the streets and in the transit lines, to provide greater safety in buildings and in the streets, and in general to make the city more beautiful, convenient, and agreeable.”

The full realization of the city’s zoning laws form 1916, effectively began only after the Second World War. Hugh Ferriss’s canonic drawings, manifesting the city’s regulations, depicted bulky structures, gradually reclining to construct an urban canyon. This pyramidal structures where shaped to balance two main forces: the economic intensive pushing to maximize the profit on valuable land and the city’s wish to maintain sun-lighten streets and buildings. This two factors dictated the slope angle structures using mathematical formulas which calculated the sun movement over the city’s grid.

But while these laws were in affect since 1916, only specific parts of the city were fully affected by them. The economic crisis of the late 1920’s, followed by the Second World War, halted many grandiose development initiatives.

During this economic period, the strict zoning regulation yielded mostly ‘paper architecture’, Utopian visions for the modern city, incorporating the 1916 regulations as form making device. Francisco Mujica’s, “The City of the Future: Hundred Story City in the Neo-American Style”, is an urban utopia, where setbacked towers rise in a mechanized-rationalized city plan. These concepts were directly inspired by the New-York zoning law and typify the post zoning mentality.

But such utopias were mostly left unrealized; only a few skyscrapers actually built under the reclining laws. Despite the construction of some of the most important landmarks in the city, as the Chrysler (1930) and the Empire State Building (1931), the majority of new office buildings were not utilizing the full potential given by their zoning envelopes, thus never facing the zoning confinements.

Additional limitation required towers to occupy no more one-quarter of the lot area (in FAR terms). This rule
encouraged the assembly of larger sites so that expensive tower construction would still be profitable. This extension of the setback formula produced a new typology: the ‘superblock’\textsuperscript{129}, a giant stepped-back tower rising over a full or a multi-block base. In the city’s real estate market of the 1920’s, only few superblocks fitted parcels could actually be bought, cleaned and constructed. Though the city was devolved intensely during these decades, many projects were conceived for much smaller parcels hence their finite height was already below the zoning cap for the pyramidal shape.

\subsection*{2.1.3 SAME RULES, DIFFERENT INTERPRETATIONS}

Hugh Ferriss’s visionary depiction of New-York had to wait to the end of the war and the great economic boom that followed in order to be realized. Superblocks, rare and already landmarked in 1945, suffered from low natural light and air circulation, mainly in their massive lower floor plates. While these buildings were considered as technological breakthroughs and even ‘world wonders’\textsuperscript{130}, in reality, daily workers suffered from these deep unventilated spaces. Naturally lit floor plates, the same concern that initiated the city’s zoning effort at 1916, still affected the lower parts of these pyramidal structures. The confrontation between the need for natural light and the wish to exploit every possible square feet of the zoning envelope, demanded a technological solution.

Soon after the Second World War, long lasting fluorescent light became popular, allowing artificially lighten buildings to simulate daylight all around the clock\textsuperscript{131}. Additionally, the restrictions of the 1916 zoning regulations on building materials hindered developers from vastly using glass as their primary material for their projects’ facades. The regulations demanded more ‘local’ materiality for new construction, including bricks, terracotta, limestone and metal. Only in a zoning amendments made in 1937 glass was allowed, quickly becoming the leading element for the city’s facades. While the European modernism already envisioned the usage of light and translucent materiality a decade before\textsuperscript{132} without the capital forces and America’s post-war economy, these concepts could not be realized.

This architecture, set backed as South American pyramids, ornamented using Art-Nouveau details and transparent storefronts, became the prevailing style of the city in the decade after the war. These technological solutions were coupled with the 1916 zoning laws, allowing maximization of the buildable

\textsuperscript{129} Lehnerer, Alex. Grand Urban Rules. 010 Publishers, 2009.


\textsuperscript{131} Lehnerer, Alex. Grand Urban Rules. 010 Publishers, 2009. p.165-169

\textsuperscript{132} Concepts and projects like Mies’s Friedrichstrasse Skyscraper in Berlin-Mitte set the tone for experimental materiality and interior order.
Figure 12.

*Equitable Building NY zoning and excess bulk limit.*

Figure 13.
Figure 14.

400 Park Avenue (right) and the Lever House (left)

“New York / 750 3rd Avenue from 46th to 47th Street, West Side. May 14, ca 1958.”
envelopes. The depth of the lower floors in these pyramids was lighten day and night by the newly developed fluorescent tubes; the air, recycled and cleaned was transported using new air-conditioning systems; modular and flexible working stations allowed efficient stacking of workers, replacing walls with semi-translucent space dividers.

But where calculated corporations opted to exhaust the 1916 zoning laws potential, few market leaders chose style over efficiency. However technologically advanced and efficient, the artificial light and air that served the inner cores of these ‘pyramids’ could not truly substitute the basic needs for modern office workers. Powerful, rich companies could therefore afford to lose valuable percentages of their zoning rights, favoring slenderness in the name of modernity and fashion.

The years between the end of the war and the city's new rezoning plan in 1961 depicted this change. The setback urbanism that ruled the 1916 zoning laws was initially a response to the violent extrusion of owners' properties, as it happened in the Equitable case. The lawmakers who worked on the city's first regulations, comprehended that limiting this extrusion is possible by enforcing gradual setbacks. The building's height, they assumed, would be a byproduct of the structure's floor plate, becoming uneconomical to construct after several setback's.

But this perception had to face new reality when economic efficiency lost its place for style and appeal. The growing power of few international corporations along with the importation of European-modernistic architecture principles instituted a new form within the current zoning. In 1950, a floor plate of 2300 sqm wasn't an uncommon variant in the city's office towers anymore. Companies who held their headquarters in New-York were responsible not only to serve their in-house worker, providing them with suitable working conditions, but also to create top-tier spaces for visitors and businessmen to meet. Architects started formulating precise measurements by which floor plates could serve maximum workers, meeting rooms and supporting functions, without losing air, light and views of the city.

This mutation is well exemplified through the comparison of two adjacent office towers: 400 Park Avenue and the Lever House. Like many other unanimous structures in the Midtown commercial district, 400 Park Avenue is a perfect product of the city's zoning. Following the setback regulations and addressing questions of materiality and presence in a conventional way, this

133. Lehnerer, Ibid


135. Lehnerer, p.167
1958 building is an artifact of law more than it is an act of deliberated design. In an effort to maximize the buildable envelope, each of the building’s facades reclines in accordance to the adjacent street. This impulsive reaction gives the building its shape, an uneven stepped pyramid.

The Lever House was built in 1952 by SOM (project was managed by Gordon Bunshaft and Natalie de Blois)\textsuperscript{136} to host the American headquarters of a British soap company ‘Lever Brothers’. Situated on the edge of midtown east on 390 Park Avenue, the building features a 24-story glass and stainless-steel slender tower, with a wide podium occupying its base. The structure, deifying other common midtown office buildings, is composed of separated elements, each programmed individually, all subdivided by open voids.

The building’s ground floor is unoccupied. It features an open plaza with garden and pedestrian walkways, with a small portion enclosed in glass and marble dividers. The second and largest floor contained the employees’ lounge, medical suite, and general office facilities. On the third floor was originally the employees’ cafeteria and terrace. The offices of Lever Brothers Company and their subsidiaries occupied the remaining floors along with an executive penthouse on the 21\textsuperscript{st} floor. The top three stories contained most of the property’s mechanical space. This scheme represents a unique programmatic division along a skyscraper in the city. Commonly, commercial programs were occupying at least the lower two floors and, along with the setbacked floors, office or residential usages.

Lever House was built under the 1916 zoning laws. Yet while the regulations required buildings to setback as they rise, it was only required if the building occupied 25\% or more of its parcel\textsuperscript{137}. The slender form of the Lever offices slab occupy smaller area, leaving significant portion of its air-rights unused. The magnitude of this architectural decision, originating in deep absorption of the European International Style, is even more apparent when comparing Lever House to its Park Avenue neighbor.

### 2.1.4 FORM FOLLOWS ZONING AND VICE VERSA

These two buildings crystallizing the change occurred in the perception of regulation and urban form in New-York City. The rules of 1916, safeguarding public rights and protecting against inequality, were put to limit development. The 1920’s ‘booming’ market required strong regulators to channel the landowners pressure.
while allowing fast-paced development to occur. As such, no prototypical architecture or urbanism was suggested through these rules. The regulations had to invent and predict the potential future, aiming to respond to it when it occurs. No form in the extents or capacity of New-York’s 1961 towers even remotely existed when the 1916 laws were initially introduced. The major change in the regulation amendments of 1961 is in its selection of a prototypical and form-centric role models. The typological maneuvers performed by SOM’s Lever house or Mies van der Rohe’s Seagram Building were under the 1916 regulations the same way many unknown pyramidal high-rises were filling the city’s landscape. The versatility of these rules became apparent only when stylistic motivations opted to lose floor area in the name of design. Those structures soon become the role models for the 1961 rezoning as their slenderness and materiality surpassed the bounds of ‘fashion’ into the immortal realm of the ‘law’. The new regulations, form-centric and economy driven, were set to please the bold and powerful forces of the city, namely corporates and large investors. The 1961 zoning laws did not dismiss the historical laws which dictated the land for 40 years. But these modified regulations, essentially legal representations of the Seagram Building and Lever House, rendered this style obsolete. Following a successful form, rather than forming a limiting envelope, established a new approach in urban regulations: from ‘form-follows-regulation’ to ‘regulations-follows form’. The effects of this new approach were dramatic to the city’s urban scape. Within a decade after the 1961 rezoning, the city streets began featuring massive ‘urban canyons’, formed by rows of slender towers and their wide public plazas. Mies’s ‘one-of’ exercise at the Seagram building became an urban hazard when it was massively copied and multiplied. The urbanism emerged from the 1916 regulations celebrated street-level activity as much as it reacted to building heights. But when the city pedestaled an anti-urban edifice, its streets and side-walks became catwalks for “marble statue in the garden” 138.  

The effects of the 1961 rezoning are still dominating the city today. While 1916 laws set wide and tight boundaries for the design of the entire city, the lesson learned after the 1961 rezoning was that a comprehensive regulation system, even if possible, is not enough. The way New-York was self-developing, the forces of

the economy, politics and fashion, simply couldn’t be answered through predetermined and centralized legal framework. While the city maintained As-Of-Right as its first line of defense, developers who now opted to exhaust their right only through this mechanism were prone to lose significant building-rights. By doing so, the city forced developers to construct channels of communications with the planning authorities, effectively negotiating each project. Within a period of half a century the city’s regulation went through a complete circle: from the anarchy of the Equitable Building to a city-scale regulation in 1916, back to the specific study of each project following the 1961 amendments. In many ways, the implications of current days plans, such as Midtown Rezoning Plan (MER 2012) follow a similar concentric school of thought. While attempted to become a comprehensive revitalization planned for the decaying Midtown area, the lack of coherence regarding key issue, rendered this plan irrelevant for many stakeholders and residents. The case of the MER, like many other plans and rezoning initiatives represents the full-circle regulations went through in a century of zoned urbanism: From the self-centered development of the Equitable Building and its kind to a wide and broad thinking concerning the city needs in the 1916 first zoning. A few decades later, the wide approach once again recapsulated into specific spot-zoning and site specific solutions.

2.1.5 MIDTOWN-EAST REZONING: FORM-CENTRIC, ONCE AGAIN

Midtown East refers to the middle portion of Manhattan and is the home to some of the city’s most iconic buildings and world-famous commercial and office zones. It is the largest central business district in the United States and ranks among the most intensely altered portions of real estate in the world. Midtown is also a growing financial center, second in importance only to Lower Manhattan’s Financial District.

The majority of New-York City’s skyscrapers, including its tallest hotels and apartment towers, lie within Midtown. It hosts commuters and residents working in its offices, hotels, and retail establishments; many tourists, visiting residents, and students populate the district. Hosting the Grand Central Station, one of the world’s busiest transportation hubs with over 150,000 passengers and 800,000 visitors a day, the area is acting as a TOD.

2.1.6 THE NEED FOR REZONING

In the past decades, the 73-blocks surrounding Grand Central Terminal started to shown sign of ‘real-estate fatigue’ and economic stagnation. Midtown office stock, especially for high-standard office buildings, threatened the district’s long-term preeminence. Despite rising rent values and development efforts, the site became more congested, featuring aging structures and deteriorating infrastructures. Slowly, the area started losing its lead as one of the world’s most prominent business center to new CBD’s in East Asia and Europe.

Traffic congestion was one of the main concerns leading the stagnation of East Midtown area. Approximately 750,000 vehicles enter Midtown on a business day. The heavy pedestrian traffic, especially during rush-hours, brought many junctions to a standstill, amounting noise and smoke pollution. While the city experimented with new technologies, as the “Midtown in Motion” sensors system in 2011, it became clear that only comprehensive approach could unplug the congested streets. In addition, there are a series of pedestrian related challenges in the area, including narrow sidewalks and the lack of open space.

Current zoning has proven to be a weakness to reinvestments in East Midtown. In the past decade, only two office buildings, both of which are mid-sized, have been developed under the existing zoning. In addition, many buildings that predate are built with.


143. According to the 2011 Traffic Data Report for New-York State, 777,527 vehicles a day went through select toll facilities into Manhattan.

144. Midtown in Motion traffic system NY 1 News, NYC CPD review, 2011 July 19

Figure 19.
(previous page)

Ezra Stoller, Exxon
Building on Sixth Avenue

Harrison and Abramovitz,
New York, NY, 1974,
Gelatin Silver Print 20 x 
16 in

Figure 15.

2012 100 tallest buildings 
in the world

Figure 16.

Buildings declared as 'landmarks' in the MER area

Figure 17.

Average age of office buildings

Figure 18.

2013 East Midtown rezoning

- Less than 5% of office stock constructed within last two decades
- Only two mid-sized buildings in last decade
- Average age 75 years old
- 80% over 50 years old
- Outdated structural features Pedestrian and Transit Network At-grade and below-grade
- Current regulations limiting development
more floor area than currently allowed, restricting efficient redevelopment of these older office buildings. As these older buildings become less desirable for office tenants, they become more economically attractive for conversion from office to residential or hotel use, which erodes the commercial core. Despite being one of the most desired office markets in the New-York area, the average age of East Midtown office buildings is more than 50 years old and around 15% are 75 years old. Much of East Midtown's office building stock has low floor-to-ceiling heights and numerous interior columns that fail to meet the needs of modern corporate tenants. Without intervention, East Midtown could have become less desirable as a business district.

2.1.7 THE MER TIMELINE

The efforts to revitalized the area began on late 2012, aiming to match the 100th anniversary of Grand Central Terminal with a new urban renewal plan. The canonic station, one of the world’s most active transit hubs, was in the center of a public debate over its contemporary proficiency and its role in the ever congesting midtown area. Under the governance of mayors Bloomberg and de-Blasio, the proposed up-zoning, meant to allow the development of some of the largest buildings in New-York City in the past decades. The plan was devoted to transformation of both the skyline and city streets, aiming to correlate up-zoning with infrastructure regeneration. The plan was designated to affect an area located roughly between 39th to 57th Street from 5th Avenue to 3rd Avenue, while distancing from landmark areas as Time Square, Central Park South and the UN district. The plan, conceived by Mayor Bloomberg late in his period of office, intended to engage the needs of many stakeholders under one rezoning regulation. Effectively, the plan proposed two main changes to the existing zoning: Higher capacity of developable areas and a revitalized urban system to support these developments.

The plan covers the area bounded by east 39th street to East 57th Street, Second and Third Avenues and close to Fifth Avenue to the west, without interference with Times Square.

2.1.8 DISTRICT IMPROVEMENT FUND

Significant part of the rezoning plan was the establishment of a monitory system to accommodate the growing needs of the area’s public realm. The rezoning plan required that in exchange for additional density and extended air

146. East Midtown Subdistrict Project Certification and Referral | April 22, 2013 DCP East Midtown

The plan has incoherently addressed the concern of many important landmarks in the area. The main concern was not their demolition, as they are protected under the preservation law, but rather the implication of adjacent development that could threaten their operation, visibility and prominence.

The Vanderbilt Corridor and the planned One Vanderbilt Parcel.
rights, developers should contribute to a District Improvement Fund (DIF). The dedicated fund was supposed to provide more than a half billion dollars¹⁵⁰ for improvements and amenities along the next two decades. The fund was set as an incentive apparatus by which developers can offer to buy additional air right on top of their basic AOR. As such, a developer owning a parcel along the Vanderbilt Corridor previously had an FAR 15 limitation. In order to extend this limit, this developer had to go through time-consuming and costly ULURP (Uniform Land Use Review Procedure) where he compete to get an approval for extended FAR. The idea behind the DIF was that a streamlined procedure could offer developers the right to extend their new FAR – for this specific developer FAR 24, by purchasing each additional square foot for $250. The DIF was not a new device invented by the MER, but a part of the existing District Improvement Bonus (DIB) mechanism. The DIB is dedicated to transit and pedestrian network improvements, especially those attached to the Grand Central subway station. The MER plan established a new East Midtown Subdistrict and replaces special permit requirements with an ‘As-Of-Right’ (AOR) zoning framework. This was meant to provide a more predictable process for commercial development as well as an incentive for public realm improvements. From an economic perspective, the MER plan offered a system of zoning incentives¹⁵¹ to promote the development of new commercial buildings and to pay for public-centric initiatives. Air-Rights beyond the AOR limitations could be bought by developers and this money would be used for public projects. Development at increased FARs was intended to be permitted on “Qualifying Sites”. These sites were defined as parcels with the full frontage along most avenue block-fronts or 200 feet of frontage along 42nd Street, as well as a minimum site size of 25,000 square feet¹⁵². New commercial buildings on qualifying sites could exceed the initial 15 FAR in exchange for contributions of $250 per square foot to the proposed DIF. The fund meant to be dedicated to critical transit and pedestrian improvements throughout the area, including a full range of at-grade public realm improvements which have been prioritized with input from area stakeholders. The MER was meant to streamline the process of landmark transfers in the area surrounding Grand Central Terminal. After contributing into the District Improvement Fund, developers of Qualifying Sites could purchase


¹⁴⁹. Mostly on the form of air-rights incentives, buying the air potential and paying for a fund for the good of the city’s development.

additional floor area from Grand Central subarea landmark buildings through an expedited process without special permit review, hence construction would have cont as As Of Right development. The plan was expected to spur renovations of approximately 10 million square feet of commercial space, and add approximately 4.5 million square feet of commercial space. Given that the MER plan intended to primarily replace outdated buildings, estimations were that the area will see increase of approximately five percent over 20 years.

2.1.9 AS-OF-RIGHT DEVELOPMENT

The MER plan aimed to also set a new As Of Right regulations on most parcels in the Midtown area, effectively increasing their Air-Rights value. Developers, through the DIF fund, could obtain more buildable volume, breaching the initial AOR envelope. Originally, City Planning Departments used AOR to automate permitting processes. This method bounds the city’s predefined zoning regulations with potential developers, actively avoiding long permitting process. In New-York City, “Most developments and enlargements in the city are as-of-right.”

Despite offering a streamlined and rapid development process, As of Right oriented regulations are capable of addressing specific cases where ordinary zoning pays no attention. As such, edge conditions in which multiple zoning areas meet or landscape with geographical differences, might be overlook by a stiff, inflexible zoning decree.

In terms of regulating the form of buildings, As of Right loosen control on finite forms, which could be more freely designed and elaborated by the developers. While AOR sets less boundaries within its confines, its extents could vary immensely. In certain cases, spreading AOR regulations over few parcels could effectively sets specific zoning regulation on these portions of the city. Coupling AOR regulations with strict setbacks and other formalistic regulations could dictate a strict city form, without a specific architectural style. In New-York’s zoning history, this approach was proved successful. Modern buildings from the 1960’s followed similar AOR envelopes of buildings half a century older, while keeping the same urban language. The flexible AOR allowed New-York City planning department to alter rights for specific buildings while restricting others.

For the opposes of the MER plan, As Of
Right zoning was maybe clear for future developers, but hard to be conceived by local stakeholders and communities:

“There continue to be many open questions, including the pricing of air rights, the plan for infrastructure and public realm improvements, and whether all of the density should be added as-of-right, or with further community input.”\(^{154}\)

2.1.10 OPPOSITION TO THE MER

Six months after the MER plan was introduced, rejections started to emerge from various parties and stakeholders. There were many specific issues presented by this opposition, but several prevailing subjects were expressed by most parties. While there was a general agreement that East Midtown should be rezoned for more commercial space, jobs and competitiveness with other global cities there has been concern about the size and number of the new buildings, how air rights would be sold and how much funding infrastructure would get. Daniel Garodnick, a New York City Councilman representing Manhattan's 4th District who opposed the MER plan said:

“The public realm plan is aspirational, and it is unclear at this point whether some of its most visionary improvements can even be executed.”\(^{155}\)

The plan’s tight scheduling proposed by Bloomberg’s administration had to do with his limited time in office and with pressure coming from multiple developers in this area, aiming to approve their plans. The timeline that was initially proposed could not sufficiently address many infrastructural concerns, which commonly demand long term planning. While it was clear that most funds directed to the rehabilitation of the existing infrastructure would have to come from the exchange of Air Rights, it was unclear how these fund would be used\(^{156}\).

The main question regarding the DIF was about the relationships between the developers aspirations to surpass the AOR envelopes and the immediate need for infrastructure renovation. To the opposes of the MER it was highly unclear how would these works be funded, if the developers are setting the pace and capacity of payments. For some, the sum of $250 per square foot seemed too little, especially when early adopters of the plan might not extend beyond the newly given FAR, thus leaving the DIF empty\(^{157}\).

The DIF mechanism, a form of Incentive Zoning is common in metropolitans


Figure 22.
Figure 23.

'The Future of East Midtown'

where a powerful real-estate market can install such arrangements. The needed investments for servicing the infrastructure, especially in the heart of dense CBD's, is extremely expensive. In the case of New-York, the density and lack of vacant lots demands creative thinking in regards to public transportation, parking lots and open spaces. Developers are commonly offered to carry the burden of constructing these much needed public amenities, in exchange for reduced limitations.

Yet in the case of the MER, the was plan initiated with only single active developer (SL Green for the One Vanderbilt project158) at the time. Those opposing the plan, argued that it is impossible to rely on speculative incomes, possibly spanning over decades, when the city's needs are immediate.

Other concern was risen by East Midtown Hotel workers claiming for insufficient limitations on hotel development. The Hotel Trades Council opposed new hotel construction since greater supply could push down room rates. The Midtown area was never meant to become touristic oriented site. The purpose of the new zoning was to maintain and excel the office supply, with no intentions to increase the hotel stock. Beyond the decrees in room rate and increased competition, building more hotels into this subdistrict would also alter the business purpose of this part of town.

2.1.11 FROM PLAN TO REACTION

After months of debates and public discourse, the plan was dismissed. In late October ‘13, State Senators Liz Krueger and Brad Hoylman issued a response letter159 to the Members of the City Council, which can serve a comprehensive argument to the state of this and other urban plans and rezoning initiatives. The letter’s tone and overall disapproval of the way this plan was introduced can shed some light on the major challenges facing large scale development efforts all around the US:

“A Flawed Process:
This plan is the product of a flawed process. It has been rushed, it has not meaningfully incorporated public input, and it has not been appropriately vetted.

Rushed and Unvetted:
This sweeping proposal to rezone the beating heart of Midtown Manhattan, perhaps the most iconic and recognizable central business district in the world, has hurtled through the review process


Figure 25.

SOM: Grand Central

The questions regarding the state of local landmarks was most relevant in this part of the rezoning plan, aiming to redesign the entire Grand Central area. SOM controversial design was later explained by the firm:

“The ambitious plan envisions an iconic circular observation deck above the historic transit hub, where visitors take in stunning panoramic views of the city. The disk moves vertically, bringing people from the cornice of Grand Central to the peak of the Manhattan skyline. This “floating” deck would be both a spectacular experience and a powerful symbol of 21st century New York.”

http://www.som.com/projects/grand_central_next_100

Figure 24.

New-York Subway Line Works

“If New-York City wants to be the capital of the world, it must have first class office space directly tied to public transportation, and the best location to do that is Grand Central...So the area is ripe for rebirth, and you can’t sit on your hands.”

with unprecedented speed so that it could be approved during Mayor Bloomberg’s tenure. The Department of City Planning ignored repeated requests by all the elected officials and community boards representing the rezoning area to delay the certification to provide time for sufficient community input, and the plan was certified barely a year after it was first mentioned in the mayor’s 2012 State of the City address.

As a result, essential details that should have been known to all before the rezoning application was certified – such as the possibility of bonding for infrastructure, or the creation of a virtually unprecedented air rights transfer sub-district for landmarks – instead surfaced only as revelations in the press in the middle of the formal environmental review process.

In particular, this new air rights transfer proposal is a radical departure from existing practice, with the potential to open up a Pandora’s box of unintended consequences. Perhaps it is a worthy idea, and perhaps it is not – but clumsily throwing this kind of massive shift into the mix this late in the game, without time for study or review, is simply not how land-use policy should be done in New York City.

Incorporation of Input from the Community and Public:
Both of our offices have monitored the many public sessions, community meanings, and communications between members of the community, the Department of City Planning, and the mayor’s office. We have also had our own correspondence and discussions with officials of the mayor’s office and City Planning. After a thorough review and discussion of how this process was conducted from beginning to end, we are forced to conclude that the administration was entirely unserious about engaging with the community, and that the failure to leverage feedback to improve the plan directly resulted in the perpetuation of the flaws that now gravely threaten its success.

Time was wasted on repetitive presentations, and question-and-answer sessions devolved into shouting matches, as administration officials unwilling to answer questions or address alternative proposals from community members chose to raise their voices when flustered.

Public review and community participation should have improved
the plan by exposing flaws and posing questions, leading to study, revision, and improvement. Instead, the administration pursued its plan with little to no consideration of major modifications, going through the motions of public participation without doing the substantive work.”

2.1.12 FROM SUBDISTRICT TO SPOT-ZONING

“Cities that don’t keep redeveloping fall by the wayside—there’s just no question about that.”160

The unsuccessful attempt to pass the MER in the City Council during late 2013, brought Mayor Bloomberg’s office to withdrew the proposal. His remaining period in office forced a temporary termination of the plan, at least until Mayor-elect De Blasio would readdress its core issues. Within a year after this failure, the New-York City Planning Department proposed an altered and much smaller version of its original plan. In May 2014, the City announced a new version of the MER plan, including a longer-term, stakeholder-driven process to determine a new framework for the overall area. This decision also devised a more focused proposal for the Vanderbilt Corridor. This new proposal was focused on a zoning amendment along five blocks in East Midtown between East 42nd and East 47th streets, also known as the Vanderbilt Corridor. The east side of the street is primarily made up of the Grand Central Terminal station, which consists of Grand Central Terminal and the Met Life office building. The west side of the street is made up of five typical blocks, containing commercial buildings from different periods and grades161. In the center of this initiative stands one project and one developer: The One Vanderbilt Place building by SL Green Realty Group. The project, a 1,450 feet tower design by KPF162 is meant to occupy the corner of 42nd and Vanderbilt Av, replacing the existing structure. When built, the One Vanderbilt would be the 2nd tallest building in the city, second only to the 1,776 feet of the Freedom Tower.

2.1.13 BACK TO THE SPOT

“Zoning is neither permanent nor rigid. It is, in a real sense, a system of values that changes to reflect the needs and consciousness of changing times.”163

“The court recognized that zoning is an appropriate extension of the community’s authority to pass laws related to protecting the public health, safety, morals and general


159. Ibid


Figure 27.

The One Vanderbilt Tower Zoning envelope

The case of the One Vanderbilt Place is not rare in the landscape of modern regulation and contemporary development. Many projects, especially those who maintain strong physical and financial presence in major parts of the city tend to draw heat during their approval processes. One Vanderbilt, an off-spring of a long and complex planning process, was facing similar hurdles since its early days. Its prime location nearing the city’s most important landmarks and its echoing prominence as one of the city’s highest towers added One Vanderbilt to the ever growing list of troubled real-estate endeavors.

When distancing form the specifics of this case, it is possible to recognize a growing pattern of project-based-regulation, specifically in markets as Midtown New-York City. While projects of larger scale, such as the Hudson Yards do manage to encompass large tracts of land under a single plan, the case of massive redevelopment in the heart of a dense urban area is much more complex. The Yards, as well one of KPF’s project, is a new development on the deserted rail yards of Manhattan’s West Side. The project takes place on a semi-deserted territory, owned by limited number of landowners. Subdivisions and rezoning processes of this parcels went with less opposition and development could go underway with a certain ease.

Yet soon after it was initially proposed, the multiple stakeholders and political forces involved in the MER began a stimulated discussion, one that is still taking place two years after the plan was dropped. Gathering hundreds of landowners and countless neighbors and residents to agree on a plan is not only a complex task. For developers today, engaging the public has become an unwritten requirement of by most planning authorities.

For the well-informed, socially and politically active residences of Midtown Manhattan, a higher level of communication and collaboration is demanded in-order to spur a fertile discussion. A speculative real-estate market and powerful economic forces constantly operating on the city producing unprecedented plans, initiatives and amendments. Confronting these forces should stand a clear legal voice, harnessing its authority to balance pressures from all sides. The case of the MER plan and its One Vanderbilt offspring, portrays a state of poor communication and lack of performative assessment prior to the establishment of a large scale plan.
"We can and should do more with the commercial corridor around Grand Central ... However, a good idea alone is not enough to justify action. We should rezone East Midtown, but only when we can do so properly."166
TLV
3rd Quarter

preservation vs. protection
“Following decades of unregulated Public-Private flexibility, the mere criteria for planning appreciation became debatable in Tel-Aviv. Thus, if uncontrolled spot-zoning and Public-Private collaboration prevail, what is the function of public planners in regulating development?”

2.2 TEL-AVIV: PRESERVATION VS. PROTECTION

2.2.1 OBSESSIVE-COMPULSIVE PLANNING

Founded in 1909, the city of Tel-Aviv was planned and sought since its day one. As the first symbolic act of Zionist urbanism, Tel-Aviv’s modern architecture and planning were the spatial instruments announcing Jewish residency in the soils of Palestine. Opposing Jaffa, the historic Arab city edging from the south, Tel-Aviv designated itself to be as modern as possible, shaking away signs of the Levant. In ‘The Jewish State’, Theodor Herzl illustrated this wish:

“We shall not dwell in mud huts; we shall build new more beautiful and more modern houses... while one of the founders of Tel-Aviv explained that while they didn’t have money, a plan we do have ...”

After the end of World War I, British and local planners found “the transformation of the oldest country into the newest fascinating assuming that this paradox gives architects and engineers a golden opportunity.” This decade featured an eclectic style of architecture, reflecting an romanticized meeting of East and West. The city’s town plan was prepared by the Scottish planner Patrick Geddes, which brought these styles and urban conception together, employing an ultra-modern buildings style with a rural British urban planning. This relationship will have a dramatic effects on future development of the city, as the wish to maintain its rural nature will meet the forces of economy and growth. The prevailing planning theme in the early days of Tel-Aviv followed Ebenezer Howard’s ‘garden city’ paradigm, which was considered one of the most advanced planning systems in Europe at the time. Howard’s ideas fitted effortlessly to the rural and agrarian conception rooted in the Zionist ideology, promoting a sparse city fabric, interlaced with and bounded by gardens and greeneries.

In 1925, after working in Africa, Geddes was commissioned by Meir Dizengoff, Tel-Aviv’s first mayor, to draw up a master plan for the new city. Geddes laid out the streets and decided on block sizes and land uses but did not prescribe an architectural style for the buildings. Geddes’s plan adapted many of Howard’s Garden City ideas, including the streets curves and


Tel-Aviv district in Israel's context. 92% of land in Israel is nationally owned, which enables national scale centralized planning, as in the NOP38 case. 40% of buildings were built before 1980 and thus are under the risk of severe damage in an earthquake event. Tel-Aviv area is under high probability for disastrous seismic activity.
Figure 33.
The White City of Tel-Aviv

This area contains a collection of over 4,000 buildings built in the form of the Bauhaus or International Style in Tel-Aviv from the 1930's by German Jewish architects who immigrated to the British Mandate of Palestine after the rise of the Nazis. Tel-Aviv has the largest number of buildings in the Bauhaus/International Style of any city in the world.

irregularities, large emphasis on natural ventilation, open spaces and overall avoidance from densification. The implementation of this plan, including green buffer zones and intentional voids, also promoted the segregation between Tel-Aviv and its historical sister Jaffa, using designed landscapes as separation instrument.

Following the 1948 war, Jaffa, absent the vast majority of its Arab citizens, was settled by Jewish immigrants. The two cities were than united under one municipal governance, named Tel-Aviv-Yafo. The city, which before was an economic center of Jaffa's Arab residents, turned into a marginal and poor neighborhood of Tel-Aviv. This situation did not change until the late 1980's-1990's, when the romantic appeal and the picturesque passages of Jaffa motivated the development of tourists' attractions and Levantine neighborhood supposing modernist Tel-Aviv.

Within the two decades between 1948 and 1967, the city kept an horizontal form of development. During the 1960's, a few of the city's decaying buildings were demolished, making way for the country's first high-rises. The Shalom-Meir Tower, which was completed in 1965 was Israel's tallest building, maintaining this status until 1999. In the early 1960's, Tel-Aviv's population peaked at 390,000, representing 16% of the country's total. But after the massive development during of the 1960's, the next two decades brought a long period of steady decline. By the late 1980's, the city had an aging population of 317,000. The high property prices pushed families out and deterred young people from moving in. Only during the early 1990's and along with massive immigration from Russia, the city managed to reverse its population decline.

This period introduced a new spirit of entrepreneurial and less-restricted development in the city. The flow of currencies and goods and the exposure to novel markets planted the seeds of the Israeli capital economy. This new economy, bold and powerful, was soon to be depicted in the physical realm of the city. After nearly 20 years of decay and stagnation, 'new money' started to materialize the hidden potential of the city, unlocking air-rights and growing foot-prints. The city started to inhabit deserted parcels along the voids gaping Tel-Aviv and Jaffa. These areas, relics of past war, began to construct the city's new CBD, a series of avant-gourd brutalistic high-rises. These buildings, mounting to no more than 20 stories, were seen as skyscrapers in front of a city of semi-rural urbanism. This era

168. Jaffa's Hebrew pronunciation
was discussed by Dutch architect Peter Kook, depicting Tel-Aviv of the 80’s and 90’s as:

“paranoia on the one hand, and the worldwide trend of the worship of money on the other. The paranoia is reflected in the fact Israeli architects are closed to any outside styles, they only see what the Housing Ministry does, and not what’s going on in the wider world. The power of money rules here in a dominant way on both aesthetics and on urban planning-Also, there is a psychological factor.”

This mixture of an old-fashion approach towards design innovation while surrendering to urbanism of capital economy will fuel the city’s Public-Private agenda. This planning practice, imported from other post-social countries, significantly morphed and shaped the physical landscape of Tel-Aviv in the past decades.

2.2.2 THE PUBLIC-PRIVATE AGENDA

As a developing municipal entity, Tel-Aviv is in constant search for incomes. The city’s most valuable resource is its stock of developable lands, extremely limited and always sought after. Amendments to regulations which enable developers to profit more on their investments are one of the tools used by municipalities to balance their budgets. Such policy changes usually feature high taxation, long-term lease, adjacent public interest investments and regional increase in land value. This act, known as a Public-Private (PP) deal is the accumulation of flexible planning engagement with particular development ventures. These ventures are based on spot-zoning that balance cost and benefits for PP organizations - the city and developers. Emerged during the 1970’s in several post-social western cities, PP:

“represent a radical departure from the regulatory approach of conventional city planning” since it is one of the first steps of privatization of public institutions. Neo-liberal policies have widen planning flexibility, linking multi-spot zoning with extreme luxury and extravagance developments. This initiatives bypass the public by creating a direct and discreet linkage between the city’s planning institutes and the developers. In Tel-Aviv, the emergence of the PP planning is engraved in the city’s skyline itself. In her overview on the growth of PP planning in Tel-Aviv, Margalit\textsuperscript{174} counts
several leading examples, depicting a methodical approach of privatized zoning and site-specific regulations. These examples, depicting sporadic skyscrapers and high-rises on the low-rise skyline of Tel-Aviv, only further highlight the obscurity of this planning agenda. These projects, built since the 1960's, represent the infiltration of both US capital economy and post-social European entrepreneurship. For the city of Tel-Aviv, these projects are commonly apprehended as the spearheading efforts for modernization of a decaying city. But even if these outcomes of the PP economy yield significant revenues back to the public, the privatization of planning institutes raises many questions. This submissive approach to capital and market, bares the question:

"if uncontrolled spot-zoning and PP collaboration prevail, what is the function of public planners in regulating development?" 17

What is in common for most PP projects is the measure of confidentiality surrounding these deals. Although cities might benefit from the ‘generosity’ of the private investors, the financial aspect of spot-zoning projects should be accompanied by an extensive cost-benefit analysis 176. But the lack of discussion and the lack of transparency of these initiatives, do not only impact the public trust in its planning institutes and municipalities. The discreetness by which these projects are being conveyed, hinders any long-term study or deep assessment on the impacts of such massive urban changes. Margalit concludes by questioning the inaccessibility and lack of discussion regarding PP projects. Such discourse, she claims, might enhance the questions regarding the pros and cons of PP projects:

“Following decades of unregulated PP flexibility, the mere criteria for planning appreciation became debatable in Tel-Aviv. Thus, if uncontrolled spot-zoning and PP collaboration prevail, what is the function of public planners in regulating development? ...the current questions call for re-evaluation of PP methods. Such evaluation should measure site-specific impacts as well as systemic ones, public benefits as well as social limits in project implementations, and challenges to planning practice and to its fundamental theorization.” 177

The last decades of the 20th century made Tel-Aviv a world city. Rapid

173. Ibid p. 80


175. Ibid p. 81
“Tel-Aviv’s ‘White City’ is part of a modern, dynamic urban centre, of unique universal value. It is considered the largest urban concentration of the early international style. The city’s uniqueness, in comparison with other modern centres, can be assessed by the following parameters:

Criterion ii: the city was an experimental laboratory for the implementation of modern principles of planning and architecture; it influenced the whole country.

Criterion iv: it is a fusion of influences and currents of the European Modern movement, and their adaptation to a regional context.”

developments created a new skyline above the modernistic White City. Beyond altering the city’s form, these initiatives redacted the cumulative planning approach that ruled the city for nearly a century. The metamorphose of Tel-Aviv’s planning department, from a top-down policymaker to a submissive party of opportunistic developers, will stand to a trail when a national-scaled Public-Private plan will be introduced in the 2005 NOP38.

2.2.3 NO38: REZONING FOR A DISASTROUS FUTURE

An Israeli National Outline Plan refers to a zoning and development statutory plan in a specific field. NOP is meant to affect the entire country and influences planning on the regional and local scales, with specification that goes down to zoning regulations. Each national plan is augmented by more local plans, usually by the counties and municipalities, that devise its implementation in more detail. NOP are drafted by the National Planning and Construction Committee or the National Infrastructure Committee, and approved by the government of Israel.

The NOP no.38 was geared towards the reinforcement of existing structures against the risk of potential earthquakes which are common in this part of the world. Since the state cannot fund these reinforcement projects, the effort is financed through a local deal: The financial mechanism of NOP38 is based on a successful corporation between private homeowners and private developers. The developer reinforces and renovates the building, and sometimes also extends the existing units without any cost from the tenants’ side. The developer later profits from the sale of the additional units built on the roof or the ground floor or from the rental of added functions (offices, commerce). Israel’s NOP38 made these deals possible by amending the regulations for every single structure which is destined to get damaged in a severe earthquake event. The new regulations provide additional building rights on top and on the sides of existing buildings which could be realized through several streams:

- by adding new residential units, typically on the roof or on ground level;
- by extending the existing residential units;
- by adding new profitable usages to the existing land use (additional parking, public amenities and sometimes commerce and offices);
- by completely demolishing the old building and constructing a new one which bares the same building-rights.


177. In Hebrew TAMA 38 (or NOP, National Building Plan)

Figure 37.

Tel-Aviv Quarters plan

3rd quarter is where both the UNESCO plan and many of NOP38 buildings resides. The two plans contradict each other in many cases, thus stalling any action by the private homeowners.

Figure 36.

UNESCO Preservation List

A list of around 4000 structures was made to reflect the UN committee’s recommendations. Most of these structures also fall into the category of structures built prior to 1980 and have significant risk of damage in severe earthquake.
reliefs. In order to push the execution of NOP38 plan forward, the national planning authorities eased permitting processes, loans approval and reduced some regulatory hurdles. Approved in 2005, the plan initially required the full consent of the homeowners. Despite the generous benefits given to developers, this obligation made it difficult to commence many of the projects. Inhabited sometimes by hundreds of residents, many of these buildings' tenants could not reach an agreements on the deals’ terms; the buildings continued to deteriorate rapidly while the risk of earthquake was rising. Therefore in 2008, an amendment was approved by the Israeli parliament changing this requirement so that 50% of homeowners can approve the building’s reinforcement project. In Addition, higher agreement percentages could grant the building additions and remodeling reliefs.

In Tel-Aviv, similarly to the city's long-term Public-Private agenda, NOP38 is a reflection of political and economic processes of transformation from a welfare state to a neoliberal economy. It is an all-purpose plan, aiming to encompass the majority of the urban scape of the city, but at the same time, it is also extremely specific. While in the past, Israel planned, introduced and executed NOP’s, contemporary national plans have more suggestive role, employed solely by local authorities and individuals.

In that sense, the main concern when NOP38 was deployed in Tel-Aviv was similar to the what challenged New-York’s MER plan: these two plans are both based on implementation processes which depends on individuals’ economic feasibility. Developers are operating both as advocates and producers of the plan, while governance is stepping aside, merely regulating the transactions. Despite this criticism, NOP38 is considered an important instrument for urban regeneration, since it can encourage housing renovation and improve the quality of residential neighborhoods in cities without significant public funding.

2.2.4 NOP38: CHALLENGES

During the last decades the socio-political environment in Israel change the structure and operation of many centralized governing bodies. While national planning authorities continued to produce large scale and national plans, the execution mechanism of these plans have changed. National plans from the last two decades, especially NOP35 and 38, hanged

179. Notably the Sharon plan, NOP 30 and NOP 35
Figure 38.

NOP38 exemplified effects on a common pre-1980 structure.

In exchange for the building reinforcements, developers enjoy significant zoning relieves, modified setbacks and height limits, up to additional 2.5 stories for each building. This incentive mechanism, effectively offers developers free real-estate in prime locations.
responsibilities on local municipalities and community stakeholders. Yet for a state that was built on centralized governance, this shift couldn’t pass smoothly. The municipal institutions which were asked to permit and approve thousands of reinforcement and renovation projects at once, were suddenly facing much more complex questions than the specificities of each proposal. Cities in which developers of NOP38 became dominant, struggled to understand the long-term consequences of sporadic increase in residential units. The randomness by which development of NOP designated structures took place, hindered these cities from deploying conscious masterplans and in-depth studies. Even in neighborhoods where concentration of structures were prone to the same earthquake risk, the pace of redevelopment was only set by the inconsistent will of the market. But while these concerns could somehow be managed in urban centers with positive growth potential, the City of Tel-Aviv met NOP38 unprepared. The Private-Public agenda that led development of most of the city’s high-rises and skyscrapers, had mainly local impact on infrastructure and density. The regulatory tools employed to withstand these projects, commonly requested reimbursements in the form of local infrastructure improvements, additional parking or landscaping. The massive projects developed sporadically along Ayalon Corridor or in the southern parts of the city’s old CBD were less of a threat in terms of population density and burden on existing infrastructure. But when private developers stormed the city, chasing revenues from NOP38 projects, the city’s planning mechanisms immediately and categorically opposed those initiatives. From the perspective of the municipal planning authorities, further congesting the existing infrastructure and overloading schools, hospitals or other civic amenities was a profound threat on their capability to offer adequate civic services. Out of the tens of thousands of structures built before the 1980’s that were included in the NOP38 lists, only around 100 received the relevant permits by 2014. Hundreds of requests for permits were ‘stuck’ in the bureaucratic channels and many others deliberately chosen to wait and do nothing due to the complex process. While implementation of the plan had other hurdles, such as funding or homeowners consent, it appears that NOP38 main barrier was and still is, the municipal permitting process. The process became even more complicated when another large-scale plan imposed new regulations on


Tel-Aviv's Quarter Plan limits

Highlighted is the White City area which occupy much of the 3rd quarter. This area is also where most buildings before the 1980's.
NOP38 building under construction and the White City landmarks

NOP38 is the largest on-going project in Israel today, proliferating generic architecture without architects all across the country.

Since many structures in the city fall into both the UNESCO preservation plan and NOP38 Earthquake plan, most reinforcement endeavors in the city are now stalled.
many of the city’s structures\textsuperscript{184}.

2.2.5 THE QUARTERS PLAN

Tel-Aviv is subdivided into nine administrative quarters\textsuperscript{185}, representing different historical development phases. Similar to other major metropolitans, this subdivision intended to ease the management and regulation of each section and to allow local masterplanning based on the unique characteristics of each quarter. Since 2013, the city was studying and deploying a new plan for some of the more central quarters, especially no. 3 and 4 in the historical center of Tel-Aviv. The plan, labeled as ‘The Quarters Plan’, proposed a series of site-specific limitations on development in these subsections. Approved in May 2014 by the Planning Committee of Tel-Aviv District\textsuperscript{186}, the plan went through many impediments prior to its final approval. One of the main opposers to the Quarters Plan was UNESCO\textsuperscript{187} organization. The UN subcommittee, which in 2002 recognized areas in Tel-Aviv as world heritage sites, could not accept the massive additions and amendments proposed by the Quarter Plan\textsuperscript{188}.

The city’s 3\textsuperscript{rd} and 4\textsuperscript{th} quarters hold architecture and urban fabric that resonates the ideas of the White City: Geddes’s plan and The Garden City movement, eclecticism\textsuperscript{189}, modernism and international style structures, Bauhaus condominiums and unique landscaping. Altering the balance between the built masses, the population density and the city scape was assumed to damage the unique features of this area.

A revised plan, conceived during the second half or 2014 was formed to accept most requests made by UNESCO and other conservation advocates. The plan reduced the allowed number of new residential units to 6500, less than 10% of the total supply of residential units in these areas. But beyond limiting development, the plan imposed specific design and architectural detailing. The revised plan depicted highly specific design regulations, specifying the buildable envelope for most structures in these quarters. When combining these laws together and adding them to the historical plans still in affect, the Quarter Plan agenda seams to lean towards UNESCO’s requirements.

One of the main concerns expressed in UNESCO’s response to the initial Quarter Plan, was the prediction of exponential growth in population density. The need for fresh supply of residential units brought the city’s planning institutes to propose massive additions to existing buildings and


\textsuperscript{183} Tel-Aviv’s Outline Plan (Hebrew ed) http://Www.project-tlv.com/urban-plans/5000/center.

\textsuperscript{184} The United Nations Educational, Scientific and Cultural. A specialized agency of the United Nations. The old center (Geddes Plan area) Tel-Aviv was announced as UNESCO heritage site in 2003.


The bulk regulations for the UNESCO plans confines (A translation form Hebrew)

This list is relevant to both 3 and 4 quarters. Other regulations may apply for specific areas. This is a partial description of the regulations attached to the approved plan, many other are included in the final documents.


- Structures will have no GFA limitation, the only restrictions are building lines, number of permitted floors, maximum footprint (set to 50%) and setbacks for ground and upper
- Porch bumps on the front and rear building edge are up to 1.6m
- Penthouse floor area would be up to 65% of the floor below
- Top floor height up to 4.5m
- Swimming pools will be allowed on the roof top.
- Number of floors allowed:
  - Non-Primary streets - 7.65 floors
  - Main streets - 8.65 on a plot smaller than 500 square meters
  - Average area per housing unit - 90 sqm.
- Building lines:
  - Lots smaller than 750 square meters - side building line - 3.0m, rear building line - 5.0m
  - Lots larger than 750 square meters - side building line - 4.0 m, rear building line - 6.0m
- Porches:
  - Area up to 14 sq.m on condition that all porches in the building will not exceed the average of 12 sq.m
  - 'Closing' balconies will not be allowed
  - Porches may cantilever up to 1.6m from the front and back of the building
- Setbacks:
  - Ground floor at the street front - 3.0m
  - Where the length of the building's forefront exceeds 30m, 1/3 of the colonnaded ground floor may be closed
  - On the top floor - 3m from the front street line of progress, and 2m at the rear end
construction of new ones replacing law-
quality buildings\textsuperscript{190}. UNESCO feared that the urban-rural balance which signifies these neighborhoods would be eventually lost by new development of medium and high-rise condominiums. The UN committee, along with broad opposition of planners, architects and residents, claimed that the ‘urban balance’\textsuperscript{192} of this area will irreversibly change. As a last-resort, UNESCO threatened to revoke the city’s recognition as a World Heritage Site, in case the plan were to be executed. To the planning community in Israel, such act would destroy a decade’s effort to join the prestigious list of world’s sites recognized internationally for their architectural and urbanism values. Losing this title would not only embarrass the city but will also have significant financial implications. UNESCO recognition is known to be a source of tourism and international interest\textsuperscript{193}. Tel-Aviv of the early 2000’s was counting on this boost to revitalize its tourism market as well as to attract international investors. Soon it became clear that unless significant changes were to be made to the original Quarters Plan, no reasonable planning institute would dare to approve it.

\subsection{2.2.6 NOP38 VS. UNESCO: DISASTER VS. HERITAGE}

Still an on-going heated debate, the latest decisions made by the city’s authorities were to approve a minimal constructing potential of around 6500 residential units and to further limit other types of development in the UNESCO designated areas. This decision, that since mid-2014 had already appealed twice\textsuperscript{194}, was backed by high ranking members of the Ministry of Interior and Foreign Affairs. The fear of losing UNESCO’s distinguished membership, mastered the concern of an undated earthquake. Dozens of projects that already commenced NOP38 permitting processes were either denied or stalled. Effectively, the consequences of the revised plan removed any incentive that could stimulate developers to pursue NOP38 in these areas. The buildable envelope depicted in this plan is extremely limiting, leaving very little potential for revenue in complex reinforcement and renovation projects. Presuming only few homeowners are capable of carrying the financial burden of strengthening their own homes, the incentive mechanism fueling NOP38 plan was rendered irrelevant. This condition, in which different planning institutes cannot reach an
Figure 47.

The typical condition of a structure in UNESCO's preservation plan

For these thousands of structures in the city, the collision of both national and international zoning plans, meant no economic feasibility for either preservation nor reinforcement, rendering both plans irrelevant.

Figure 48.

Building permits & approvals for NOP38

Figure 49.

1100 structures are under UNESCO preservation list

Figure 50.

Out of 155K, 100K apartments in tel-aviv are under earthquake damage risk. By late 2013, only 1000 INITIATED any reinforcements process.
agreement or contradicting plans cannot coexist, is not uncommon in the Israeli planning culture. As a state that began self-planning even before it was officially established, Israel has grown a cumbersome and intertwined planning mechanisms. Unlike the US, the local and municipal levels in Israel have limited power to define and regulate development within their territories. Most major plans are being discussed in the district level or even in the National Planning Authority. Since many plans are being dealt by multiple institutes, cases of disagreement, foot-dragging or bureaucracy are no uncommon. Yet while many plans tend to expose different voices and augment discussion, Tel-Aviv's case of NOP38 and UNESCO's conservation plan sets a new chapter in the evolution of regulatory forces in Israel. These two plans have to do with major tracts of the city while also dealing with very specific details for nearly every building. Both plans aim to describe appropriate urban design and architecture, in accordance to their own agendas, whether it is geared towards conservation or earthquakes reinforcement. In that sense, legal instruments such as zoning and building rights were not depicted as the end-results of an extensive and profound plan: in both cases, regulatory design specificities are themselves the plan.

2.2.7 ZONING AS A NATIONAL PLAN

This approach, in which governmental institutes use homeowners and private properties as vehicles to stem enterprises of national magnitude, is yet another step in the efforts to privatize governmental responsibilities. Requiring private owners to both reinforce their properties and to preserve historical values highlight the miscommunication amongst the different planning authorities. It is also pointing out the gap between the idealism of top-down masterplanning and the reality of executing these plans. In the coming years, the City of Tel-Aviv will have to face several rough decisions. From one end, the risk of a disastrous earthquake is clear and immanent, demanding swift actions. While the NOP38 plan bloomed slowly in other parts of the country, it is now gaining thrust, becoming the main development project in nearly every Israeli town. But in Tel-Aviv, despite having high percentages of dangerous structures, most NOP38 projects are still stalled. The municipal planning institute stacking new obstacles in front of developers and private landowners,
obstructing the execution of otherwise a straightforward plan. While it is clear that this part of the world is destined to a massive earthquake within the coming years, the rarity of these events and the inability to predict them supports this foot-dragging approach.

From the other end, UNESCO's declaration of Tel-Aviv as a world-heritage site could be significantly jeopardized if NOP projects would bloom across the White City's area. As one of the city's main financial engines, tourism and foreign investment, could decline upon losing this distinguished title.

While it is clear that matters of safety and well-being are coming before any stylistic aspirations, the planning institutes of Tel-Aviv maintain firm opposition to such rapid and uncontrolled development. The city's infrastructure and amenities will be even more congested when thousands of new residents will occupy the additions made by the NOP38 plan. The lack of a comprehensive mechanism to assess and determined the impacts of these plans leaves each project to be examined individually, forcing the city to react instead of planning ahead.
ENDNOTE

lawmakers as designers
In both the cases of New-York City and Tel-Aviv, it is highly apparent that regulation has significant effects on the formation of city form. Behind this two contemporary stories lays the fact that comprehending the long term effects of the legal actions is a complexed task. While certain aspects of these cases share more tactile depictions - like the One Vanderbilt project or UNESCO's White City building codes - it is largely difficult to follow the steps leading to these physical outcomes.

The major hurdle in conceiving these effects is the time-line connecting different regulatory amendments. While a given urban plan or a specific construction project presents a graspable and finite timescale, when it comes to regulations, no such framework exists. When it comes to public opinion, connecting these space-time dots is nearly an impossible task. For that reason, both cases represent a failure to pass important regulatory changes due to the public's reaction amidst these plans.

In both cases, the public and the municipalities share tremendous influence on the progress and advancement of the plans. They repeatedly act as bottlenecks for the approval or rejection of the initiatives and commonly express deep dissatisfaction form the way these decisions came to light. In both cases, despite the goodwill and shared aspiration to improve and excel the city and the urban realm, the proposed regulations tend to focus on specific issues while nearly neglecting others. In the nature of modern planning, the public seized to act as a silent bystander to these decisions. The days of parachuted masterplans are inherently over and without gaining significant support from the public and their constituents, these regulations or rezonings will reside in the bureaucratic pipeline for good.

But stalling these efforts has rarely a positive effect. In the presented cases, as well as in many other similar endeavors around the world, stagnation leads to decline and lack of development yields major urban concerns. The friction caused by the two parties involved - the regulator and the public - is being solved only in the local scale. As such, relentless spot-zoning and Public-Private projects sprawl throughout the city, offering some relief to the development pressure. It is clear however, that the continues lack of comprehensive thinking results in sporadic acts, which will eventually damage the delicate mechanisms safeguarding cities. A comprehensive approach is therefore necessary to test, evaluate and question regulatory changes.
Chapter 3

TOWARDS TANGIBLE REGULATIONS
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“participation should be seen as a multi-way interaction in which citizens and other players work and talk in formal and informal ways to influence action in the public arena before it is virtually a foregone conclusion.”

Your Building is too high!

See Cambridge zoning Article D.12.
3. TOWARDS TANGIBLE REGULATIONS

One of the main concerns rising from the investigation of regulation history and contemporary case studies is the level of ambiguity surrounding the law. While many of the depicted regulations and policies represent clear motivations and bare strict outcomes, attaching multiple regulation and assessing their cumulative effect is highly unattainable. In early regulations, such as the depiction of New-York’s 1916 zoning in Hugh Ferris’s drawings, the urban regulations were condensed and specific. Yet the nature of modern law and planning introduced cumbersomeness and inaccessibility to the outcomes of urban design regulations. In that sense, processes of city planning and design must endure an additional burden, prior to the actual act of design. Planners and designers must research, compare and visualize the commutative effects of regulations, so that their designs could fit appropriately into the laws’ confines. This chapter proposes an alternative perspective on regulation design and embedment. It illustrates the way design is using different methods to express ideas and notions and aims to propel these methods to make regulations and city planning more accessible. It also examines past and existing research which combines technological advancements with more ‘classic’ tools and aims to building upon these prototypes. At last, this section describes the design and utilization of a Tangible Regulation Platform that was prototyped and tested at the MIT Media Lab Changing-Places Group during 2014-2015. The platform was used in a series of experimental interactions, bringing community, stakeholders and professionals to discuss various planning challenges. Their inputs and conclusions were gathered here as well, allowing a critical overview on the way such system could be deployed. Lastly, this chapter moves to question the future of regulations in light of new technological advancements: Does modern accessibility to data and new tools for sharing information can alter the way regulations are being assessed? Can regulations be revised as a result of a simulated analysis? Can the public become a prominent player in the process of urban decision making?
TANGIBLE REGULATION PLATFORM
This segment explains the decision to incorporate a physical-technological tool for the distilment of regulations and zoning laws. It investigates the history and development of platforms, tools and methods all made to bring different parties to discuss complex urban issues. A repository of different approaches is proposed to depict the many ways these issues are being examined today and to offer a discussion on the proper way to deliberate these concerns.
3.1 COMMUNICATING DESIGN

The question of representation in the fields of architecture and urban planning is in the heart of a centuries-old discussion. It yields research and practice, shaping not only the nature of the demonstrated ideas but also the finite design outcomes. Ever since the early ages of the renaissance, where accurate measuring and mathematical representation methods were conceived, design professionals perfected these tools, allowing a comprehensive exchange with clients, stakeholders and the authorities. The modern era reshuffled this discussion. New and innovative representation technologies suddenly introduced, even faster than the modern advancements in design and architecture. Since the introduction of mass-media and computation, design discourse have shifted away from the ingenuity of the one to a much border, nonlinear discourse.

The invention of computer-based graphics and rapid prototyping processes offered designers fast feedback capabilities, along with the integration of environmental, structural and visual analyses. These capabilities enhanced the design process so that different professionals and stakeholders could have gainful input on the proposed design. While these tools and methods reduced the margins between the imagined ideas and the finite results, they all suffer from different levels of inaccuracy and potential 'data loss'. The missing information is commonly substituted and exchanged by the usage of multiple references. As such, the design of a simple office building will be communicated via superimposition of models, drawings, diagrams and textual representations, depending on current audience (clients, municipalities, fellow designers, etc.).

In the contemporary practice every proposal must be explained and demonstrated in a verity of methods. Yet while these tools have become more accessible to professionals and non-professional alike in the past few decades, certain aspects of preliminary design processes stayed the realms of the few. As such, advanced vitalization and analysis tools are less for discussing new regulations or a rezoning initiative. While over the years, some municipalities and private companies made an effort to visualize regulations, the provided information commonly suffers from different degrees of miscommunication, partiality and inaccessibility. Effectively, most of the communication made

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192. Critical Thinking In A Digital World: Using Computers To Ask Questions. Mark S. Lindhult, FASLA; James L. Sipes, ASLA; Eran Ben-Joseph, ASLA; Steven B. Mullen LandTech Annual Proceedings, American Society of Landscape Architects, October 2002
between municipalities, stakeholders and the public haven’t changed significantly in recent history. When publicly communicating regulatory amendments municipalities usually employ more old-fashioned channels such as street signage, local media and press, community meetings or peer-to-peer disclosure. Outside of the official channels, discourse regarding planning or regulations is carried through by the goodwill of private endeavors, such as unofficial public gatherings, informative websites, forum discussions, blogs, etc.

3.1.1 FROM MISCOMMUNICATION TO COLLABORATION

While contemporary design enjoy wide variety of representation tools which can propel the discussion, investigation of new or modified regulations is limited by the stiff language of law, urban codes, policies, zoning regulations and building standards. These commonly suffer from inaccessibility and lack of essential explanatory apparatuses. Yet, and as shown in the case-studies, regulation and law have tremendous impact on the way cities are being formed and shaped.

The lack of tools and methods to communicate urban regulations has an impact on two main streams: one is the complexity of distilling the regulations into concrete edifices and the other is the inability to construct a fruitful discourse with communities and stakeholders. While these issues may not represent all cases, they are increasingly common in complex urban sceneries which bare long legal history and ‘regulatory memory’.

These challenges are not only relevant to the planning authorities. Contemporary planing initiatives could not be held successful without wide consent of the general public. Consensus making has become more and more crucial in complex planning processes and the well-informed public is being asked to raise its opinion more frequently. In Susskind’s9, ‘Seven Step Model of Planning Practice’, building this consensus is a world wide concern:

“Throughout the world, we have seen the continued growth of public engagement in government decision-making; partly in response to demands for “more democracy” and partly as a pragmatic step aimed at building public support for the actions of elected and appointed officials.”

Building these engagement platforms is in itself not an easy task. Even when it is clear that the main hurdle stalling development is the degree of

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194. Ibid
acceptance by the public, the effort made to create discourse channels is still limited:

“Unfortunately, too many government agencies fail to pursue these requirements in an effective manner. They go through the motions, hunkering down to defend decisions rather than engaging stakeholders in a timely and meaningful way. This breeds even greater public cynicism. It is easy to do better.”

From the point of view of public officials, the transformation into a discourse-saturated decision making will hurt their authority and will have biased consequences. However, the public eventually voices its dissatisfaction in one way or another. In a modern society, where information could no longer be sustained, concealing decisions at a certain point will not guarantee smooth execution later. It is rather that when policy makers and planning authorities do share their ideas during the process, that complex planning gets wider consent faster and with less opposition. The first step in creating a fertile discussion is the translation of the policy and law into explicit terms, adjusting it to the discourse of the public:

“In an important task... is to translate policy principles into criteria to be used in regulating land and property development rights. The performance criteria... provides an helpful groundwork upon which to build this translation emphasizes argumentation around policy principles. But these principles cannot merely be articulated into abstract norms and criteria. Because of the variety of manifestations of spatial change, their social meaning and relevance have to be constructed and interpreted in the context of concrete places and the lives of real people and companies. They have then to be translated not merely into legal administrative terms but into the way stakeholders are thinking.”

In that sense, these conversations will not resolve issues by simply initiating a discussion with the public. There is a need for constructive discourse that employs narratives and jargon that could address the wider audience. The effort put into creating such language is being rewarded by general consent and more efficient decision making.

“Strategic place making undertaken in a collaborative way helps to
articulate a shared language which can relate the concrete realities of lived experiences to general principles and organizing ideas and then translate them back into arguments to be used in framing investment and regulatory decisions. Such a style of place making develops into a framework which serves to shape and coordinate the actions and attitudes of many stakeholders.\textsuperscript{203}

In the construction of this discourse, the ‘new’ languages that are offered for broadening the discussion, might suffer from a deliberated or unintentional information loss. It is therefore necessary to retain information accessibility and accuracy throughout the collaboration and to stay alert to all channels of inputs:

“One of the biggest issues in participation is information, who controls it and whether it is trustworthy. In collaborative participation joint fact finding is conducted in which the parties can question data and present their own. Citizens and stakeholders have information that can improve the quality of decisions.”\textsuperscript{204}

Innes and Booher’s “collaborative participation” methodology is materialized through Ben-Joseph’s\textsuperscript{205} innovative approaches for collaboration. These platforms share different attributes, from Internet based geo-planning systems to community mapping endeavorers\textsuperscript{206}, yet essentially these tactics all possess several fundamental characteristics:

- **Harnessing collaborative knowledge**: while most of these methods present a basic starting point, the process tends to yield different, sometimes extreme alterations.
- **Dependence on the end-user**: the quality and depth of the discussion cannot be guaranteed by the promoters. If the end-users will lose interest or will be drawn into an unproductive argument, the collaboration will eventually fail.
- **Multiplication of data sources**: identifying the communities’ specific needs in complex urban environment demands an agglomeration of tools and methods. Practical superimposition of data layers from verity of sources is crucial for layering wide foundation for discussion. As such, incorporation of deliberated surveys, social networks reaction and interaction with edge-communities might reshuffle conventions.
3.1.2 DESIGN, COMMUNICATION, COLLABORATION

Methods and technologies for supporting decision-making processes have evolved tremendously over the last few decades. They span from classic sketching tools and physical models to interactive technologies such as web-based, augmented reality, and tangible interfaces. These methods all share similar goal: Intuitive interaction that can create collaborative spaces where users can efficiently work with each other, and see the result of their interaction immediately. The ultimate goal is to offer all parties a planning process which not only more efficient, but also widely agreed upon.

Physical and tangible tools were always part of the design process. They better help illustrate the final outcome due to their three dimensional nature, allowing a broader discussion. The history of tangible representation as a mean of design collaboration is as ancient as design itself. Models of building details and complex intersections were found in early construction sites, suggesting their usage for communication with the builders during the construction phase. These models were less a representation of the entire structure or its concept and more of a decision making and guidance for builders in the construction site.

The Greeks and romans extended these techniques to depict entire buildings by models. Models of completed buildings aside to wax models of ornamental details were found and proven to serve as reference during the building phase. Throughout the mid-ages, an ornamental culture of building miniature sprang all over Europe, memorizing great structures of ancient times and serving as relics to the great days of the empire. These miniature were not part of the design process and were made only after the structures were completed or already demolished. Chronicles by Vasari and others prove the extended usage of models in design since the beginning of the renascence. Michelangelo used models as well and perfected the techniques of modeling, drafting and illustrating the model and then re-modeling a depiction of these drawings. Many of these models were kept in the buildings themselves. They were often used to reference maintenance works, while also being a source for students and teachers to explore the origins of these structures. While the majority of the original drawings couldn't
survive, these models were kept by the buildings' patrons (mainly priests or librarians) and thus served as an important source of knowledge on the design process.

Similarly to the invention of press and sharing knowledge through printed materials, very little has changed in the field of collaborative design methods since Vasari's recollections. Architecture and city design have commonly shared two major methods to communicate and collaborate their processes: physical models and two-dimensional graphic representation. It wasn't until the mid-20th century that computers and digital media became a prominent alternative to these millennium-old techniques. The minimization of computational design systems and their rapidly declining market prices, reformed the collaborative nature of design. If before the 1980's, architecture and urban planning required drafting boards, model rooms, plotters and supporting devices, the digital revolution introduced full minimized studios in the form of a personal computer:

"With the development of the personal computer (PC) platform in the early 1980's, CAD software started to gain widespread acceptance. AutoDesk, which released its AutoCAD PC platform in 1983, gained recognition as the industry standard. With the introduction of Intel's 386, the use of CAD spread to many more companies and end-users. It particularly gained momentum in 1988 with its first exploratory release of a three-dimensional modeling system. By the early 1990's, the technology for generating entire landscapes by computer was readily available to design and planning professionals. Yet such simulations required time-consuming calculations to generate realistic lighting, reflections, and rendering details."

Designers and their firms became almost mobile and consumed less floor area, allowing reduction of manpower and decrease in leased spaces. But this change also affected the degree of social interaction and collaboration in design work. Design processes which previously required multiple designers, were suddenly handled by a single CAD professional. But where these tools improved the work in studios and design firms, innovation in tools for collaborative design did not paralleled the progress in the single-user design tools:

"While urban simulation programs have made steady progress in the
past decade, they are still confined to two-dimensional flat interfaces. As such, they leave much to be desired.\footnote{216}

Since its early days, computational design struggled to offer collaborative way of work. Collaboration through software are a challenge for both designers and computer developers. The nature of CAD tools was commonly geared towards an individual working experience. Since the emergence of networking and shared working environments, these tools integrated collaboration capabilities, such as sending and receiving feedback or online discussion over a shared document\footnote{217}. Yet these sharing capabilities did not alter the way design was made with these tools; in most of these cases, the act of sharing was following the act of design, so that each phase was made separately. Ultimately, most tools still allow only a single user, with a single screen to directly interact with the design.

\section{3.2 COLLABORATING DESIGN: A CATALOG}

"If the creative process is to be assisted by the computer the machine has to act reciprocally and simultaneously to produce a smooth dialogue. For an urban designer this conversation must be graphical. His entire training, practice and design process are graphical: a progression from doodles to finished plans."\footnote{218
\footnote{212}}

This section aims to list several key approaches of collaboration and sharing design information, specifically in the urban scale. This short catalogue is subdivided by the major method each platform utilizes, in an effort to illustrate the many branches of design sharing method currently in use. This list is invested in the understating of sharing as an immanent part in the process of design. For that reason, platforms and methods which are not relying on technological advancement, will be more relevant to that list than advanced designing tools which are only geared towards the individual user. Ultimately, this list will serve as a background for emerging type of collaborative platforms, one that is inherently multidisciplinary, crossing media types, technology ans scales.

\subsection{3.2.1 HARDWARE}

This is a gathering of several on-going initiatives that collaborate stakeholders and communities to find common grounds on urban design issues.
The main effort of these groups is to simplify and distill complex problems by using rudimentary physical objects. These tools commonly do not involve computational components, in order to allow all parts of the community to engage effortlessly and without prior expertise.

3.2.1.1 The Center for Urban Pedagogy (CUP)

CUP is a nonprofit organization that uses design and art to improve civic engagement. CUP projects distills urban policy and planning issues that impact communities, so that more individuals can participate in shaping their surroundings. CUP works with advocacy organizations, policy experts, and designers to produce publications, workshops, and other teaching tools that explain important policy issues for the people who most need to know. Projects such as “Know Your Lines” and “What is Affordable Housing?” uses physical game-like tools, such as large scale maps, print-outs and pamphlets, drawing booklets and table games to declutter urban issues. The main goal of CUP is to establish pedagogic channels that offer uniformed communities a chance to understand their physical and legal surroundings. In that sense, the tools used by CUP usually operate in one direction: from the lawmaker and municipality to the public and community.

3.2.1.2 Place It!

Place it! is a design and participation based urban planning practice that uses model-building workshops and on-site interactive models to help engage the public in the planning and design process. Through the design and game sessions, participants are able to learn about the role of planning and design in shaping cities, and to translate ideas into physical forms and models. The discussion that start with this game-like platform is being translated by professionals to serve as future design input. From these physical results the Place It! team (architects, urban designers and planners) generates plans, drawings, and policy recommendations for municipalities, NGOs, and elected officials.

3.2.1.3 Game Urbanism: ‘The Making Of’

Game Urbanism deals with the culture of spatial planning. The Game Urbanism platform examines the structure of game playing and applies it to spatial planning and collective decision-making processes. Spatial planning can involve anything from changes to a public space, to the restructuring of a neighborhood, to an urban area’s search for identity. Most games share a common structure: there

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are players, there are rules, and there is the objective to "win". The relation between playfulness and seriousness is a key feature in 'Game Urbanism'. The game simplifies complex situations, reveals the wishes and interests of those involved.

3.2.1.4 Dreamhamar

is a participatory urban planning project by Madrid-based architects and urban designers Ecosistema Urbano. During 2011-2012, Dreamhamar project aimed to redesign the public space of Stortorget Square in Hamar, Norway. Citizens and various stakeholders were taking part in a collective brainstorming process that defined their new square. This approach to the construction of a public space or transformation of existing ones supported by workshops, lectures, urban actions, communication and participation tools. The project involves various stakeholders that became part of the community of Dreamhamar and participate in some of the working areas:

Urban design - a technical research and urban approach to the public space.

Physical Lab - a "pop up office" where workshops, lectures and exhibitions take place.

On-site Workshop - workshops and lectures led by local and international creative guests to create a large database of the citizen ideas.

Urban actions - a way for citizens to experience directly on the public space possible uses of the future square.

Dreamhamar is a unique example where design, urban intervention and public engagement come together to serve an urban need. While many projects offer certain involvement of the general public, this design process presented a new level of collaboration in the act of design and implantation.

3.2.2 SOFTWARE AND WEB BASED COLLABORATION

Collaboration through softwares was always a challenge with the limitations of modern computers. Even after four decades of personal computing, the PC interface still remains similar: one man, one screen, a single input channel. This list includes projects and companies that are striving to break this convention, opting to portray new methods of interaction through computer software and web-based applications.

3.2.2.1 CommunityViz

CommunityViz began as an idea in the late 1990's, when Noel Fritzinger and Lyman Orton sought a software tool that would make the planning process more accessible to ordinary citizens. CommunityViz is a software...
which packs several extensions to the market leader ArcGIS Geographic Information System software. CommunityViz proposes analysis tools for urban planning, land use planning, geodesign, transportation planning and resource management applications. CommunityViz is designed for community planning and natural resource management and is a decision-support framework. It is comprised of three software components: design and analysis of alternative development scenarios, 3D visualization of these alternatives, analysis of development policies and their impacts over time. These capabilities made CommunityViz a base point for many site specific projects, in which planners and their local communities utilized specific builds of this package.

The initial team included The Environmental Simulation Center, Fore Site Consulting, PWC and others. For the next two decades, ESC themselves used CV applications in many community engagement projects. Following are several projects and collaborations created with CommunityViz softwares and other collaborators:

3.2.2.2 The Environmental Simulation Center (ESC) Projects

The Environmental Simulation Center is a laboratory at New-York City’s New School for Social Research. The ESC combines computer imaging, policy simulation, and computerized impact analysis. The Center uses softwares that allows citizens to model various site-specific development scenarios in a manner similar to the Sim-City environment. The ESC agglomerates existing technologies and acts as a hub for the public to engage these tools.

Some of the ESC projects involve multi-participant events where communities and stakeholders join to discuss and learn about planning process. The mediating role of the center allows for non-professionals to explore technologies commonly used only by industry specialists.

3.2.2.3 South Kingstown

In 2005, the town of South Kingstown, a town in Rhode Island, asked the ESC to develop a build-out analysis model that would be easier to maintain and update each year. The project had three parts: replication of the Town’s previous method and output; model design and implementation; and installation of the model and training of the Town staff on operation.

South Kingstown has about 30,000 residents and occupies 56.8 square miles of land and 6.1 square miles of water. Settled for over 300 years, the town features a variety of housing types and lot sizes. The Town has a


mechanism in its zoning ordinance that place a limit on building permits as a part of its growth management program.

The ESC developed the model in the CommunityViz platform, so that the model could be easily integrated with the Town's GIS. The design of the model was developed with the town staff, in an effort to understand what was considered an important development. Assumptions could be turned on or off or adjusted via a the software so that the town could simulate the effect of policy changes on the results of the Build-Out model.

3.2.2.4 Baltimore Vision 2030

For this project, ESC used GIS analysis to identify and create maps of potentially developable areas within the five counties and City of Baltimore region and compared the available land area with the region's projected growth needs. The mapping included 3d models of the existing areas and of the proposals, allowing both map and street-level views. The ESC conducted several planning workshops, in which stakeholders distributed projected development on these maps at various densities, revealing the relationships between development pressures and open space, density thresholds and regional sustainability. This enabled citizens to make more informed choices and was critical in reaching consensus on three distinct development strategies.

3.2.2.5 Flux.io

Initiated as a google X project, Flux.io is one of the first online tool that engages questions of zoning and regulation with real urban cases. Flux.io meant to bridge the gap between the planning information and the private sector. It wishes to provide accessibility to information that usually resides only in the archives of planning department and to visualize it in a compelling way. In that sense, Flux.io aim less to the general public, as much as it wishes to attract investors and developers. The company's business model is based on sharing planning information with stakeholders, clarifying potentials or limits for new development. Since regulatory information is very specific, the company is deploying pilot projects in selected locations. This projects must first establish fertile discussion with local planning authorities, in-order to get full access to the regulatory data. The first project, deployed in the city of Austin, Texas in 2014, also marked the company's first steps outside of Google's 'X' innovation hub. Flux.io offers a set of online tools, composed of a 3d visualization of the city (based


on Google Maps and Street View database), visual representation of the regulatory envelopes and statistics and calculation tool bars. Flux.io joined a wide envelope of tools created or developed by Google in the past decade, all aimed to augment and excel planning and design processes. Amongst are the popular Google Maps, Street View and Google Earth which altered the way mapping is wildly used and conceived.

3.2.2.6 SmarterBetterCities

SmarterBetterCities offers solutions for decision makers, urban planners, municipalities and designers. Their Web based system provides visualization of complex urban sceneries and allows decision-making solutions to be shared with the public on-line. The main advantage of this product is the simplicity of sharing the urban models across platforms and with multiple stakeholders and the ability to comment and discuss these plans in real-time. This tool, similar to other web based collaborative platforms, is based on the Web version of the ArchGIS platform.

3.2.2.7 SynthCity

Synthicity developed a series of tools to engage communities in decision-making about urban development through simulating urban and visualize alternative scenarios in 3D. The company main product, UrbanCanvas is a visualization and analysis tool that can inform design by facilitating early-stage prototyping with easy to use design tools, and integrated analytics. It enables a broad set of users and stakeholders to engage in the planning and design process in its early stages and follow this through more detailed planning stages.

3.2.2.8 ARTHUR

The Bartlett School of Architecture, has developed an augmented reality interface for design collaboration. Using see-through augmented reality glasses, the ARTHUR round table generates virtual models of the design scheme. Twin cameras fitted to the glasses and computer vision techniques provide head tracking for the users, as well as tracking real world placeholder objects on the table that allow the users to interact with the virtual model. The glasses and the real world placeholders mean that all members of the round table have equal access to the design user interface. The ARTHUR team also developed a series of simulations and visualizations of building performance, so that the consequences of design changes can be evaluated while the design is being
INTERNATIONAL BUSINESS MACHINE PUNCH CARD

Developed for tabulation of land use data in each City block. These cards provide the City Planning Commission with a permanent record of 1948 land use, 1948 zoning and the means for future tabulating and analysis.

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Plan for Rezoning the City of New-York by Harrison, Ballard and Allen, October 1950

Harrison, Ballard and Allen were asked by the City to develop recommendations towards modernization of the 1916 Zoning Resolution. Plan for Rezoning yielded eight proposals and their impact on the city. Much of its contents form the basis for the 1961 Zoning Resolution. Computation was also proposed to improve land use assessment and analysis:

"Through the generous cooperation of a group of financial institutions, which contributed funds for the purpose, teams of City Assessors were employed after hours to enter the appropriate numbers in each property on the base map. These entries were then sample checked in the field, and corrected as need be.

When complete, the map was colored to bring out the various uses visually, according to a color schedule especially designed for the job. This colored use base map has served many purposes. As a base it affords comparison with transparencies showing existing zoning. It aided in the preparation of generalized use maps, where predominant use, rather than individual properties, was of interest. It served as a reminder of non-conformity when compared with these generalized use maps. But perhaps most important of all, it permitted quantitative measurement of the ways in which the City's land is now used. In order to do this, specially designed I.B.M. Cards were prepared for each block in the City. The present use of the land in the block used for each of the 13 categories and the area in each present zoning district in the block were punched on these cards. Space was left for the proposed zoning and for other data the Commission might in future wish to record by blocks."
manipulated. For example, the effects of moving building blocks relative to each other on patterns of pedestrian movement could be visualized through a real-time simulation of pedestrian flows on the ARTHUR tabletop.

### 3.2.2.9 Other tools and online platforms

A slew of new tools are being developed along with the growing power of Internet application to display and compute complex data structures in a fast and compelling way. Many of these features were depicted in “Web 2.0 for urban designers & planners”, a 2008 dissertation by J. Wilson and in “Large scale participatory futures systems: a comparative study of online scenario planning approaches”, a 2011 dissertation by Michael Flaxman. Both theses envision many of the developments already taking place online and projecting a future of collaborative planning realm over the web. Some municipalities already incorporated such tools in order to better communicate and educate the public on urban developments and on-going projects.

As such, BuildingEye gathers planning data from various city authorities and visualizes the data on maps, which link directly to the relevant planning information and documents. New-York city Planning department has developed its own tools to devise urban planning data, including Zoning and Land Use tool called ZOLA. The tool allows users to view zoning information for every parcel or block in the city and to extend this information using the city’s code and design guidelines.


Also:

Figure 55. Community Viz used by FEMA to consult communities about risk prevention measures.

Figure 56. Flux.io Metro demo
3.3 INTERDISCIPLINARY DESIGN PLATFORMS

3.3.1 THE CHALLENGE OF MULTIMEDIA

When choosing the right methods to express their design concepts, designers face the problem of multimedia. This issue is not driven from the lack of communication tools but rather from their multitude. Even newer tools for fast feedback, such as rapid prototyping and fast-computational 3D modeling, are all bounded to certain limitations. When a designer utilizes a computational system for devising a design solution, its limitations are of the representative medium, or the 'host' (the computer's memory, screen, input devices, etc.) The produced design over this machine answers to its limitations; The result is therefore somewhere in between the device's boundaries and the designer's ideas.

For example, the physical dimensions of a common 3D printer are bounded by the traveling area of the printer's 'head'. While virtual models could be composed on a scale-less dimension, when plotted or printed, these models must comply with the 'host' production limits. Therefore, the amount and density of information displayed in such model would have to comply with the printable area. These inherent limitations forces design processes to constantly utilize many parallel tools and methods, demanding wide expertise and divided attention from designers and their clients:

"The spatial and temporal separation between the forms of design representation increases the cognitive load on the urban designers who is required to draw relationships between dislocated pieces of information during design sessions. Converting the media between digital and physical representations... is time consuming and distracts the designer from focusing on the task. The urban designer is in critical need of a platform that allows the simultaneous understanding of a wide variety of representations, including drawings, physical models, and digital analysis. After observing the urban planning process, we concluded that simultaneous use of physical and digital media in the same space is an important requirement of the design studio of the future."\(^{37}\)

The question of representing multilayered complex information, is in
the center of a five decades research and practice. This section aims to depict several key multidisciplined tools and platforms that advanced collaboration in design. Inherently, these tools were experimental and were more geared towards proof-of-concept than a marketed product. Nevertheless they all excelled and progress the discussion on technology applications in decision making and design.

This new typology of collaborative design lays in the in the rather ambiguous margins between technological platforms and primeval physical elements. This era brought advancement not only in terms of technology and information but also to the seamless relationships occurring between humans and machines. Together with to these advancements, these projects repeatedly augmented massive amounts of information with simple, sometimes childish components, allowing professionals and non-professional alike to investigate complex questions without technical background.

3.3.1.1 Sketchpad

Ivan E. Sutherland 1964 SketchPad project changed forever the relationship between human and computer. While an Electrical Engineering doctoral student at MIT, he developed Sketchpad, the first computer program to use a graphic user interface.

“The Sketchpad system makes it possible for a man and a computer to converse rapidly through the medium of line drawings.... In the past, we have been writing letters to rather than conferring with our computers.”

Through Sketchpad, Sutherland threw open the doors of computing to designers. He made a short film of his discovery called “Sketchpad: A Man-Machine Graphical Communication System,” which became a cult classic in computer research circles. CAD programs and Object Oriented Programming later sprang from the ideas he introduced.

3.3.1.2 Seek

In 1970, The Architecture Machine Group at MIT combines the physical and computational to automate a city design process in the ‘Seek’ project. The Architecture Machine Group, under the direction of Nicholas Negroponte and Leon Groisser, experimented on interfaces and tools that connect architecture, engineering, and artificial intelligence, from 1967 to 1985. Negroponte described the mission...
midway through the group’s lifespan as follows:

“The Architecture Machine has chronologically become a book, a minicomputer, a family of minicomputers, a small curriculum, a computer ethic, another book, and a catch-all for a variety of papers.”

An architecture machine, as Negroponte saw it, would turn the design process into a dialogue that would alter the traditional human-machine dynamic. AMG Projects such as the URBAN 5 computing system grew out of the “Computer-Aided Urban Design” class that Negroponte began teaching in 1968. Later projects, such as the Spatial Data Management System (starting in 1978) and the Media Room spawned masters theses and PhD dissertations, such as the Aspen Movie Map, a proto-Google Map and Street View application that allowed its user to “drive” down streets in Aspen, Colorado, from an Eames chair equipped with joysticks in its armrests. The 1970 Seek project (also referred to as “Blocksworld”) was designed and built for an exhibition at the MoMA, featuring a computer-controlled environment full of small blocks and inhabited by gerbils. Following instructions programmed by Negroponte, the robotic arm automatically rearranged the blocks in a specific pattern. Once the arrangement was disrupted, a computer-controlled robotic arm rebuilt the block configurations in a manner its programmers believed followed the gerbil’s objectives. The designers, however, did not successfully anticipate the reactions of the animals, who often outwitted the computer and created a total disarray.

Negroponte’s work on the Seek project introduced another integer to the equation of computers and humans: the randomness and unpredictability of the human mind. In this experiment, the relationship between man and machine were not a well synchronized augmentation of human capabilities, but a two streams discussion between a limited machine and limited animals brains.

“Can a computer be programmed to respond intelligently to unexpected events? A toy-block “city” was the stage for an experimental contest between a simple computer system named SEEK and a small colony of gerbils. The computer’s instructions were to keep the “city” in order, but the playful gerbils would not cooperate. The experiment was set up as a New York art museum exhibit.
concerned with the interaction between people and machines by the Architecture Machine Group of MIT. The group is working on computer systems which can aid architects in solving design problems; not just to solve engineering problems, but to interact with the architect and discuss urban design problems with him. The computerized environment exhibit was an attempt at showing the problems encountered when living things, such as the gerbils in this case, interact with a machine which is an integral part of their environment.²⁴¹

3.3.1.3 From GUI's to TUI's

"The Tangible Media Group at the MIT Media Laboratory moved from GUIs to tangible user interfaces (TUIs) in the mid-1990s. TUIs represented a new way to embody Mark Weiser's (former chief scientist at Xerox PARC) vision of ubiquitous computing by weaving digital technology into the fabric of the physical environment, rendering the technology invisible. Rather than make pixels melt into an interface, TUIs use physical forms that fit seamlessly into a user's physical environment. TUIs aim to take advantage of these haptic-interaction skills, an approach significantly different from GUIs. The key TUI idea remains: give physical form to digital information, letting serve as the representation and controls for its digital counterparts. TUIs make digital information directly manipulatable with our hands and perceptible through our peripheral senses through its physical embodiment."²⁴²

A major step in the long process of narrowing the gap between humans, computers and data, emerged around 2000, with a series of projects from a joined effort by the School of Architecture and the Media Lab at MIT. In these projects, Underkoffler, Ishii, Ben-Joseph and their students pioneered several Tangible-User-Interfaces to augment and simplify complex design and planning questions. The Augmented Urban Planning Workbench²⁴³ (also known as URP, LPT) project in 2002, proposed and prototyped an Augmented Reality device for planning and designing in real time. The platform, also called the "Luminous Table", attempted to address the issue of "spatial and temporal separation between the varying forms of representation used in urban design." In other words, the multiplication and inconsistency

²³⁶. "Life in a Computerized Environment", Electronics Australia, September 1972
Figure 58.

Hugh Ferris
Analysis of 3 zoning periods

Ivan Sutherland
Sketchpad: a man-machine graphical communication system

Nicholas Negroponte
SEEK - the Architecture Machine Group

John Underkoffler
Urp: a luminous-tangible workbench for urban planning and design

Eran Ben-Joseph
Augmented Urban Planning Workbench

Tangible Computational

1959
1962
1970 1999 2002
of design representation tools makes it difficult for stakeholders, designers and their clients to communicate. This challenges the designers to not only produce quality end-results but also to provide sufficient argument to support their designs.

The designers are "required to assimilate these divergent media into a single mental construct and in so doing is distracted from the central process of design." 244

The design of the Workbench included a table which holds a physical model and a projection scheme form above that augment different layers of data on the model through projection-mapping. These layers showed sun-shade computation, traffic simulation and architectural geometrics. “By ‘triangulating’ between these multiple forms of representation, we gain a more realistic sense of the site and proposed urban design.” 245

The Workbench was tested in various scenarios, including a semester long urban design urban design class at the MIT School of Architecture and Planning during the spring of 2000. The class was divided into three groups, and each group was asked to perform the same urban design exercise. The Workbench allowed students to model their designs, helping them to gain a clear sense of the spatial implication.

The trial period was concluded as a successful combination of conventional models and drawings with the power of digital simulation. “We have shown how the system provides users with a means of understanding the relationships between the static form of physical models and the dynamic behavior of previously intangible factors such wind speed, shadow movements and vehicular flow.” 246

This work came along with a slew of projects which utilized a sudden advancement in technology and its relations to human interfaces. As such are the Clay Table247, The I/O bulb248, the Luminous Room249 and other variations on the idea of multilayered information projected over a tangible interface. This platforms made it clear that in order to achieve both freedom of design and data based decision making, it necessary to transform unrated sets of information into a unified product.

3.3.2 THE NEED FOR SINGULARITY

Only few other professions experiences such swift and dramatic change in their most basic tools of work as designers and architects250. For centuries, what was expressed using either two dimensional projections or three
Figure 59.
Figure 60.

The dichotomy between the representation methods could be eliminated with the introduction of new tools, which seamlessly bridge between representation methods.
dimensional illustrations and models, developed into an extensive gamut of possibilities. The dichotomy between the representation methods could be eliminated with the introduction of new tools, which seamlessly bridge between representation methods. Key factor in the success of these new tools lays in their ability to perform individually. Although many tools, such as augmented reality, rapid fabrication and model making systems or web interfaces, transform complicated information into an accessible one, it is necessary to blend several mediums in order to retrieve a comprehensive understanding of the subject matter. The Workbench and other tangible platforms presented an intersection of rudimentary elements (physical, site and topography models and input devices) with virtually rendered layers of information. The result, an augmentation of physical and virtual elements, offered an accessible system which could handle complicated issues without requiring other tools. The fact that even if each of the system’s elements (the table, the models or the projections) was presented on its own, would still make sense, is a cornerstone in the multiplication of such platforms. Sophisticated visualization systems that employ singular output channels, will always suffer from limited functionality and accessibility. Similarly to maps or technical drawings, it is commonly difficult to imagine their full intent without complementing tools. The multilayering of representation methods, such as physical models, drawings, projections and screenings, creates not only rich environment for inputs and outputs but also a place in which different people from various backgrounds can communicate comfortably. In other words, the power of these systems is that they always prefer augmentation over substitution, adding to the existing instead of trying to imitate it.

Figure 61.
*Link Blue Box Training - WWII flight simulator*

II TANGIBLE REGULATION PLATFORM
A common condition, in which a developing area is becoming a byproduct of numerous plans and initiative, is represented in Cambridge Kendall Sq. Area. The emergence of this postindustrial section of the city, awaken many historical plans and recommendations, now striving to imprint their conception on this territory. Similar to many other redevelopment initiative all across the country, the intersection of old and new ignites a debate on the future of renewing cities. In the context on the Tangible Regulation Platform, this site is being used as a testbed to explore the implications of numerous zoning laws, regulations, design guidelines and other sources, all imprinting tactile outcomes into any future development. The platform will build upon these laws, aiming to distill their form-making segments into a coherent regulatory envelope.
3.4 KENDALL SQUARE: AMOUNTING REGULATIONS

During the last decades, the underutilized, post-industrial area of Kendall sq. reemerged as a technological hub, bringing various stakeholders to propose massive redevelopments. Many plans and studies were initiated in order to respond to both the development pressures and the local community needs. Most of these plans pursued regulatory modifications in an effort to increase capacity for MIT's eastern campus and the adjacent area, aiming to change current height limits, AOR, GFA and other regulations.

Kendall sq. area was chosen as the case study for the development of the platform due to the ease of access to planning information and the transparency surrounding the redevelopment process. This access also allows an informal segue to key stakeholders and local community members which were heavily invested in the reemergence of this area. This site is currently undergoing a transformation effort, from an underdeveloped post-industrial territory to an important innovation and tech district. Since this change is anticipated to sprout all across the US in the coming years, questioning the existing legal framework could shed some light on similar cases of regulatory changes. The complexity this area represents - sitting on the verge of MIT, adjacent to low-dense neighborhoods, close to Boston CBD and surrounded by unique geographical features - creates additional interest when studying the regulatory approach for its redevelopment.

This case study was selected not because it represents a unique example of contemporary regulations or zoning. Similar to countless urban sections across the US, Cambridge's Kendall Square represents an everyday redevelopment initiative, aiming to renew and improve an aging part of the city. The planning processes of this area depicts a common example to some of the complexities and cumbersomeness of contemporary regulations. The few streets that composes this area have been planned, designed and regulated over and over again in the past few decades. While these plans all aimed to improve and modernize the area, the multiplication of these efforts created a 'regulatory memory'. These legal traces, tending to erupt during redevelopment, are shaping and modifying the area, similar to the way legally imposed building preservation stalls a new project. In that sense, Kendall area redevelopment...
is not following one distinctive planning approach but rather an accumulating set of zoning laws, design guidelines, policies and regulations. The generic and unassuming nature of this area better represents the common issues concerning numerous redevelopment projects all across the US. The site's proximity to MIT allowed ease of access to planning and regulation data as well as to the processes of the contemporary redevelopment initiative. Many of the stakeholders and community live and work in short distance form the site and were taking an active roll in the planning process.

3.4.1 THE REEMERGENCE OF EAST CAMBRIDGE

Soon after the construction of the West Boston Bridge in 1793, the eastern area of Cambridge has become a major transportation center. The area, the closest land to Boston beyond the Charles River, provided direct rail routes to the city, allowing industry and commerce to grew into Cambridge. Kendall square remained an important industrial center during the 19th century, hosting distilleries, power plants, soap and hoses factories along with other manufacturing facilities. In 1916, MIT campus relocated to its current site on the Charles northern bank, later sprawling from Massachusetts Av. In west to the Kendall Square area in the east. Due to new campus proximity, Kendall Square and the surrounding area have faced significant changes in terms of land use and population distribution, raising land values and altering the industrial nature of the site. After the Second World War most plants were shut down and moved to cheaper and more modern sites across the country, leaving the area neglected. This abandonment of one of the most important industrial centers in the East Coast brought significant losses in terms of property taxes, declined residential areas, surging urban unemployment and dropping business vitality. Many of the remaining industrial spaces became home for MIT-related technology startups which developed exponentially after the WWII. This small companies enjoyed the proximity to their seed-labs, using the Kendall area as a gateway before expanding their businesses across the world. Nevertheless, the surrounding city remained mostly underdeveloped until the mid-1950’s, when the Mayor of Cambridge together with the president of MIT, the City of Cambridge Redevelopment Authority and several real-estate developers planned Technology square. This concept, one of the first University

Linked Business Parks, was planned to revitalize the area while benefiting from low land value and flexible development opportunities. This initiative brought important corporates to set a branch across the streets of MIT. In the 1960's Kendall Square accommodated one of NASA's research center alongside the first signs of private development. During the 1970's, The Marriot Hotel complex was built, improving the capacity and usability of the area. During the 1990's, The University park was developed along with private R&D headquarters for several technology market leaders. The East Cambridge Riverfront Plan's implementation (1978-2002) and the 2001 Citywide Rezoning began the process of moving away from the common urban renewal approach, by emphasizing the importance of the pedestrian-oriented development and creating open spaces at the street level. In its current phase, Kendall Square is changing identity again, transforming into a more diverse area. After decades of mono-functional development, the site is now seeking to create a mixture of university linked Business parks, luxury housing buildings and high-quality office complex.

3.4.2 A TYPOLOGICAL MIX

Despite representing a small area of Cambridge, MIT Eastern Campus and the Kendall Square triangle are heavily regulated and intensively planned. One reason for the focus on this area could be found in the geographical settings of the site: it is adjacent to the Charles river delta, bending it from its north-east orientation to the north. This knee shape formed several different urban grids which all meet at the Kendall Square area. Each grid resonates a different bank of the Charles, histrionically altering street directions and parcels dimensions. These grids also represent various historical phases in the development of the Charles River banks. The land north to Kendall Sq. was subdivided according to its industrial and manufacturing purposes, usually accommodating warehouses and depots.

Another reason for the complexity of this site is that the square is also where multiple zoning and land uses intersect. From the south-east, the MIT main campus holds relatively low-rise buildings and continuous facades, stretching along Main st. and Memorial drive. From the north, a mixture of high and medium rise new condominiums, mixed together with low industrial structures. Further to the north and to the north-west, low-rise and private residential buildings, a common typology of Cambridge. These multiple


249. O. Robert, p. 77
typologies, conjoined on a one mile radius, created a demand for specific regulations that could maintain each area's uniqueness while binding them together.

Additionally, the proximity to Boston's business district could explain the unique regulations on site. The Longfellow bridge serves as one of an important connections to Boston's city center and its CBD. The T-train and the Kendall sq. stop allows easy and fast commuting. This physical proximity altered the value of land on the northern bank of the Charles, suggesting higher and denser development which imitates east-Boston peninsula.

These relationship were manifested in the area regulations. During the first transformation of the site in the 1950's, several parcels were planned to resemble the towers demarcating the other side of the Charles. As such, the John A. Volpe National Transportation Systems Center featured a modern slender tower, surrounded by a low-entrance building and generous plaza. The building was originally designed to accommodate NASA's Electronics Research Center (ERC) which opened in 1964, taking over the administration NASA business in New England. The campus, a 14 story high-rise with five surrounding lower buildings, never reached its original design height; instead of a tight, square and slender tower, NASA erected a bulky building, standing oddly in the middle of an unproportional wide landscape255.

Before its Cambridge outpost was shut down in 1969, NASA only got to building on half of its land in the Kendall area. When NASA left the area, Cambridge was staring at a white elephant: an empty government-owned tower surrounded by a vacant land256. After a year, the site and the buildings were transferred to the U.S. Department of Transportation (DOT). This project, as well as other towers and high-rises built during the 1960's in this area, represents Cambridge's transformation and the wish to reflect the modernization which took place on the other side of the Longfellow bridge.

Most redevelopment initiative since the 1950's had to bridge the gaps between the different typological features of the area. While early plans included dramatic physical changes and involved cleaning of the site by constructing massive new structures, contemporary plans shows more settle approach. In most cases, plans of the past few decades commit to maintain historical features and the site's 'spirit' and translating this approach into the development regulations.


3.4.3 A SLEW OF REGULATIONS

In order to apprehend the effects of the City of Cambridge regulations on Kendall's forthcoming project, it is necessary to outline the multitude of plans and initiatives previously issued for the site. While not all specifically redesign this area, they all touch certain aspects in its physical or operational features.

A prominent example of the ambiguity that might arise form this slew of regulations and policies, could be found in the city's K2C2 study. Cambridge began a planning study of the K2C2 area (Kendall and Central squares) in early 2011 in response to interest in increased development capacity. The overarching goal of this study was to articulate visions that acknowledge the interconnected qualities of the two, while enabling individual appropriation to each. In the study, Kendall Square maintains its role as a major center for biotech, entrepreneurship, high tech, and the knowledge economy, with the additions of more housing, retail and public amenities.

The Kendall Square Design Guidelines are created to inform property owners, business owners, developers, and the general public about the desired form and character of development in Kendall Square...

The guidelines will be referenced in the City’s Zoning Ordinance... and in the PUD texts... and will be used by the Planning Board in their review of all discretionary permits such as special permit and PUD applications for projects in the Kendall Square area."

Aside to the main report which was finalized in 2013, K2C2 issued an architectural guidelines booklet, detailing the tactile and physical recommendations for future development in the designated areas. The Design Guidelines booklet focused on many architectural and urban design aspects, including: General scale and massing for new development, architectural design standards, architectural identity, street walls and commercial facades, high-rises design and desired appearance, towers and roof shapes, buildings separation rules, location based typology, building forms near open and public space and others. While the study and the attached guidelines represent thorough research being done in order to improve the site’s redevelopment, the legal status behind these recommendations is not clear:

"However, the guidelines are not intended to impose a strict limitation

The Task Force was asked to provide two general pieces of guidance on upcoming decisions related to campus development within the capital planning process known as MIT 2030: advice regarding the development of MIT-owned property in Kendall Square, and advice around the most effective ways to engage the MIT community in the overall campus-planning process going forward.

The task force’s most immediate challenge was to advise the administration on whether MIT should move forward with submitting a rezoning petition.

In 2011 - 2012, the City of Cambridge conducted a planning study to develop a vision for Central Square, Kendall Square, and the area South of Main Street (including the Osborn Triangle) connecting the two squares. In addition to developing a vision for the study area, the process has formulated recommendations including specific actionable steps to achieve the vision. The consultant team was also charged with providing peer review of anticipated rezoning proposals in the area – namely the Novartis, Forest City, and MIT rezoning petitions.

The goal of the East Campus Urban Design Study is to help MIT create a long-range development framework that shapes future academic, residential, and commercial uses for its properties in the Kendall Square area. The initiative also seeks to create a vibrant gateway into MIT’s east campus.

East Cambridge Planning Team, a neighborhood group with a track record of working in concert with developers, took the unusual step of commissioning its own study. Noting a “land use imbalance” with too much focus on commercial office and laboratory space, the independent study called for 440,000 square feet of new residential space, more than double the amount of residential space than was recommended in the city’s K2 Study.

Figure 63.

Timeline for the Kendall area/East Campus redevelopment project

<table>
<thead>
<tr>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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2010 2011 2012

TOWARDS TANGIBLE REGULATIONS
The East Campus/Kendall Gateway urban design study, led by a multi-disciplinary steering committee of faculty, students, and staff, worked with consultants through an extensive exploration of various schemes for the East Campus area, and benefited from input collected through a series of community forums. Final work was done with the leadership of the School of Architecture and Planning, a working group composed of faculty and staff who has worked to refine the concepts explored through the East Campus/Kendall Gateway urban design study.

The drawing conveys a proposed parcel assembly and a potential approach for the creation of connected public open spaces within the development area. The parcel plan includes space for academic, commercial, and retail uses, as well as housing for graduate students. It also envisions underground parking and vehicular access to MIT Medical. MIT has issued Requests for Proposals for design teams to create building concepts that we will bring through the City’s review process.
on the building form and style. Other creative design solutions, or measures, not noted here may also be utilized to achieve the same goals at the discretion of the Planning Board, especially in the interest of enhancing architectural diversity in the area.”

While this plan and other alike were not issued as a dictating act of design, they tend to recommend particular design outcomes. The following list depicts plans, projects and studies issued prior to the current rezoning of the area:

1. The Cambridge Redevelopment Authority (CRA, 1955) major development in the Square is the Cambridge Center project, a 3 million square feet of office/research & development served by hotels and retail uses. The project followed the American urban renewal approach of the 1950's, including large blocks with overly wide streets and little attention to ground floor retail and a pedestrian-oriented street life. The project do incorporated several public spaces of varied character, including the first rooftop garden in the district and the Kendall Square public plaza.

2. The East Cambridge Riverfront Plan (1978-2002) began the process of moving away from the 1950's urban renewal approach. The new approach emphasized the pedestrian realm with a focus on open space at the sidewalk level. The Planned Unit Development (PUD)\textsuperscript{258}, a subset of zoning regulations made to modify a specific tract, was established close to Kendall Square. This regulatory subdivision guided one of the earliest special permits, the Riverfront Office Park (1982), that provided ground floor retail and created the Broad Canal walkway on the south side. Within the next decades, the method of special permits and PUD's will prevail the area, proposing a patchwork of plans.

3. Technology Square Expansion (1999) resulted in a reconfiguration of the original 1960's project by breaking up the superblock and connecting a formerly isolated green plaza to Main Street. Additional Special Permit was amended in 2005 to allow construction of two one-story pavilions, creating space for active retail uses on Main street and gating the open plaza. The introduction of these active uses along the street was made to transform Main Street into a connector between Kendall Square and Central Square.

4. The Eastern Cambridge Planning Study (ECaPS, 2001) followed a

Figure 64.

The Kendall Sq. area and East Campus redevelopment project site

Figure 65.

The Kendall Sq. area and East Campus redevelopment project Proposed urban plan (2014)

Citywide Rezoning and went into more detail about the future of the area. With regard to Kendall Square, ECaPS suggested that housing and ground floor retail would be beneficial along Third Street and created zoning incentives for these desired uses. This goal was realized on 303 Third Street project and in the Cambridge Research Park project. The plans also addressed desired outcomes for the Department of Transportation (DOT) site and adjacent neighborhoods.

5. The Cambridge Research Park - Kendall Square PUD (1999) Masterplan expanded the area’s biotech emphasis while creating several public amenities (an ice skating rink/summertime plaza and canoe access). In terms of residential development, the plan created the Watermark housing complex with retail on street levels. Some office space was also part of this PUD, creating a mixture of residential, commercial, office and leisure across the Canal. These developments activated the Broad Canal walkway that was initiated in the 1980’s and completed by the expansion of the power plant in the 2000’s.

6. The 303 Third Street PUD (2003) led to the construction of a new housing near the Watermark housing at Cambridge Research Park. This project emphasized ground floor retail, and helped create a “critical mass” of housing and retail activity.

7. The Alexandria Rezoning (2009) adjacent to Kendall Square allowed for higher density research and development with ground floor retail and neighborhood-scale open spaces. A PUD Special Permit issued in 2010 allowed 1.5 million square feet of commercial use, 220,000 square feet of residential use, and 20,000 square feet of retail use. One of the key features of the PUD master plan is the provision of a major open space to serve the adjacent neighborhood.

8. The 650 Main Street Project (2009) in the MIT Osborn Triangle includes 400,000 square feet of office/research & development use with ground floor retail. The first phase for a building of 230,000 square feet with Pfizer as the tenant was completed in 2014.

9. MIT Projects made several additions to the urban environment under the envelope of the institute. Gehry’s Stata Center (2000) and the Sloan School Project (2010) created new pedestrian gateways into the campus. The MIT Cancer Research Center (2010) reinforced Main Street by providing
Figure 66.
Zoning Ordinance Maps - CDD - City of Cambridge, Massachusetts.

Figure 67.
Kendall Square Central Square Planning Study (K2C2) - CDD - City of Cambridge

Figure 68.
The Kendall Sq. area and East Campus redevelopment project process
new shade trees, lighting, and seating areas.

10. The Boston Properties Rezoning for the Broad Institute (2010) increased by 300,000 square feet the amount of non-residential development allowed in the district, in order to help retain and expand the Broad Research Institute, and augment the potential for additional housing. In addition, Boston Properties proposed the creation of a 200,000 square foot housing tower across the street from the Broad expansion.

3.4.4 ONGOING DEVELOPMENT PROJECTS AND OTHER INITIATIVES

Beyond the historical development of the area and its surroundings, many regulatory amendments emerged from new and on-going projects. Commonly, most of these are being devised on a project-based discussion. The city ties this approach to a complex form of ownerships:

“There are several different sectors of Kendall Square that have been treated as separate districts, because the area is so large, and has been subject to different ownership and development dynamics.”

These sub-districts bare different zoning and regulations and therefore share different impacts on their surroundings. Amongst these sites are the Novartis project site on Mass Ave, which went through a rezoning process in 2011. The former All-Asia block was rezoned in February 2013. The MIT area was rezoned in accordance with Cambridge’s K2 Committee recommendations in April 2013. Other sectors, such as the Cambridge Center, Volpe-DOT, and One Main Street area will also be rezoned individually. The City’s Master Plan (1993 with updates in 2007) includes policies that are particularly relevant to growth in Kendall Square:

“Existing retail districts should be strengthened; new retail activity should be directed toward the city’s existing retail squares and corridors. Trend to cluster related uses should be strengthened. Retail districts should be recognized for their unique assets, opportunities, and functions to maintain their economic viability.”


3.4.5 KENDALL SQ. AS A CASE STUDY

Giving the ongoing redevelopment of the area and the ambiguity surrounding the authority of these regulations on the site, selecting Kendall Sq. as the platform's case-study seemed a relevant choice. Beyond the exploration of the current project and its qualities and effects on the surrounding area, the discourse regarding the state of regulations could yield more general understandings: How could this platform test and assess the accumulating effect of so many different regulations?
TANGIBLE REGULATION PLATFORM
The next phase in the formation of the Tangible Regulation Platform was to distill the plans, zoning laws and design guidelines and restructure them as a single repository in an effort to illustrate their design inference. Using a computational algorithm and a physical model, the given laws emerged into physical boundaries, allowing designers a guided process of urban planning. By doing so, questions on the motives and aspirations of these laws start to emerge: Why certain typologies are less accepted than others? Could the request for specific architectural details truly preserve the desired nature of a place? Which precedences or failures led these regulation-based-forms? What was the input of the local community in the establishment of these regulations? How imposing are these laws when new developments emerges? What mechanisms are used for reviewing and discussing these guidelines or regulations?
3.5 TANGIBLE REGULATION PLATFORM

The last part of the thesis describes a proposal for a Tangible Regulation Platform (TRP), a technological-physical tool made for distilling regulations in the process of urban design. This work initiated as project hosted at the Changing Places Group at the MIT Media Lab and with the assistance of two fellow students from Harvard GSD. The proposed platform is a modular system for urban decision making and community engagement. Using real-time feedback and analysis, the platform offers a common ground for discussion with municipalities, developers or the public. The platform's algorithms correspond to the city's policies, zoning laws and regulations thus allowing a more realistic simulation of the users' proposals. The tested designs are measured and studied in real-time, in order to reflect their impact on the built environment. This data is then being projected back to the platform table after being augmented by multiple layers of information, such as transportation, climate, visibility and more.

By analyzing a massive repository of relevant laws, policies, regulations and guidelines, this platform presents a dynamic model for urban design. While other visualization methods, such as physical models, computer renderings, diagrams and drawings appear in later stages of a project, this platform aims to offer an early assessment of the design envelopes, both to professional and non-professional alike. In that way, a community undergoing a redevelopment initiative or a public discussion on a proposed project, could benefit from an accessible simulation in the very early steps of discussion.

The TRP is composed out of three major parts: the city model table, the computational unit and the feedback module. The computational unit is responsible on converting the city's regulations and guidelines into a series of autonomous 'components' in-order to allow the structuring of a cohesive and streamlined algorithm. This algorithm complies zoning, code and regulations into the form of physical envelopes, similar to the way a municipality would evaluate a development proposal.

A series of sub-algorithms then offer analysis of the wider implications of the proposed design, beyond its legal fitness. These could be climatic and energy analysis, mobility, walkability and transpiration, density of population and land use.

The TRP was designed on top of the CityScope system that has been...

---

TRP - The computational algorithm

This algorithm compiles zoning, code and regulations into the form of physical envelopes, somewhat similar to the way a municipality would evaluate a development proposal.
HEIGHT
GFA
FAR
SETBACK

BUILDING SEPARATION
ARCHITECTURAL IDENTITY
SCALE AND MASS

SHADOW
SUN EXP.
ENVIRONMENTAL
ADDITIONAL ANALYSES

REGULATION DESIGN

FORM
DESIGN
DETAIL
Figure 71.

In order to deploy this algorithm on the site, the MIT Eastern Campus was transformed into a uniformed grid, where each pixel represents 8 square feet—based on the smallest unit found in the zoning documents.
Figure 72.

This simulation is an early 2014 testing of the algorithm running on this site. For this test it uses only two zoning codes: Buildings setbacks and height limits. The resulting form was fluidic and incoherent; it became clear that since regulations are not definitive forms, but only responsive boundaries, another representation technique was needed to clarify the regulations' effects.
developed in the lab through the last couple of years. The proposed platform had several key technological and operational advancements over its predecessors. First, the platform is the first large scale iteration that incorporates real-time feedback and artificial intelligence. The system reaction is given immediately, as soon as the user modify the urban model. Second, the platform is design as a plug-in system, meaning it is capable of obtaining other regulatory frameworks and react accordingly. In that sense, the platform is not bounded to a specific location or set of regulations and could be retrofitted to display other scenarios. This method incurs relatively short preparation and implantation process. Ultimately, the platform aim to offer a repository of urban codes, building envelopes and potential development analysis, fully accessible to the public, allowing shared insights in future design processes.

3.6 DESCRIPTION AND OPERATION

The TRP is composed out of three major elements: the Table, the Bank and the Output mechanism. During the trial and observational experiment period, each of these elements was constructed separately and thus could be altered without affecting the rest of the platform. This separation also helped explaining the operational concept of the platform; The audience could choose to focus their attention to either parts of the platform or all of it, allowing a more accessible and user-friendly engagement process.

3.6.1 THE TRP TABLE

The TRP includes a kit of tagged 3D objects (e.g. buildings or massing elements of zoning envelopes), a table that constrains the placement of 3D objects into a scene, sensors for scanning the scene, computers, display screens, and projectors for projecting light patterns onto the scene. The projected light patterns, via projection mapping, augment the 3D physical scene with information and analytics unique to the user’s configuration of the objects. The TRP arbitrarily detects many uniquely tagged physical objects in real time as the user moves them. It performs rapid digital reconstruction of objects’ configuration including form, position, ID, and metadata. It also performs real-time analysis of the objects’ configuration and visualization of analysis via display screen and projection mapping of visual content.
Decoding

The first step in building the platform's mechanism was to decode and distill only the form-making elements from the zoning and regulations of the site.
onto objects. The TRP detects, digitally reconstructs and projects light onto more than 1,000 separate physical objects in real time. The number of objects can be scaled up while still requiring only modest computational resources. This ability to process (i.e., detect, digitally reconstruct and project light onto) a large number of separate physical objects in real time is facilitated by augmenting simple 2D information into complex 3D models. The confinements built into the system force users to follow a simple grid, reducing the amount of calculated information into X and Y values.

3.6.2 SIZE, SCALE AND RESOLUTION

The platform’s table is composed of a physical grid of 192x192 Lego bricks or ‘pixels’. The grid represents two conditions: the ‘constant’ - that is, the non-modifiable elements in the system and the ‘playground’, the open-ended part of the TRP. In this prototype, a user places the physical objects into indentations which form a grid on the table. The fact that the allowed locations of the physical objects on the table are limited to a set of specified positions in a physical grid simplifies detection and digital reconstruction of the objects and also simplifies projection of light onto the physical objects. Processes are performed in close to real-time (faster than human reaction time) to give human users instantaneous feedback from the system. As such, components of the system are configured to overcome latency issues that have previously prevented real-time reconstruction of arbitrarily many uniquely tagged 3D objects.

The TRP table grid size is limited by two main factors: first, in order to allow analysis for the interchangeable parts of the system, it is necessary to scan the table from a relatively short proximity. Scanning from afar, using common techniques (non-laser or other ray-based scanning) is limited to the light conditions in the room and to other interferences. Therefore, the table’s extents are set to the camera’s FOV and farthest it can scan the table with significant interferences.

Second, the table size is bound to the computational capabilities of the scanning algorithm. While only partial area of the table is modifiable, the scanning algorithm is built so it scans the entire table many times each second, detecting changes which occur in real time. Similar to digital monitors, the ‘resolution’ of the table, that is - the density of pixels for a given area, is

257. Field Of View, the maximal angle is the extent of the observable world that is seen at any given moment.

258. The exact number varied along the experiment, as lower scanning rate resulted with better accuracy in reading changes on the table but reduced the effect of ‘real time’ response.
The 'Bank' Module

The Bank Pieces are pre-coded volumes representing various land uses and different number of floors, allowing numerous iterations to be tested against the zoning. These rudimentary shapes are not intended to simulate Architectural details but rather to visualize the zoning and regulatory envelopes which will later allow architecture and design to take place.
the leading parameter in setting the urban model scale. While meticulously crafted architectural models can represent almost the same level of detailing across different scales, which making the scale decision a matter of preference, the 'crudeness' of the Lego model is far less flexible. While the usage of Lego helps to gain trust and accessibility from the participants, it also bares a significant degree of roughness and 'data loss'.

In setting the appropriate scale for the platform’s urban model, the smallest unit must represent the smallest unit for the desired interaction or analysis. If that unit will reference larger dimension, the accuracy and relevancy of the entire platform is questioned. It is therefore that this decision should not originate in the purely physical aspect of the model, such as the level of details for architectural elements or the overall resemblance of reality, but rather from the smallest referenceable unit. In the case of the TRP platform this measurement was based on the smallest unit being used in the site's zoning documents. In other iterations of the platform, this unit can represent an entire building or a constant dimension. Reading into the site's laws and zoning documents, it became clear that there are numerous laws that could be depicted within the platform. These rules are spanning from the smallest measurements of an architectural detail to the largest units of an urban scale. However, many of these laws were drawn from the specificity of a single buildings, in other words - these were laws applying on parts within a single building individually. For example, rules regarding openings in the building (widows, bays, storefronts etc.) appeared as part of the overall urban design guidelines despite being specific architectural details. While these laws are still important to the overall experience and form of the urban scenario, the goal of this platform was not to illustrate the impact of specific details but rather the overall urban massing.

The model scaling was thus chosen to illustrate the urban-scale impact of regulations and not the architectural detail. This distinction was necessary in order to gather a reasonable amount of rules operating on the platform and to lower the table's 'pixel resolution'. The smallest impact on the urban form was found in an 8ft setback rule, imposed on low-rise building parcels of side streets. This rule was set as the smallest sampling unit for the entire urban model and consequently - for the buildings' height and appearance. While not intentionally planned, in the circumstances of this experiment, this
unit also worked well in the vertical parameter. Average floor height in residential buildings is around 12-14 ft or 12-20 ft for commercial, office or industrial. With the scale given by the regulation as explained above, these measurements were close enough to represent buildings floors, so that a single Lego brick could also act as a single floor.

The importance of being able to represent an average floor height with a single Lego brick lays in the self-explanatory aspect of this platform. While the average floor heights may vary, using a modular element to illustrate floors proved to easily communicate the sheer volume of the urban plan. Users, whether professionals or not, could simplify the process of deploying their ideas when FAR and GFA calculations could be done instantaneously. These advantages proved the utilization of a modular and flexible building block such as Lego.

3.6.3 THE ‘BANK’

The second component composing the TRP platform is the Bank: A set of rectangular blocks, situated outside of the main table. The blocks, different in height but equal in their footprint, are a collection of 16 unique modules together composing the urban envelopes by the users. Each module retains two major parameters: Program or land-use and height. Each module can retain more than one program. For example, one module with 22 floors may have 3 floors of retail space in the street level and 19 floors of residential or office space above. In that way, there are virtually countless iterations for each module to encompass relevant mixture of usages and program.

However, a single module cannot represent an building. In order to construct a viable envelope, each of the given modules must be attached to others. The assemblage of these modules creates buildings and envelopes that in turn could be analyzed by the system.

There are two main reasons for using prefabricated blocks instead of free formed Lego structures. The first is a technical one and a byproduct of the scanning capabilities in the system’s current iteration. As explained before, no spatial scanning solution is used in order to retrieve the necessary information from the table. In order to allow the users free interaction during session while not interring with the scanning process, a simple web camera is positioned beneath the table, capturing the bases of each of the modules. A bar-code system marks each of the 16 modules with a different
code. The camera then captures this codes and the TRP computational algorithm analyzes the users design proposals. The second reason relates to the wish to concentrate the design on envelopes rather than on specific architectural details. In early stages of development, the platform was designed to allow 3d scanning, preformed through the combination of either Microsoft Kinect, laser scanning or HD digital cameras. The scanning was intended to take place outside the table area, in a designated scanning station, so this process could resolve without interference from the fixed surrounding model and from the users movements. The idea behind the hi-quality scanning was to allow users to build accurate structures, comprising of specific shapes and details. The scanning process was meant to determine the structures' appropriateness to the city laws. Yet when this approach was simulated in early experiments, it became clear that much of the users' attention was given to the architectural design and detailing, rather than to overall the urban impact. By doing so, the users aimed to solve their structures' fitness to regulation, with only little attention to the overall urban outcome. The scanning phase, while relativity short in time, signified and isolated each structure to be individually examined. 'Phasing' the proposal and the lack of immediacy between assembling the structures and placing them into the urban context, altered the discussion from the urban to the local scale. It was therefore suggested that all acts of design will take place in real-time on the table. Users can pick a certain block which fits the physical form they wish to construct and place it on an empty 'pixel'. The block is than scanned and analyzed, connecting it with other block on site.

3.6.4 THE OUTPUT MODULE AND THE PROJECTION SCHEME

3.6.4.1 Scanning and Computation
This component is responsible for the analysis, computation and display of the design made by the users. When users interface with the platform by changing the configuration of a tagged 3D objects, the output module actively response to the change. Unique patterns placed upon the bottom of objects are visible from the underside of the table. A sensor continuously scans the state of the table's grid and a computer takes the sensor feed as an input and performs an algorithm that determines the pattern (or nonpattern) at each grid cell. From that pattern the algorithm determines the location, ID,
The platform is visualizing the historical plans and regulations operating on the site, allowing the different stakeholders a better understanding of the current rezoning.
and rotation of each object present on the table. Since location and rotation are constrained by the table, the algorithm requires fewer calculations and latency is significantly low.

The computer merges the location, rotation, and ID data with a digital object repository, or a data table. The repository contains additional information about object form and any other metadata important to associate with that object. In the TRP, the repository was populated with building metadata including land use, building use, population density and built area. The computer then performs another algorithm that takes the finished digital reconstruction as an input and generates secondary analysis of the model. The unique attributes of each object, representing a building, are used to compute an evaluation of zoning and regulation fitness. The computer also performs an algorithm that packages the digital 3D model, its meta-data, and any analysis into integrated visualizations for export to display screens or projectors. The user may use the visualizations to influence their next interaction with the system, thus completing a real-time feedback loop.

3.6.4.2 Feedback Devices
The platform consists out of two major output devices: The first is composed of 4 hi-definition projectors, mounted on the room’s ceiling, above the table’s corners. The projectors are synced to accurately perform ‘projection mapping’ on the table. The projectors are responsible for the augmentation of multiple layers on top of the urban context model, depicting different sets of information and analysis.

The projectors basic functionality is to follow the urban context static model and the flexible intervention parcel with texture mapping and edge enhancement. The projected information follows the current iteration of the user’s design, so that any change made to the physical model will be echoed with a visualization element. The update speed and refresh rate of these projections is crucial for a seamless user experience; a delay or ‘lag’ between a user action and the system’s response will weaken the reliability of the platform and will stall adjustments by the user.

The most basic layer projected on the urban context presents the employed land use for each parcel or a building. The projectors draw a series of different colors, representing different land uses or a designated program. The overall outcome is a visualization of the current and proposed land use, allowing a quick assessment of the sites programing
TRP: Multiple layers

The platform can visualize different layers of information beyond the regulatory fitness, aiding users in the design process. Amongst are historical maps, view and solar analysis, transportation and more.
The second part of the projection scheme is a large TV or a vertical projection plane. The role of this component is to deliver information commonly obtained through flat surfaces, such as boards, paper or screens. This information is paralleled and synced with the projected visualization, so that the analytical information appearing on this screen could be related to changes made to the table. Information depicted on the screen is comprised of several calculations:

1. GFA calculation for new additions and for existing urban context;
2. Percentage of buildings using or exceeding existing FAR;
3. Open space and built-area ratios;
4. Occupancy and sub-sectioning each land use.

These calculations are being updated with every change in the table settings, allowing an augmented understating of the users' designed. Ultimately, these calculations could engage more complicated analyses, such as workability, transportation, climatic or energy consumption. In the context of TRP's initial testings, the major calculation was performed against the city's regulation and zoning laws.

3.7 SIMULATING ENGAGEMENT

Evaluating the platform performance within the confines of the lab had several limitations. First, intervention in an existing urban design proposal should involve stakeholders or communities that have direct relations to the area in question. Amongst the lab researchers, only few were local residents and they generally shared wide and inconsistent degree of acquaintance with the site.

Second, the lab researchers were already 'contaminated' by preconceptions regarding the site. Since a critical overview on the Kendall area design proposal is desired when addressing local communities, the discourse in the lab throughout the months prior to the experiment already left impressions and preconsumptions amongst the lab members.

In order to test the platform's usability and user experience, members and residents of MIT and Kendell Square area were openly invited to participate in a simulated Community Planning Meeting.

During the session that took place in two spaces at the MIT Media Lab, the participants were divided into two equal groups: one engaging the Platform, while the others are partaking in a 'classic'
Figure 80.

In order to test the platform's usability and user experience, members and residents of MIT and Kendall Square were invited through this website to participate in a simulated community meeting.

Figure 81.

Steps in a method of detecting, digitally reconstructing and projecting light onto physical objects

System for Real-time Digital Reconstruction and 3D Projection-Mapping of Arbitrarily Many Tagged Physical Objects
MIT Media Lab. J. Ira Winder, 2015
community meeting. This session was recorded and later analyzed as part of on Observatory Study, examining the degree of engagement and responses of the participants.

### 3.7.1 OBSERVATORY STUDY

While the recent years show increasing interest in designing tangible user interfaces (TUI) in the context of urban planning and design not much has been done in studying the usability of such systems. Soon after deploying the TRP system, it has become clear that an unbiased outlook on the performance and usability of this system is necessary. An observational study on the system was suggested, aiming to examine its usability in an urban planning process and to investigate its effect on stakeholders’ engagement and decision-making. The study aimed to improve the understanding of how TUIs and physical objects encourage collaboration and communication among stakeholders, which lead to more informative decision making and decision-making. The study examined user engagement and decision-making in a regulation based, tangible planning platform, process for urban planning contexts is often coupled with inadequate understanding of interdependencies between decisions scenarios made by stakeholders from different sectors. As shown, existing urban modeling and planning tools are often designed for specific professional audiences and are not accessible to a wider scope of users. In the case of TRP, only small percentage of the anticipated audience might hold preliminary knowledge on the given site’s regulation and legal status. Moreover, such participant may also encourage different outcomes within an uninformed group of participants.

Being a multi-option non-linear decision making system, it is difficult to anticipate usability problems from users with varied backgrounds and expertise. In the TRP platform users’ interactions consist of sequences of actions on tangible objects and perception of the system feedback from the digital information embedded in the physical objects. The purpose of this study was then to ‘test drive’ the system, so that it could effectively facilitate stakeholder dialogue and interactions, and consequently help making more informative decisions.

The study examined user engagement and decision-making in a regulation based, tangible planning platform,

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Figure 82.

Simulated Community Meeting

Groups working on the TRP and in a 'classic' pen-and-paper discussion format

and investigated the utility of different approaches for assessing the user experience with both tangible collaborative systems and ‘classic’ urban planning engagement methods.\textsuperscript{269}

The observational study was conducted with a representative sample of users from different backgrounds. The users were randomly invited to examine the usability of the collaborative tangible interface and to express their opinion on ways to better planning processes through such platforms. The sessions involved decision-making and design scenarios using artifacts that included either paper-based methods as well as interactive tangible models of the urban area. The sessions were recorded and analyzed; A coding scheme was developed and considered for analyzing the video observations to examine the wide spectrum of actions, verbal cues, and non-verbal gestures, and quantify the occurrences of these interactions during the experiment\textsuperscript{270}.

### 3.7.2 METHODS

Several observational studies have been conducted on TUIs. Brereton and McGarry\textsuperscript{271} tested the usability of tangible objects and how TUI encourages engineers design thinking and communication. Fjeld and Sissel\textsuperscript{272} test the usability of TUIs compared to alternative traditional 3D and 2D single user tools, by examining the learning effect and the overall user experience. These studies showed the 3D tools outperform the TUIs in terms of user satisfaction. Falcão and Price\textsuperscript{273} focused on investigating collaborative activities in a tangible table-top environment to support how shared interfaces affect the way collaborative activities are structured, and examines the kinds of collaborative interactions that are productive for learning. Ben-Joseph examined the functionality and benefits of a Luminous Planning Table (LPT), installed in a classroom settings. The goals of this platform were to evaluate the LPT and to further develop its functionality based on feedback from end-users through its implementation with an actual site slated for development. Later Ben-Joseph, Ishii and Ratti\textsuperscript{274} explored the usability TUI systems to simplify teaching, making the principles of site and landscape planning more accessible to students. This study aimed to compare two different urban planning methodologies: ‘classic’ pen-and-paper urban decision making and the TRP TUI platform. The comparison allowed for a deeper understanding of the characteristics of a regulation-based and well-informed urban planning session, versus the classical approach.


\textsuperscript{266} Brereton, M and McGarry, B. An observational study of how objects support engineering design thinking and communication: implications for the design of tangible media, Proc. CHI 2000, ACM, pp. 217-224.
### 3.7.3 PARTICIPANTS

Fifteen participants from MIT community, including students, staff, and affiliates were invited through an open, unrestricted online form, email lists, and in-campus publications. Upon arrival, the participants were divided into two groups; one group started with a paper-based discussion (Community Meeting session) then moved to the interactive tangible model of the urban area (TRP session). At the same time the second group started with the TRP session to the Community Meeting session.

### 3.7.4 SESSION PROCEDURE

The day was divided into two sessions: Community Meeting session that utilize a ‘traditional’ urban planning process meeting, where participants were asked to convey their ideas on trace papers, maps, diagrams or boards. The other is the TRP session. Using real time feedback and analysis, TRP offers a common ground for discussion between municipalities, developers and the general public.

In these sessions, participants were asked to respond to real-life planning and design challenges in respect to exiting plans and regulations imposed on site. They were asked to rebuild and plan the Kendall Square area taking into account zoning restrictions by adding or changing residential, commercial buildings, parking lots, parks and other public amenities. In the Community Meeting session, the participants were introduced to the current planning proposed for MIT’s Eastern Campus and Kendall Square area. In the TRP session participant were asked to interact with the TUI that gives a real time feedback notifying the user whenever a violation of the zoning restrictions occurs through a real time visualization platform.

### 3.7.5 OBSERVATIONAL PROCESS AND FINDINGS

This study analyzed the video recordings of the sessions using a predetermined coding scheme. This scheme included several types of actions, verbal and non-verbal behaviors, verbal communication and physical gestures. A Usability Testing Software (Morae) was the testing tool to record, observe, and analyze the sessions.

The usage of a preset coding schemes when analyzing video observations of users’ interaction with the TUI, helped to propose a methodological and design considerations. For example, it was apparent that most of the participants started the session...
1. Pickup a few pieces and start imagining your project!

2. Position your buildings into the city model.

5. Please consult with us on how to improve your design.
Our system will guide your design using the city's regulation and guidelines.

Our system will highlight design issues in real-time on the model.

Tip
Try to think of ways people would interact with spaces they would use in your design.

Note:
A user should be familiar with defined basic anatomy.

Figure 83.
PlayGround platform hand manual

This pamphlet was the only explanatory method used to initiate the groups' engagement. It was meant to test the self-explanatory aspects of the tool and the level of interaction prior to formal introduction.
by exploring the TRP platform and searching its basic functionality as noted by the multiple occurrences of EXP and SCH codes. Therefore, giving users a clear demonstration of the system would make them less puzzled and more comfortable interacting with it. The occurrences of code IDE indicates that dealing with physical objects made participants more active and engaged in the planning and decision-making process. Due to the feedback visualization, participants can share a common understanding of the proposed plan (ACC code).

The incidents of other codes proposed some other design considerations. Unlike traditional sketching methods, where participants focused only on individual buildings without taking into consideration zoning and regulations and their effect on the surrounding area, the TUI system gives real-time feedback whenever a violation occurs, which helps participants in the sense-making process as indicated in the multiple occurrences of CLA and EVA codes.

In terms of design considerations, the design of TUI systems can cause participants frustration and confusion, noted in codes FRT and PUZ, as when participants could not differentiate between removable and fixed physical objects, and when they indicated difficulties in identifying an object. These observations revealed opportunities for improving the visual perception of the TUI system.

### 3.7.6 CONCLUSIONS

This study analyzes the usability of the TRP system by applying a coding scheme on video observations of users’ experience. In order to design a successful tangible interface system that supports collaboration and facilitates decision-making between stakeholders, it is essential to test its usability in various scenarios.

Informal and informal responses coming from the participating groups, emerge two main finding. First, While the first group enjoyed long and profound presentation on the site features and current planning, the second group was asked to perform on the TRP with only minimal knowledge on the technical operation of the system. However, the ‘Classical Community Meeting Groups’ which used pen-and-paper to discuss the site's planning, had little to no practical recommendations or an alternative proposal. At the same time, the TRP group engaged almost immediately, establishing concrete designs options that responded to the given regulations.

Second, this participants emphasized

the need to not only test the regulations against a physical design proposal (zoning, regulations, codes, etc) but also against multiple performance-driven evaluations. They expressed the need to be able to approach a regulation-based discussion from a more 'conventional' angle, emphasizing concrete questions. As such;
- municipalities or public officials may test walkability and transportation concerns as by-products of regulatory changes.
- The quality of open landscapes, public amenities and civic safety can be tested in existing or amended regulations.
- Developers and investors can use the regulation platform to help predicting potential revenues or market-appeal of properties prior to amending the regulations.
- Design-oriented stakeholders or preservation advocates can use the platform to examine the physical outcomes of new zoning laws.

At last, findings suggest that TUIs are superior to traditional urban planning methods in terms of rapid prototyping, collaboration, and decision-making process. The coding analysis highlights methodological and design considerations when designing a TUI system. Future work would involve applying these coding schemes in larger study in the context of urban planning, engaging not only small groups but continuous discussion with multiple participants from various backgrounds.

Table 1. List of Observational Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXP</td>
<td>Explore Function/Tool</td>
</tr>
<tr>
<td>PUZ</td>
<td>Puzzled</td>
</tr>
<tr>
<td>CLA</td>
<td>Clarification of Idea</td>
</tr>
<tr>
<td>IDE</td>
<td>Introduction of Idea</td>
</tr>
<tr>
<td>ACC</td>
<td>Acceptance of Idea</td>
</tr>
<tr>
<td>EVA</td>
<td>Evaluation of Idea</td>
</tr>
<tr>
<td>REF</td>
<td>Refine ment of Idea</td>
</tr>
<tr>
<td>HAN</td>
<td>Hand-over</td>
</tr>
<tr>
<td>HES</td>
<td>Hesitation</td>
</tr>
<tr>
<td>DIF</td>
<td>Execution Difficulty</td>
</tr>
<tr>
<td>EXE</td>
<td>Execution Problem</td>
</tr>
<tr>
<td>EXT</td>
<td>Excitement</td>
</tr>
<tr>
<td>SUR</td>
<td>Surprised</td>
</tr>
<tr>
<td>ACT</td>
<td>Wrong Action</td>
</tr>
<tr>
<td>FRT</td>
<td>Frustration</td>
</tr>
<tr>
<td>DIS</td>
<td>Discontinuous Action</td>
</tr>
<tr>
<td>REC</td>
<td>Recognition of Error or Misunderstanding</td>
</tr>
<tr>
<td>DBT</td>
<td>Doubt</td>
</tr>
<tr>
<td>COR</td>
<td>Corrective Action</td>
</tr>
<tr>
<td>FLO</td>
<td>Floor-Holding</td>
</tr>
<tr>
<td>TAS</td>
<td>Give Task to Another User</td>
</tr>
<tr>
<td>SCH</td>
<td>Search for Non-Existing Function</td>
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</tbody>
</table>

Table 2. The occurrences of codes in video observations

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Code</th>
<th>Description</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Execution Problem</td>
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<td>2</td>
</tr>
<tr>
<td>DIS</td>
<td>DIS</td>
<td>Discontinuous Action</td>
<td>-2</td>
<td>1</td>
</tr>
<tr>
<td>COR</td>
<td>COR</td>
<td>Corrective Action</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>GOAL</td>
<td>GOAL</td>
<td>Wrong Goal</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>PUZ</td>
<td>PUZ</td>
<td>Puzzled</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>SCH</td>
<td>SCH</td>
<td>Search for Non-existing Function</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>DIF</td>
<td>DIF</td>
<td>Execution Difficulties</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>REC</td>
<td>REC</td>
<td>Recognition of Error/Misunderstanding</td>
<td>-2</td>
<td></td>
</tr>
<tr>
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<td>HES</td>
<td>Hesitation</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
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<td>EXT</td>
<td>Excitement</td>
<td>-1</td>
<td>3</td>
</tr>
<tr>
<td>SUR</td>
<td>SUR</td>
<td>Surprised</td>
<td>-2</td>
<td></td>
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<tr>
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<td>2</td>
</tr>
<tr>
<td>DBT</td>
<td>DBT</td>
<td>Doubt</td>
<td></td>
<td>-1</td>
</tr>
<tr>
<td>HAN</td>
<td>HAN</td>
<td>Hand-over</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>CLA</td>
<td>CLA</td>
<td>Clarification of Idea</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>REF</td>
<td>REF</td>
<td>Refinement of Idea</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>IDE</td>
<td>IDE</td>
<td>Introduction of Idea</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>EVA</td>
<td>EVA</td>
<td>Evaluation of Idea</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>FLO</td>
<td>FLO</td>
<td>Floor holding</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
TOWARDS TANGIBLE REGULATIONS
EPILOGUE: CODE THE CODE

While inherently, the TRP does not portray any profound alteration to the existing mechanism of policy making, long term practice might eventually endure change. The multiplication and complexity of urban legal framework is difficult to comprehend and interpret in tangible tools. Inherently a parametric system, zoning laws and design standards do not form a static envelope for development, but rather a fluidic field of options. The TRP platform was designed to bypass this ambiguity, thus allowing a more coherent understanding of large portions of the law.

While the TRP was set to demonstrate specific aspect of planning and design, i.e. the power of law over built form, it could also allow other interfaces to duel aside. During the development of the platform, it became apparent that demonstrating the built form as only a byproduct of zoning and regulation, is missing profound substances of contemporary planning processes.

While urban planning, design and architecture should eventually respect and comply with the guidelines of the city’s laws, it is common for planning processes to emerge from other sources. For example, a plan for the redevelopment of several city blocks could begin from transportation analysis, aiming to increase capacity for vehicles or pedestrians. An initiative for a new neighborhood could start from the design of a park or the desired open spaces. In many cases, these and other anchoring points are the initial motivation for a new project and much of the design outcome will follow their intentions. In that sense, a more complete version of this platform should allow such design aspect to be examined along with the inherit legal aspects. This approach could be demonstrated via two paths: an infill and a new development.

INFILL PROJECT

The Infill Project, similar to the one presented in the Kendall sq. case study, is dealing with a given urban scenario which bares an existing regulatory framework. In this case, a proposal for a change (redevelopment, new construction or a conservation effort) is being tested through the TRP platform. Initially, the site is being studied in its current state, including the statutory framework, existing and planned projects. This information is being evaluated and fitted to the TRP algorithm rational. The action require deep understating of the given site
and access to most relevant planning information for that area. It is also vital to incorporate historic information, such as previous plans and amendments, even if obsolete or were altered throughout the years. These accumulated information could serve as a base for many types of overlaid information schemes, such as conservation guidelines, historical development and evolution of the site’s regulations. Together, these layers could augment the planning process while distilling the motivations behind historical decisions. In an agreement-seeking effort, this information could resolve many issues originating in misunderstanding and lack of historical knowledge. For both communities and developers, decluttering these historical issues can provide a common ground for discussion and exchange on future initiatives.

**TABULA RASA**

The second condition can allow the design teams to explore the full potential of an undeveloped site. Given a territory in which no preliminary design or planning took place (such as an extension of the city into rural territories or a large un-zoned void in between urban areas) this iteration of the TRP could allow a study on the planning...
and zoning potential for this site. This study would allow the incorporation of any desired panning methods brought by the selected planners and designer. After the proposal was established and built into the TRP, the planners could retrieve a parametric analysis of their intervention in the form of a ‘regulation pack’. This pack is an agglomeration of the planning and design acts which were converted into parametric rules. For example, if the majority of buildings in the given site share the similar height of 7 stories while those positioned on block edges and around street corners are set to 10 stories, the system will be able to extract these attributes as basic FAR and GFA rules. This approach offers ‘reversed engineering’ for zoning, in which the planners are not forced to identify zoning and regulation beforehand, but are free to examine planning outcomes parallel to the manifestation of the law.

These ‘zoning packs’ could then be examined to failure within the same system. After concluding the phase of design and extracting the a desired ‘regulation pack’, the rules can be loaded back into the TRP algorithm. The platform will allow to test these laws by either the professionals themselves or any other study-groups: constructing random elements, shifting locations of roads, blocks and buildings and playing with height, width and form. In case any of these iterations fail to follow the design conceived earlier by the planners, the ‘regulation pack’ could be altered and modified to accommodate the desired changes.

**DECODING RECODING**

The TRP and other modern systems for design and collaboration of regulatory information, proven to excel and simplify complex processes. Yet beyond the improvement of these processes, can such tools also change the way regulation is being initially created? As shown in the first two parts of this thesis, the way regulations and zoning laws are being created does not suggest any improvement over time. Rather, the growing number of laws and their wide interpretations only adds to an already complex and cumbersome system. Every city or town across the country holds its own regulatory structure, a distant branch of the rather simple and clear 1916 zoning laws of New-York City. Even within the cities themselves, the regulations do not follow a strict and coherent structure, so when they are being modified, it is necessary to dive into the history and archives of the law, in-order to construct new regulations.

That was the case of the K2C2 plan in Cambridge. The depiction
of new guidelines for several streets in the center of the city demanded a comprehensive study on every plan, design, rezoning or discussion concerning this area. That was the also case when building the TRP; Decoding the historical regulations for only few blocks in East Cambridge was a long and tedious task which took nearly a month to complete and included archival work, meetings and unbiased assumptions. This concern is not new, as depicted by Vermilya in 1941:

“There is no record of the exact number of building codes that are in effect. Estimates of the number of communities so controlled place the number as between 1,600 and 1,800. According to the 1940 Census there are some 3,500 urban communities having a population of 2,500 and over. Many of these communities no doubt have ordinances controlling building which are not strictly classified as building codes.”

But when looking at history, another outburst of information was resolved by modern technology and innovative thinking. The Gutenberg Bible from 1450, the first widely printed book, shifted dramatically the landscape of media distribution all around the world. Gutenberg’s printing machine that allowed the mass-publication of books, opened a new path to the reproduction of information and to the unprecedented distribution of knowledge. Yet alongside these advancements, the old methods used for cataloging and structuring libraries and archives were suddenly rendered irrelevant. Facing this extraordinary amounts of new printed materials, the old systems operating locally to sort and maintain information, could not handle the change.

It took nearly 300 years to present a global solution, when France was the first country in the world to develop a national cataloging system. The card catalog system that ruled libraries for centuries was used until 1970, when the worldwide ISBN system became the ultimate way to catalog knowledge. These cataloging systems do not only improved the ability to rapidly find information. Since they were firstly employed, they changed the way parallel fields of research meet. They allowed to share and build upon existing information, improving both the process of accumulating knowledge and the creation of new one.

It is possible that regulations and zoning will have to wait three centuries before converging into a similar solution. The way modern regulation is being devised would amount unimaginable


Printed books 15th - 18th centuries
Figure 86.

TRP for Midtown East
New-York

The platform is visualizing the effects of the EMR plan with the current and new demands for public transportation and infrastructural changes.
Figure 87.

TRP for Tel-Aviv Quarter
3/4

The platform is simulating the effects of random incorporation of NOP38 or the UNESCO preservation projects, paralleling them to the public amenities and infrastructural needs of the growing area.
slew of laws and regulations in the coming future; The TRP system as well as other smart and innovative tools appearing every year would have to face this exponential growth. But what if instead of manually distilling the code time after time to understand its effects, a cataloging system would structure and tag old and new regulations? What if instead of sporadic and unrelated sets of rules, a system of depending regulations could devise the law of the land? In that sense, regulations of different cities could be not only more accessible and coherent, but in a way, also comparable products. This approach could allow successful sets of regulations to be tested and transferred between different cities, acting as the mentioned ‘regulation packages’.
This change could allow comparable simulation where various regulatory scenarios are being tested and evaluated, while encouraging impartial discourse around regulations and their urban effects. As such, a ‘good urban form’ could be analyzed through its devising regulations and not only by its intangible features. The profile of such place could be transferred and studied in other locations, serving as a prototypical regulatory framework.
Ultimately, this approach, the TRP and other tools are not intended to dictate design or suggest improvement to urban form. Rather, these new technologies and devices are set to question the effects, roles and authority of regulation, guidelines, zoning and code on contemporary urbanism, as a critical aspect of information driven society.
Appendix
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II. Biographical Note
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Ishii, Hiroshi, Eran Ben-Joseph, John Underkoffler, Luke


Online & Software CoLab Tools


Hardware


Tangible


BIOGRAPHICAL NOTE

Ariel Noyman (b. 1980) is an architect and urban designer with over seven years of experience in large scale urban design, institutional, public and private projects, data visualization, graphics and fabrication. Parallel to his studies at MIT, Noyman is holding a Research Assistant positions at the Changing Places Group of the MIT Media Lab and previously at the Center For Advanced Urbanism at MIT SA+P. Prior to MIT, he graduated the School of Architecture at Bezalel Academy of Arts & Design, Jerusalem (Cum Laude, '08) where he later held a Studio Lecturer position. Since 2006, Noyman have practiced at leading architecture and design firms in the US, Europe and in Israel, while developing an independent body of work through major projects, competitions and research.