

Over Growth

A Metabolic Densification of Cape Town

Key Words: symbiosis, cellularity, growth, densification, decay

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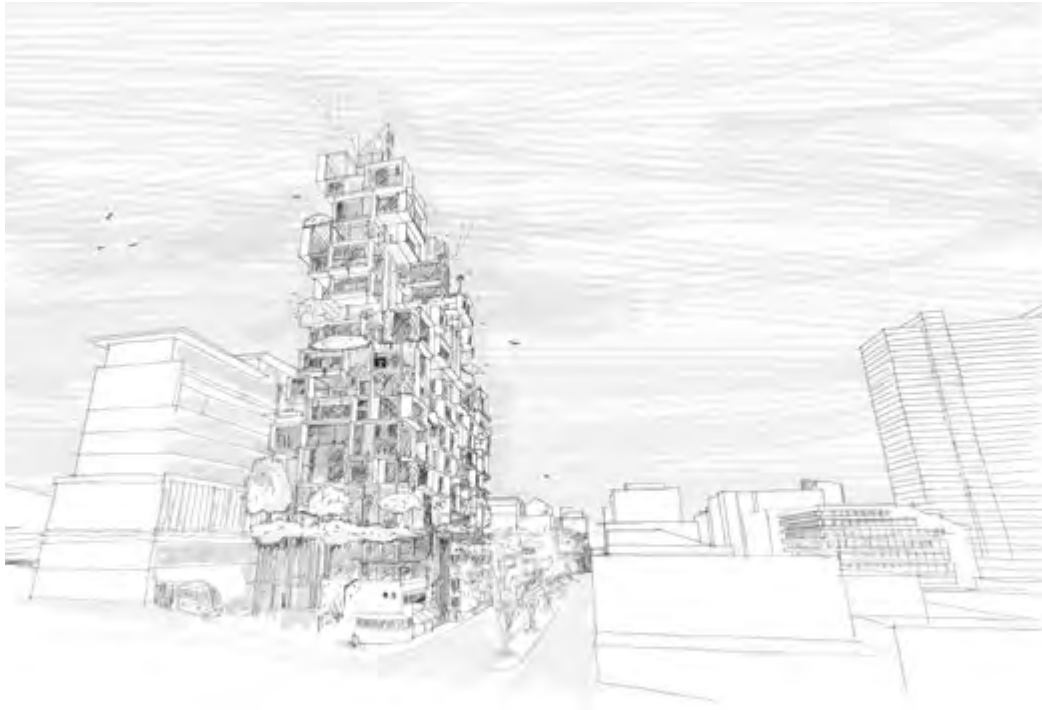


Figure 1: Author's Concept Sketch

Over Growth

A Metabolic Densification of Cape Town



Figure 2



Figure 3



Figure 4

Abstract

Contemporary cities are experiencing unprecedented growth to cater for growing populations and immigration into urban centres¹. As a result cities are becoming increasingly densified especially in developing countries². Densification, and the associated growth, provides many social and cultural benefits, but can lead to increased pollution, environmental degradation, the destruction of existing urban fabric, a lack of greenery, a lack of light to street level, unmanageably large, decaying buildings and increased pressures on infrastructure. This dissertation argues that the design of densified spaces is of utmost importance if we are to maintain a healthy operating space for humanity and the planet.

Since before the industrial revolution our society has become governed by a mechanistic way of thinking that originates from technology and science³. These thought patterns have shaped the way we design and perceive architecture globally. Many other aspects of society are also influenced by the same mechanistic thought, including our global economic system. This system focuses on indefinite growth; a goal that our finite planet cannot sustain. This paradigm suggests that new, complex approaches to city growth need to be considered to avoid impending disasters.

Over Growth investigates various biological concepts that can be applied to densification. Metabolism is used to understand how Cape Town can become more socially and ecologically sound. It suggests that to retain its local character and multi-cultural identity new buildings should grow over valuable, existing urban fabric. The cell is used to interrogate basic increments of city growth. These range from from the scale of an urban block, to individual ERF sizes and to the basic units of the proposed architecture. Symbiosis suggests that cities can exist in harmony with the natural environment. City growth, as an organic process, facilitates the necessary shift away from rational, dualistic thinking towards more complex solutions.

These ideas are applied to the South African context, and in particular, a site on Bree Street. Many cities in the developing world continue to aspire to the

¹ Jencks & Burgess 2000

² Jencks & Burgess 2000

³ Kirokawa 1994

western models of development⁴. The development of Cape Town is thus threatened by the predominant mechanistic worldview. Conversations with Gawie Fagan, an architect and occupant of the chosen site, gave insight into the city's future and its past, explained later. In general this process was open, collaborative and interdisciplinary to be congruent with the push towards complexity over mechanistic thinking.

In short, I develop an approach to architecture that could most suitably alleviate the negative affects of densification in central Cape Town. These include: the deconstruction of spatial hierarchies by using the idea of cellularity to create a more diverse, inclusive social realm; the adaptation, configuration and tectonic of cells; the provision of structure, services and greening to accommodate future additions in a layered 'over growth' that is simultaneously occupied and under construction; and the malleability of the city's zoning regulations and its densification strategy.

This dissertation intends to create a desirable solution for multiple owners, investors, tenants and buyers. It emphasizes the need for interdisciplinary work and the importance of locality in an ecologically minded city. A suitable client and program are suggested. The maximum mass and bulk of over growth relates to all of the above factors.

⁴ 4 Jencks & Burgess 2000

Key Concepts:

A few meaningful concepts have been borrowed from the father of the Metabolism Group, Kisho Kirakowa.

A Philosophy of Symbiosis is essentially the conviction that all existence - human beings, plants, animals, and minerals are not only living, but at the same time, being given life by the rest of existence.

The Age of the Machine is an era characterized by reductionism, rationalism and dualism. It is synonymous with 20th century ideals, models, and norms that emanate from the promise of better futures through industrialization and machines.

The Age of Life is in opposition to the age of the machine. It is an era characterized by symbiosis, plurality, complexity and diversity. Its arrival coincides with the onset of the information age. We are presumably already in the age of life.

Thesis Statement: Growth in city centres should be understood as a complex, biological process to allow for more ecologically and socially sensitive densification.

Objectives

- * Investigate city growth as a complex, biological process from the scale of an urban block to the basic units of a building.
- * Investigate the densification of Cape Town through the metabolic process.
- * Outline symbiotic growth that creates a more inclusive and diverse city that celebrates locality.

Structure

This dissertation is structured into three main parts. Part one introduces the problems and suggests symbiosis as a new model for society. The methods suggested to facilitate this change are explained, as well as the significance of the metabolic process in our local context. Part two discusses the solutions associated with growth in three tiers: city & society, street and ecology and the urban block. Part three discusses a tectonic that could best achieve the desired solution as well as the intended program and client for *Over Growth*.

1.1 Introduction

In the 21st century mechanistic thought patterns that include our present economic system could arguably culminate in wide-spread food shortages, climate change and resource depletion. In addition, unprecedented growth is reaching developing countries in the coming decades to cater for immigration into urban centres⁵. Cities are becoming increasingly densified to respond to growing populations⁶.

A prediction for the outcome of indefinite economic growth was made in the 1972 report “*Limits to Growth*.”⁷ Although the report has been criticized for its limited accuracy⁸, due to computer generated modelling, today the trajectory has proven remarkably accurate when actual events were plotted and compared on the same graph (see original graph figure 5). City growth is not only creative processes. It increases pressures on our resources and destroy natural habitats to claim space. It is firmly linked to our economic system yet it too can not occur indefinitely.

I share the perspective that nature is ultimately more powerful than humankind. Allan Weisman explored this in his thought experiment “*The World Without Us*.”⁹ The speed at which cities decay, by way of nature, without human inhabitants is remarkable¹⁰. There is however much positivity in the power of nature and its ability to interconnect with human creation. Essentially, Weisman suggests that a careful balance is needed¹¹. The architecture developed in this dissertation aims to achieve this through symbiosis. It suggests that architecture should readily accept, and thus manage, the inclusion of nature and the associated decay.

Although city growth is needed to respond to humanity’s present paradigm, it is not an unerring solution to human settlement. In light of the problems associated with indefinite economic growth, the associated densification and

⁵ Jencks & Burgess 2000

⁶ Jencks & Burgess 2000

⁷ Meadows. H, Meadows. L, Behrens III & Randers 1972

⁸ William, Stavins, Nordhaus, Weitzamn 1992

⁹ Weisman 2007

¹⁰ Weisman 2007

¹¹ Weisman 2007

the projected population of 9 billion by 2050¹², new radical approaches to architecture must be developed that can allow for growth and criticize its negative affects. I argue that it seems realistic that insensitive, rapid, mechanistic development based on over-rationalized thinking may leave future generations to live in dystopias of unmanageably large, socially disturbed, ecologically disconnected, homogenous cities.

Earth's geologic periods – defined by evidence in rock layers – typically last more than three million years¹³. Barely 11, 500 years into the current epoch, the Holocene, scientists are already defining the markers of a new geologic epoch—the *Anthropocene*¹⁴. This term refers to the widespread impact inflicted by humans on the environment, including habitat loss, environmental pollution and animal and plant extinctions. Industrialization, population growth and urbanization each have irreversible repercussions for the earth's surface. It has become increasingly important to consider more ecologically minded cities.

One major problem with cities is that they disconnect society from the living world. However they also provide the platform for interaction, collaboration and progress. In order to maintain a relationship with culture and nature, it is vital to nurture socially and environmentally minded ideas. Cities could be inspiring places that differ vastly across the globe. In Cape Town more greenery, life and diversity in architecture is needed to create a positive effect on physical and mental health.

¹² Jencks & Burgess 2000

¹³ Rockstrom, Steffen, Noone, Persson, Chapin, Lambin, Lenton, Scheffer & Folke 2009

¹⁴ Rockstrom et al. 2009

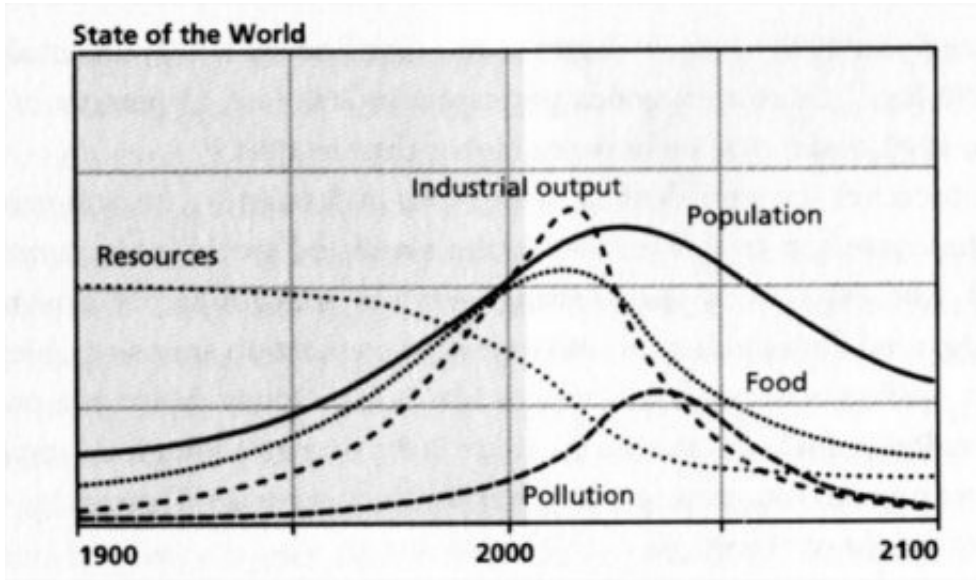


Figure 5: 1972 Limits to Growth graph



Figure 6: The prediction was made using a computer modelled trajectory

1.2 A New Model for Society

This dissertation evolved from the perspective that our universe is not a machine that is predictable and controllable by man¹⁵. The writings of the Metabolist, Kisho Kirakowa, in “*A Philosophy of Symbiosis*,” underpinned ideological themes for the growth of cities. The move towards symbiotic model for society lead to an interrogation of our present paradigm as an over-rationalized world. Kirokowa’s concepts, namely the “*Age of the Machine*” and the “*Age of Life*,” are used to interrogate city growth and aims to harmonize it with the planet and societal needs.

Twentieth century architecture, based on rationalism and reductionism, regards the degradation of air, rivers, oceans, forests and the extinction of species, as inescapable circumstances of the technological and economic development needed to support human society¹⁶. It’s cities and buildings were perceived as immortal¹⁷. The proliferation of Western culture is presumably the corner stone of our global civilization and many cities continue to grow according to these principles. However not all Western thinkers can be criticized for sharing a homogenous worldview¹⁸. In Foucault’s *Pendulum*, Umberto Eco presented a worldview that challenges rational thinking¹⁹:

“I have come to believe that the whole world is an enigma, a harmless enigma that is made terrible by our own mad attempt to interpret it, as though it had an underlying truth.”

- Eco 1989

Eco allows us to free our thinking from the over-rationalized model of the Western world, with the touch of irony that this is also a model for it.

A symbiotic model for society requires an interdisciplinary approach. This is a way of thinking that transcends all divisions among differing fields of

¹⁵ Harding 2006

¹⁶ Kirakowa 1994

¹⁷ Kirakowa 1994

¹⁸ Kirakowa 1994

¹⁹ Eco 1986

specialization²⁰. Complexity theorists acknowledge a multitude of methods for generating knowledge. Art, recognized as means of scientific research, is one example, since art can be used to produce understanding²¹. This dissertation seeks to indulge in artistic discovery, as much as scientific enquiry to establish the parameters for complex, organic growth. However, it is acknowledged that this dissertation is produced within the dominant Western paradigm of today that heralds dualist, reductionist and rationalist thinking. This dissertation aims to counter this dominance with the inclusion of art, complexity and interdisciplinary opportunities.

In “*Delirious New York*”, Rem Koolhaas explains that a city built with a common purpose can result in the beautiful articulation of architecture²². The densification of Cape Town should promote a society pre-occupied with symbiosis, the contrast of which is urban centres as an expression of the present economic system. This encourages new ways of being in the city and allows for alternative economic models that promote diversity and inclusivity. Symbiotic architecture should express a society that places equal importance on the individual, the collective and the planet. It includes the cultural importance of retaining existing fabric as well as the impact of new development. Symbiosis, as a new model for society, encompasses the broad spectrum of identities present in our demographic landscape and unites them with the common purpose of symbiosis.

²⁰ Kirakowa 1994

²¹ Cilliers 2008

²² Koolhaas 1978



Figure 7: Seagram Building, New York



Figure 8: Authors Photo: Dept. of Public Works, Cape Town



Figure 9: Strand Street, Cape Town 1910



Figure 10: "Cities in the Air" model by Arata Isozaki (1960)

1.4 Metabolism- A Connected Living Organism

In “*Complexity and Life*” Capra explains that,

“to comprehend the nature of life, it does not suffice to understand DNA, cells and the other molecular structures that are the building blocks of living organisms, because these structures also exist in dead organisms, for example, in a dead piece of wood or bone”.

-Capra 2005

Metabolism represents the relentless flow of energy and matter that allows a living organism to continually regenerate, adapt, repair and sustain itself²³. The organic nature of city growth can be understood through this process as it encompasses the ageing, regeneration, adaptation, sustainability and development of buildings.

The application of metabolism to cities was born when Japanese architects made the observation that, like living organisms, cities process energy and matter. “*Metabolism*” looked to blend the embedded cultural notions of traditional Japanese architecture with modernist principles while symbolizing renewal and growth²⁴. Institutional urban infrastructures were re-envisioned to support the freedom of the individual²⁵. This was to be done through an architecture of cells that could be adapted to the users needs.

Configurations of cells were designed to shrink or grow to support society’s demands. This architecture arguably resulted in large, overbearing structures that could be criticized for their autocratic social implications and brutal expression. It remains interesting that *Metabolism* essentially formed a polemic against the fixed, monumental rules of purely modernist architecture. Many of its ideals could be adapted to suit the argued complex approach of densification and city growth in South Africa today.

Metabolism is a non-finite process and thus provides a far wider range of possibilities for the densification of cities than the typical norms of regulations and policies such as zoning schemes. As one example, Cape

²³ Capra 2005

²⁴ Van-Essen 2016

²⁵ Van-Essen 2016

Town's densification strategy shows a limited number of models for densification, shown in Figure 11. Often more unique and sensitive approaches are needed to respond to the *genius loci* of a particular site and its existing fabric. The densification of cities understood through the metabolic processes renders them perpetually incomplete: growing, metamorphosing and decaying. This can be seen as a remedy to the unspoken finitude of zoning²⁶.



Figure 11: Density Models According to the City of Cape Town's Densification Policy (2011)

In Japan, Metabolism looked to represent the country's unique, cultural identity in a globalized world. Modernism had already given rise to the international style of architecture that favoured a *tabula rasa* approach that discredited locality and existing urban fabric. Human identity depends on locality even if, at times, we experience the urge to override our senses and numb ourselves to our environment²⁷. In the Age of the Machine rationalism was synonymous with progress and modern architecture became limited by universal principles and fixed, eternal solutions²⁸. This architecture resulted in a loss of scale, a homogenous identity and a lack of place making and has become counter productive in the age of life²⁹.

²⁶ Mostafavi 2003

²⁷ de Botton 2006

²⁸ Kirakowa 1994

²⁹ Kirakowa 1994

After more than 20 years of democracy the search for architecture that is true to the multi-cultural identity of South Africa remains equally important. South African cities, including Cape Town, were not spared from the global phenomenon of modernist infrastructure, architecture and planning³⁰. Decades of draconian planning presumably led to the destruction of many pockets of characterful, historic buildings. The remaining valuable, historic fabric should thus be preserved, which is a sensitive operation. This dissertation suggests that the metabolic process could be suitable enough to foster this preservation, as well as developed a truly unique, local architecture. The metabolic densification of Cape Town thus represents the layering of changing needs over time. This less rational, organic method allows for cultural interpretations of existing urban fabric that celebrate locality through a continual process.



Figure 12: Early Concept Sketch

³⁰ Fataar 2015

2.1 City & Society

An industrialized society allowed humanity to be liberated from menial work and allowed for unabridged leisure³¹ that gave respite from the wildness of nature. This became the preferred model for modern architecture; the architecture of machines that excluded nature. Models, norms and ideals superseded diversity to favour the mechanistic ideals of modernism. This architecture was meant to provide homogeneous satisfaction since the middle class was expected to shape itself into the ideal market for the machines it mass-produced³².

It resulted in a remarkably large amount of urban spaces that became environmentally disconnected, homogenous and non-participatory³³. In South Africa this was coupled with the social and spatial divisions created by Apartheid. Such historic contexts beg for new approaches to city growth that provide a healthier interface between humans and nature. This allows a return to diversity, which happens to be the natural expression of healthy ecosystems³⁴.

This shift in designing could uncover areas of potential opportunities in places that were once disparate and segregated. The urban surface could be transformed into a participatory and transforming space that allows for inclusivity, adaptation and engagement. Mostafavi calls for all citizens to imagine, support and construct urbanism that encourage participation³⁵.

In addition to this the theory known as “Urban Metabolism” contributes to a more environmentally and socially connected city since it examines the connection between urban structures and lifestyles³⁶. The modern city forms an intersecting arena between society and the environment that embodies an over-rationalized model. However cities can be considered well tooled for innovation, as they provide a concentration of the social, intellectual and

³¹ Kirakowa 1994

³² Kirakowa 1994

³³ Mostafavi 2003

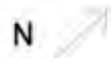
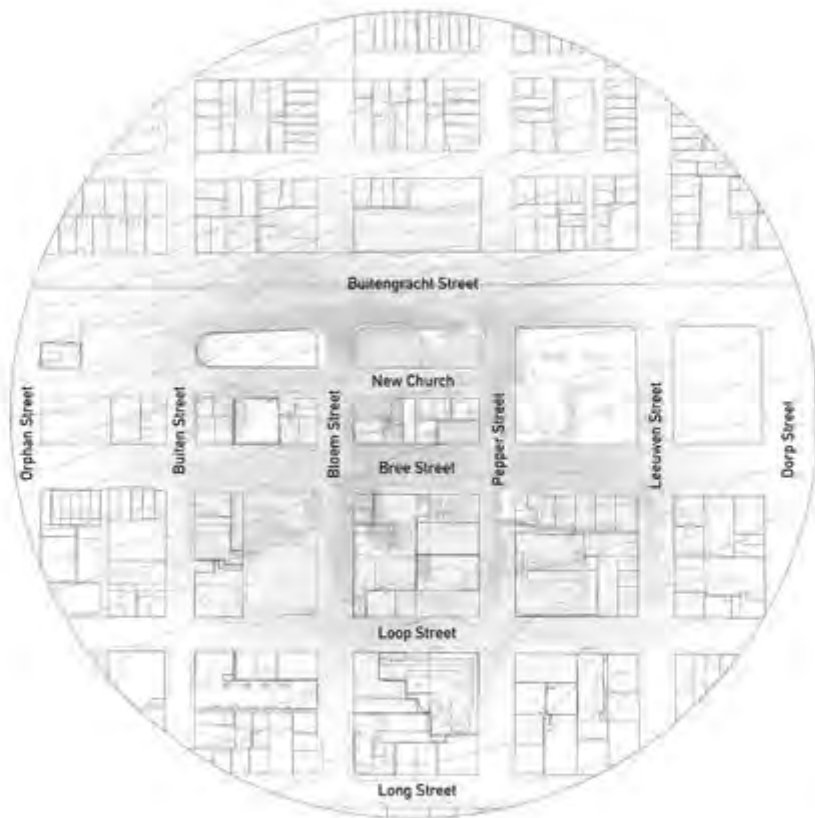
³⁴ MacDonald 2012

³⁵ Mostafavi 2003

³⁶ Barles 2010

physical resources necessary for change³⁷. The demand for growth in developing countries could benefit from a move away from reductionist thinking. The above interpretations motivate the need for city growth that blurs the boundaries between society and the environment.

Metabolic flow is a useful measurement of the consumption of materials and energy needed to grow and sustain cities. Cities are significant consumers of materials and energy³⁸. This section has explored densification in the city centre and the opportunity to foster a socio-ecological city. Cape Town faces the problematic legacy of modernism and Apartheid. Urban metabolism could facilitate more ecological and cultural inclusivity and more conscious action in the city's growth. A more inclusive, diverse city will be the product of recognizing our differences and unique opportunities.



Site Plan

³⁷ Barles & Sabine 2010

³⁸ Barles 2010



Authors Images: Site at Bree Street



2.2 Street & Ecology

To explore the ideas presented in this dissertation a site along Bree Street has been chosen. Despite this street being an important part of Cape Town's Central Business District, in recent years it has become a firm part of its cultural core. The introduction of events such as "First Thursdays", a monthly walk-about the city's art galleries, has led to widespread activations of street fronts along it. Many new cafes, restaurants, shops, offices and galleries are now operating from the characterful, small scale buildings that are dotted along the street. Many large hotels, office blocks, parkades and a hospital line the street that create a less appealing street frontage.

The scale of the fabric is thus inconsistent; it includes Cape Town's tallest and newest sky scraper, "The Portside," which dwarfs the much smaller historic buildings on the street. The street slopes steeply, both length ways and across its breadth, contributing to its unique character. A large island allows for a step in road level and is planted with palms and Acacias. It runs almost the entire length of Bree street. Many raised plinths and staircases, that provide height above the mud of unpaved roads for the historic buildings, continue to form part of the street scape.

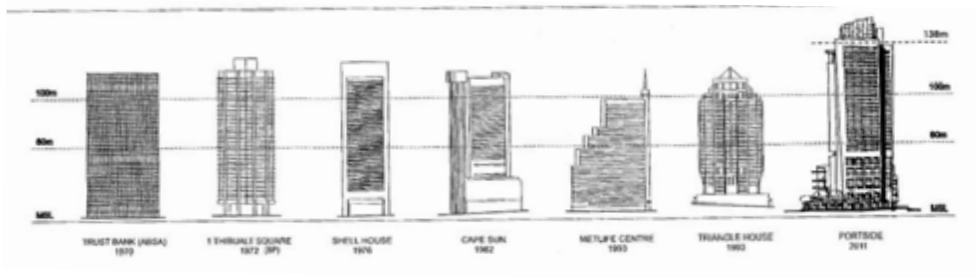


Figure 13: Cape Town Tallest Building Comparison, The Portside is depicted far right

Bree street is well positioned to function as part of Cape Town's rich ecological and cultural opportunities because they are so prevalent in the area . Bree Street runs parallel to Buitengracht Street; the word 'Gracht' meaning canal in Dutch, as this street is a canal that was covered in the 1800's for sanitary reasons. The indigenous people of the area, the Khoi San, called Cape Town 'Camissa,' or place of sweet waters. The Camissa stream continues to flow under the city today and as much as three million litres of unused, drinkable water flow into the ocean daily³⁹.

City growth that taps into this under utilized resource is essential, since it can reduce pressures on existing infrastructure while allowing for densification. Architecture that is socio-ecological becomes synonymous with diversity. Furthermore it remains living and flexible, since object and function are not separated⁴⁰. This motivated for the symbiotic growth of the city to occur around a spring that taps into the existing Camissa stream.

South Africa is a semi-arid country that experiences droughts every few years⁴¹. The increased pressures associated with city growth and densification will presumably place greater strain on our resources in the future. Urbanism practice advocates the use of infrastructural systems and the public landscapes they give rise to as the ordering devices of constantly transforming cities⁴². The Metabolist projects in Japan suggested the creation of new infrastructures⁴³, in a symbiotic architecture the already existing infrastructures should be utilized more wisely, this could arguably give an ecological order to the city. Landscape urbanism offers a fresh perspective on how city centres can be understood as part of nature⁴⁴. In contrast to the idea that a city is where nature stops, a city is a part of the natural landscape⁴⁵. Natural landscape and urban tapestry should become permeable.

³⁹ Web Source: http://www.huffingtonpost.com/sven-harding/cape-town-tunnels-drought_b_9619340.html Accessed November 2016

⁴⁰ Nitschke 1964

⁴¹ Web Source: <http://www.weathersa.co.za/learning/climate-questions/36-what-kind-of-droughts-does-south-africa-experience> accessed Nov 2016

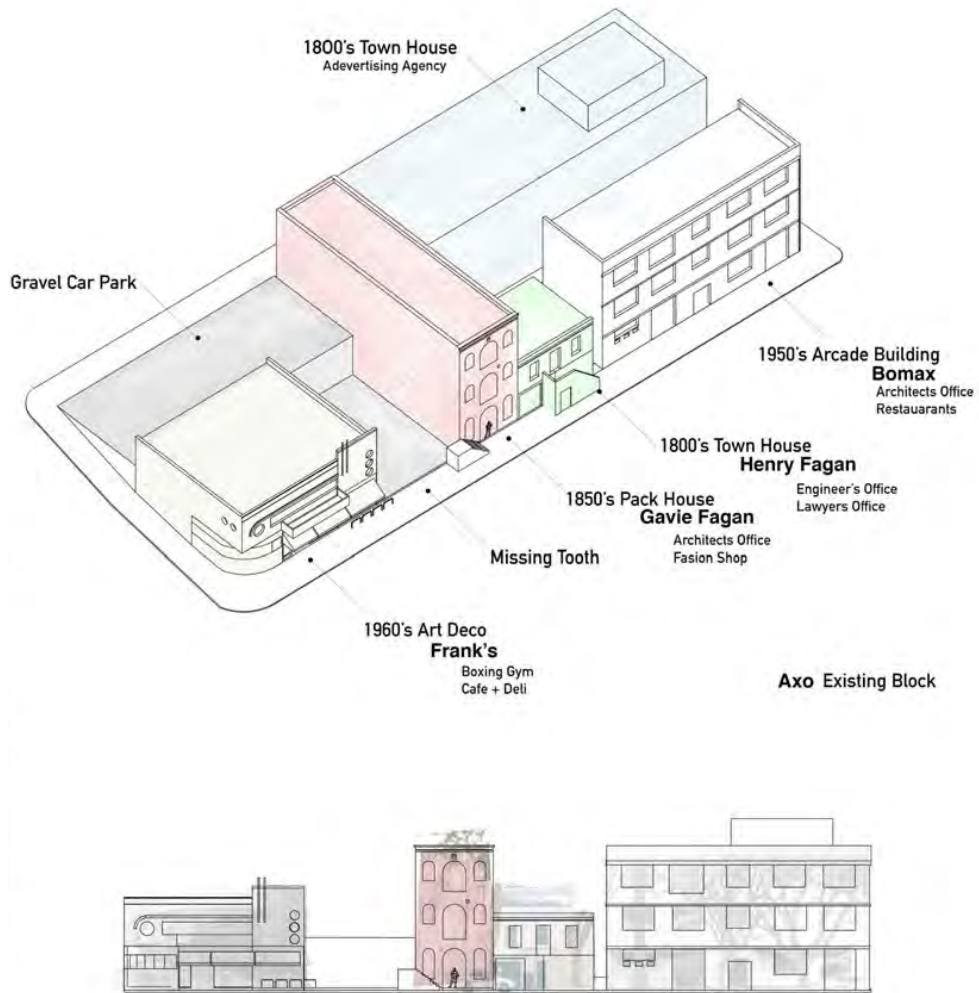
⁴² Waldheim 2006

⁴³ Nitschke 1964

⁴⁴ Mostafavi 2003

⁴⁵ Kaika & Swyngedou 2011

The top of Bree Street is located between Company Gardens, the original farm that supplied produce to the Cape Colony, and Signal Hill, a part of the Table Mountain National Park. The Cape Floral Kingdom in which Cape Town is situated is one of the most biodiverse biomes in the world, supporting endemic birds, plants and insects. Part of this dissertation motivates for densification that encourages symbiosis between humans and nature. The site is thus chosen to provide a bio-corridor between existing green areas of the city. It draws on elements from the surrounding environment to make the division between city and nature less distinct.



Site Axonometric and Elevation

2.3 Urban Block

The chosen site covers an entire urban block. The block is of interest due to a peculiar mix of older and newer buildings, none of which are above three stories in height. A well preserved 1850's pack-house runs the length of the site. The south corner boasts a 1960's art deco building. An infill gap and a gravel parking lot between these two buildings provides a clear opportunity for insertion. The north portion of the site is entirely developed, save for a narrow servitude.

The block's long, narrow plan and the small ERF sizes on it are indicative of the early residential character of the city bowl. At the site, New Church Street divides the standard block size of Cape Town by half. This was presumably done to accommodate more residential street fronts as well as the church which once stood at the T-junction at Pepper Street. Today the street is in-active with many buildings turning their backs to it. The church has been replaced by a parkade.

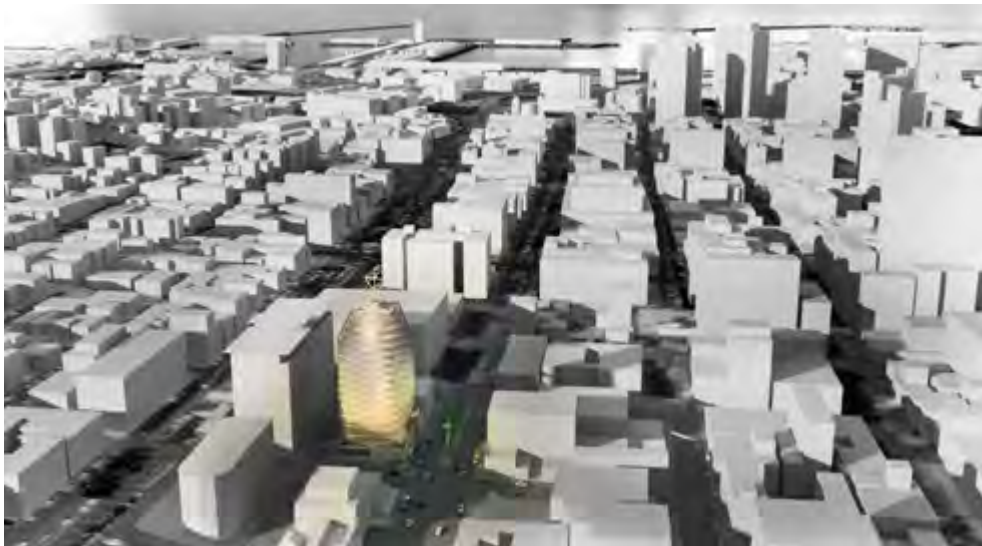


Existing ERF sizes indicate the basic increments of growth or "cells" of an urban block

The selected site varies from its corresponding half-block which has building that is over 12 storeys in height and occupies its entire half-block. It creates an inactive street edge and cuts out light to New Church Street. This is exemplary of many of the negative affects of present day developer-driven approaches to densification. These approaches are arguably governed by mechanistic thinking and lead to the maximization of zoning regulations.

The chosen city block is zoned as Mixed-Use (MU 3) with an allowable height of 38m and setbacks from 25m. It is dubbed a transitional zone between the General Business (GB 7) zone of downtown and the more residential character of the uptown suburbs. The juxtaposition of heights seen in surrounding fabric demonstrates the changes in zoning regulations over time. Parking decks are present in two adjacent buildings. Today parking decks are discouraged by the city yet still considered a necessity by many developers.

My conversations with Gawie Fagan further revealed the malleability of the zoning scheme. Fagan is one of the oldest practicing architects in South Africa. His office is situated in the 1850's pack house, which he saved from demolition in the 1960's. It transpired that Fagan had already proposed a design for the empty portion of the block; an 18 storey office tower that is fitted with full plumbing to allow for adaption to residential units. It gained approval under the previous zoning scheme and is almost 60m high. The building is structured around a tubular core and each floor plate turns a few degrees to allow the top floor to face direct north. It became clear that the shifting demands of the city and its policies could change over the life-span of the organic process suggested. For this reason *Over Growth* explores a variety of life-stages for a building that does not always meet zoning requirements.



Fagan's Design for the site, with permission Fagan Architects

The biological cell is used to understand the smallest increments of growth needed to initiate the process of organic growth. As such this basic unit of growth is a way of understanding the development of the city from its grid layout to the non-finite building process suggested. Additions can thus be made by multiple owners over time. ERF sizes, as ground level cells, need not dictate cell sizes above as they can be free to grow in the air space above existing fabric. Configurations or individual cells could be sold as sectional titles through negotiation with land owners. The block becomes unified through this process of development and ownership. The cell celebrates the individual and benefits the collective.

The allowable bulk and height of the *Over Growth* is fractured and controlled through this tectonic of cells, and made possible by the redundancy in structure supplied in the first growth phase. Fagan's design gave me interesting insight into structure and ownership of the block. The design depends on the 1850's pack house not being developed to allow it to be a freestanding spiral. If Fagan did not own the pack house it may be obscured by a future, neighbouring addition.

Furthermore cells provided the opportunity to describe the most desirable massing and to explore versions that represent both positive and negative affects of densification. They can separate, set back or overhang to allow light into the growth and onto street level where necessary. Cells can correspond to structural rules set at ground level, and like an ecological, vertical village they offer a variety of options to tenants that would like to be a part of the growth. Cells allow the process of growth to be negotiated with the city.

3.1 Tectonic Approach

The dissertation requires a tectonic that could link a collective of new and existing buildings both vertically and horizontally. Three different types of collective building forms, as distinguished in 1964 by the Metabolist, Fumihiko Maki, have been investigated. The modernist space is hierarchical, unchangeable, puritan and complete. Next the megastructure introduces the idea of ever-changing cells supported by an infrastructure and superstructure that accommodates society like a landscape. Lastly ‘group form’ is readily adaptable: elements can be added or subtracted from a configuration without destroying the balance of an entire composition⁴⁶. Instead of imposing mastery group form asserts interdependence among incongruent or unfinished elements, rather than establishing hierarchy and isolation⁴⁷. Group form thus most readily concedes to the suggested organic process of densification.

The urban scale of “group form” became interesting as it allowed a seemingly infinite addition of elements. Moreover it offers an organizational order of elements such that structures do not become completely scaleless. Service cores and circulation are proposed as the ordering elements of the scheme. The merit of such schemes originates from their changeability and an evolutionary potential that is inherent in non-hierarchical architecture. Here scale is related to the idea of structural systems generating a continuous, frequently linear, urban fabric that resembled a medieval village, an arabic medina or monastery⁴⁸. This character is present in Bree Street and the neighbouring area of Bo-Kaap and thus the approach of ‘group form’ seemed particularly appropriate to retain scale in the city. The mass could become fractured and the scale more human.

In opposition to the modernist, homogenous and hierarchal skyscraper ‘group form’ suggests a tectonic that differs from the puritan technological ambitions of the international style. Instead of being preoccupied by structural spans that achieve the flow of open-plan and allow for an interpretation of use a modulated, flowing space is proposed⁴⁹. As such the

⁴⁶ Maki 1964

⁴⁷ Koolhaas & Obtrist 2009

⁴⁸ Oxman, Hadas & Ehud 2003

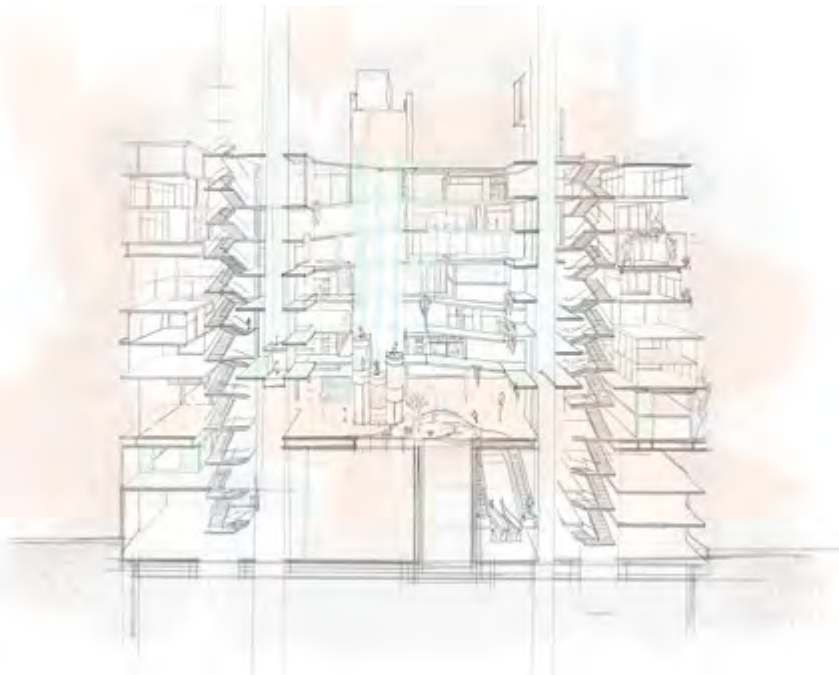
⁴⁹ Chu, Strand & Fjelland 2003

structured space of a historic buildings can be hybridized with the flow of open-plan.

Megastructure projects provide the structural capacity and adaptive potential that could accommodate organic growth. The structural concept of ‘support’ and ‘supported’ systems implies that buildings could adapt perpetually as units are replaced. These radical ideas were explored by Archigram in the 1960’s and include the expendable buildings of ‘Plug-in City’; it called for an investigation of an urban environment that can be programmed and structured for change, ease of maintenance and planned obsolescence. It should be noted that an architecture that suggests prefabbed elements hoisted into position on a skeletal frame and plugged into ready-made infrastructure is still thought impractical by most designers⁵⁰. The apparent adaptability of ‘support’ and ‘supported’ has all too often proven to be highly ineffective. The initial expenditure of energy and resources in building is so high that contemporary, ecological design can not suggest indefinite replacement of parts.

Projects that attempted to develop cities in less rational ways than modernism lead to the development of architectural principles that were both inspired by them and that criticized their short-comings. An organic process of city growth suggests adaptivity and change, yet it is clear that that replacement of large elements is unpractical. The process of metabolic densification responds to the changing needs of society with cells that allow flexibility in how they are configured. Each cell can expand or shrink according to structural rules that allow cantilevers and transfer beams from the mega-structural elements of core and grid. Cells can multiply or divide but they are essential not replaceable. The building can be grown over time yet once built, major elements, including the cells, remain fixed.

⁵⁰ Crompton 1972



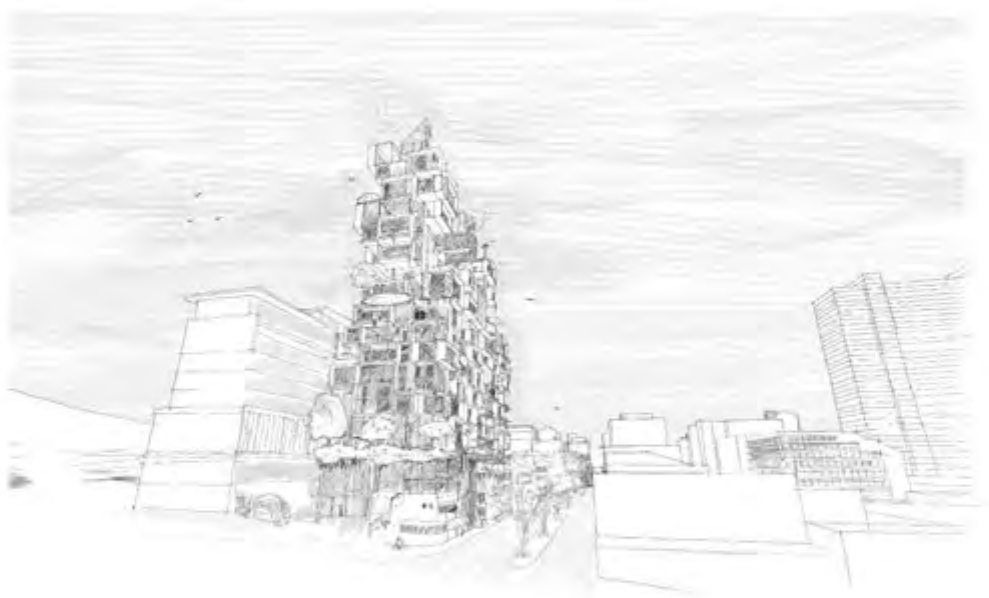
Concept Sketch of Interior

3.2 Over Growth

This section discusses the specific technical solutions, program and client suggested for *Over Growth*. It was deemed necessary that a portion of the structure could be free from the existing fabric on the site should be explored. Cores were strategically positioned to allow this. They were envisioned as modular elements that allow for the provision of services. The layout of interconnected cores reverses the typical typology of an urban block. Circulation occurs through organic connections between existing fabric and new additions.

Cores alone were insufficient to support the entire growth and thus I began to look at column grids. Developer-driven buildings arguably favour a column grid that allows for parking decks or basements. The feasibility of this was explored yet it became evident that this is a mechanistic approach. The Cape Quarter development is an example of this. It retains the facades of existing buildings and creates a basement parking that dictates the parking grid and spaces above.

The existing facades become symbolic of the buildings that once stood there. This approach essentially discredits the cultural value of the space,



which relates to the entire use and layout of existing buildings. It is arguably far better to retain more than just the facade of old buildings for cultural reasons. Column grids should rather be true to the existing footprints and structure should reinforce existing fabric.

The structure is designed to be redundant and allow for the maximum growth of up to 85m or 25 stories. It is designed to become lighter in the upper levels of the system, allowing for more freedom amongst cell transfers and cantilevers. The mega-structural elements are designed of concrete, as well as the cell walls.

In *Over Growth* the cells are designed to accommodate various sizes that correspond to a column grid based on existing fabric. As such they represent a genetic change between old and new. It became clear that a limited number of modules was an over-rationalized approach. Yet this can simply the design, where possible agglomerations of cells are the same. Similar cells could be understood to form tissue, similar tissues group together to form organs and as such the growth is a supra-organism.

Public realms above street level are used to link one city block to another and further de-centralize hierarchies. A public park is envisioned as the mediator between new and old structures and an amenity for surrounding buildings. Routes across various cultural or business districts could be established over time. The sharing of amenities, such as neighbouring parking, is made possible through bridges.

The relationship of the “cell to core” is unlike the homogenous approach of “core to floor-plate” in modern-open plan. Instead it is intended to create an autonomy and diversity amongst different parts of the building. The circulation route throughout the growth allows for multiple levels that can be connected using a series of ramps.

The cells lead onto a narrow void in the core of the building and hot air is invited to escape upwards. The building is a ventilation stack and a spring, overgrown with vegetation, it is a lung-like porosity that creates fresh air. The cells allow for each user to control their own climatic comfort. The variable relationship of cell to core allows for multiple benefits from promoting diversity in programme to creating passive cooling.

The variety and configuration of cells allow for diversity amongst the tenants. The growth intends to create an easy environment for various size NGO's and start up's that could grow or downscale as needed. This allows a formalized change to the office block typology. Alternative models of our economic system could thus come into play. The structured trajectory of a business can be understood otherwise to the indefinite economic growth or mechanistic "corporate ladder" represented by a modernist skyscraper.

Over Growth requires the cooperation of many role players. The client envisioned to support the project would be NGO's associated with the 100 Resilient Cities network. The formation of "*100 Resilient Cities*" network is an initiative started by the Rockefeller Foundation that aims to help cities in all parts of the world deal with unprecedented growth, instability and change.

Over Growth provides offices, meeting spaces, accommodation and amenities for citizens to help instil widespread environmental and social change. The opportunities and far-reaching affects of such an initiative would aim to have a positive affect on the entire city. The advantage of diversity is that it encourages collaborations and interdisciplinary relationships. Innovations can therefore occur at intersections.

3.3 Conclusion

Many biological ideas could relate to city growth, this dissertation explored symbiosis, metabolism and cellularity. These ideas triggered the simultaneous exploration of both the positive and negative affects of densification. In preference over mechanistic thinking, that continues to govern the majority of development, *Over Growth* suggests a less rational process. The move away from mechanistic thought has facilitated a meaningful transformation in my own ideas of design. It is difficult to find truth from only one perspective. It is thus pertinent that thinking like this can facilitate the growth of a more socially and ecologically minded city.

The art of building cities has become increasingly paradoxical since humanity has become aware of the pressures it exerts on our planet. The difficulty of this disertation stems from the fact that it acknowledges the need for growth and also recognizes the short comings of present day systems that support it. The mechanistic thought patterns that have shaped our cities and environments continue to dominate development today and it is vital that their place in history be questioned if we are to avoid a social and environmental disaster. Today architects, and in fact all citizens, are faced with this two-fold problem. On the one hand we have to develop existing cities that will be the habitat for the majority of humanity; on the other hand we have to consider the limits of our finite planet and our ability to sustain human creation.

All cities need to produce the solutions that can solve their own, unique challenges of growth. A global shift is needed to avoid the imminent disasters associated with mechanistic thought and hence insensitive development. This change will be a local one that deconstructs hierarchies and celebrates diversity, inclusivity and culture. The Age of Life will see the rise of locality and unique architectural solutions. Change will be difficult, yet possible if implemented by inhabitants that share a passion for their planet and their city.

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Image References

Figure 2: Vancouver by night Available: <http://www.world-wallpaper.com/user-content/uploads/wall/o/82/Vancouver-At-Night-1600x900-Wallpaper.jpg> Last accessed 16 October 2016.

Figure 3: Life inside the densest place on earth: Remembering Kowloon Walled City. Available: <http://edition.cnn.com/2014/03/31/travel/kowloon-walled-city/>. Last accessed 16 October 2016.

Figure 4: Cellular Structure: Available at <http://www.biologicalcapital.com/slides/cellular-structure/> .Accessed September 2016

Figure 5: A Synopsis: Limits to Growth. The 30-Year Update. Available: <http://donellameadows.org/archives/a-synopsis-limits-to-growth-the-30-year-update/>. Last accessed 20 October 2016.

Figure 6: Old Computer; Available at <https://www.mitre.org/about/our-history> Last accessed 20 October 2016.

Figure 7: Seagrams Building Jordi Milà Jansà. Available <http://milajansa.com/seagram-building/> Last accessed 20 October 2016.

Figure 9: Strand Street 1910, available at <https://za.pinterest.com/pin/215539532144965098/> Accessed September 2016

Figure 10: "Cities in the Air" model by Arata Isozaki (1960) Available <http://www.archdaily.com/422486/ad-classics-shizuoka-press-and-broadcasting-center-kenzo-tange>. Accessed September 2016

Figure 11: Density Models Source: City of Cape Town Densification Policy 2011

Figure 13: Cape Town Tallest Building Comparison. Available <http://www.skyscrapercity.com/showthread.php?t=441920&page=2> .Last accessed May 2016