The Autopoietic City –
how to create a city that can create itself (and why it matters)

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Abstract

This major research paper (MRP) argues how a simple process that is self-sustaining can create a more balanced, thoughtful and livable framework for cities.

How? By analyzing the history of cities, their challenges and the range of solutions proposed over time, we can uncover a set of simple rules that govern how individual cities work within their environmental and structural context. We can then use these rules to help communities create the spaces and places they want to live in. We can also see how breaking these rules can cause a cascade of solutions that invariably fail.

The rules are mechanisms which create an internally-consistent system. This MRP aims to integrate these rules into a coherent framework for the system.

We want to turn many little, individual transactions into a cohesive force that creates a livable, thriving city, without prescribing that people should act a certain way. We view humans realistically with all our flaws, not idealistically as perfectly rational beings. We view people as participants in their own vision of the city. By doing so, we achieve cities that are functional without having to wish them into being through top-down governance processes. With this approach, we enable cities that create themselves naturally, following simple patterns and relationships.

This MRP tests this system of rules using three methods from the strategic foresight and innovation toolkit; using 1) systemic leverage points, 2) foresight scenario building and 3) strategic windtunnelling. We make the case that these rules are both necessary and sufficient to enact paradigm-shifting change.

The first part of this MRP is gathering data from the past in the form of case studies, research, lived experience and statistics. The second part attempts to gather 'data from the future' in the form of scenarios, strategies and thought experiments. Together we will have an idea that balances reliability and validity.

The outcome of this MRP will be a business case to support further investment of resources to prototype these rules in a variety of applications for those who want to make a lasting impact on the next century of human progress.

Acknowledgements

Thank you to Jeremy, for illuminating the path ahead through your koans and questions;
and to Michael for your insight and input across great distances of space and time.

And to Andrew, David, Josh and Paul, the four horsemen of intellect, for allowing me to ride in your cavalry towards an exponential future.

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Dedicated to Laura, for your support, your sacrifice and your supernatural ability to focus on what matters.

And to Jake, may you live in the world we have tried to create here today;
a world where the price of ice cream is inversely correlated to the temperature outside.

Contents

Table of Figures

PART 1 // SETTING THE STAGE

“Any city, however small, is in fact divided into two,
one the city for the poor, the other of the rich.”
Plato, *The Republic*

Introduction

Urban planning as a professional discipline is implicitly flawed towards its approach to the design of cities. In formal logic, the term: “urban planning” would be a category error—a mistake to view urban environments as something that can be planned.

This stems from our modern desire to make messy systems ‘legible’ through maps, plans, strategies, and grids. (Scott, 1999) It temporarily suppresses the underlying messiness without ever solving it. There is a better way to think about cities, how they evolve and our role in the process.

It helps to start with two fundamental truths:

1. Incredibly complex systems arise from a set of very simple rules, and;

2. We cannot predict the future, but we can invent it.

By thinking about the city differently, we can reframe the challenges we face and see why our solutions are not working. We can then create a better framework for thinking about “the kind of problem a city is” (Jacobs, 1961), one that is better suited to our 21st century challenges and opportunities.

We will see that in the nested systems that form a city, humans are always the wild card. This major research paper (MRP) argues how a simple process that is self-sustaining can create a more balanced, thoughtful and livable framework for cities.

We can achieve **The Autopoietic City**

> *[Sidebar: “Autopoiesis is a natural process which includes the potential for transformation, the creation of novelty, from within the organization itself. Autopoiesis literally means ""auto (self)-creation"" (from the Greek: auto - αυτό for self- and poiesis - ποίησις for creation or production) and expresses a fundamental complementarity between structure and function. The term was originally introduced by Chilean biologists Francisco Varela and Humberto Maturana in 1973.” (Korn, 2019)]*

How? By analyzing the history of cities, their challenges and the range of solutions proposed over time, we can uncover a set of simple rules that govern how individual cities work within their environmental

and structural context. We can then use these rules to help communities create the spaces and places they want to live in. We can also see (understand) how breaking these rules can cause a cascade of solutions that invariably fail.

The rules are mechanisms which create an internally-consistent system. It is strategy without design. The rules point to a radical bottom-up approach to urban development: by creating incentives for people to act in a certain way, in line with their self-interest, using innovative voting mechanisms, the collective individual actions would create a livable, thriving city without any direct central oversight. Like biology, incredibly complex systems can emerge from a simple set of rules. All you need are elements, interconnections, and purpose. (Meadows, 2008)

This MRP aims to collect these rules into a coherent framework for the system. We want to turn many little, individual transactions into a cohesive force that creates a livable, thriving city, without prescribing that people should act a certain way. We view people as they are, not as we wish them to be, as participants in their own vision of the city. By doing so, we get cities that are functional without having to wish them into being through top-down governance processes. With this approach, we get cities that create themselves naturally, following simple patterns and relationships.

Masterplans are exactly what we want to avoid. Without any rigor, testing or validation of the rules, the job of creating a city would be incomplete. We want things that work, and that are practice-based.

This MRP tests the system of rules using three methods from the strategic foresight and innovation toolkit. Using 1) systemic leverage points, 2) foresight scenario building and 3) strategic windtunnelling. We make the case that these rules are both necessary and sufficient to enact paradigm-shifting change.

The first part of this MRP is gathering data from the past in the form of case studies, research, lived experience and statistics. The second part attempts to gather 'data from the future' in the form of scenarios, strategies and thought experiments. Together we will have an idea that balances reliability (predictable outcomes on a consistent basis) and validity (outcomes that meet the desired objective, even if the system employed cannot produce a consistent, predictable outcome) (Martin, 2005).

The outcome of this MRP will be a business case to support further investment of resources to prototype these rules in a variety of applications for those who want to make a lasting impact on the next century of human progress.
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Why do cities matter?

Why cities? Why, in a technological, always-connected age, do we care about where we live? Don't the benefits of cities, living closely to one another to benefit from economies of scale and network effects, become obsolete when we can all connect online, from anywhere?

There is a paradox at play in the relationship between distance and connectivity. Ed Glaeser refers to this as the “paradox of the modern metropolis” where he says, “proximity has become even more valuable as the cost of connecting across long distances has fallen.” (Batty, 2018 p. 65) Connectivity allows for more efficient sorting, thus creating denser city cores and more distributed suburbs. The easier it is for us to be apart, the more we want to be together.

According to United Nations projections, by 2100, we will all be living in cities. (Batty, 2018) Not one giant city, and not a distributed network of individuals, but cities of different shapes and sizes. The future of humanity is the future of cities; thus, it is important we manage the transition correctly.

So far though, our mechanistic view of cities has led us to choose approaches and tools unsuited for the job. What we are doing is not working. “Urban planning” as a term and approach is a category error, and a flawed approach. One cannot plan a city any better than one can plan an old growth forest. To challenge Le Corbusier, the city is not a machine for living in, nor a thing that can be planned, built and realized from start to finish. This city is more like a forest ecosystem: the result of millions of individual actions and choices that ultimately create the environment for that ecosystem.

The city is not a fixed entity, either. This is where urban planning runs into its first challenge. Fixed concepts like zoning, permits and property taxes apply static thinking and rules to a dynamic system. Cities are an artifact of nature, and of ourselves, and these require organic evolution. Cities take shape and form in constant interaction with signals from elsewhere. What happened in the past impacts what happens in the future, and cities are always regenerating. Batty (2018) uses the example of the City of London’s medieval street structure staying largely intact, despite the activities of the financial district changing unrecognizably over the years.
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What is a city, then?

A radical approach to how we think about cities requires redefining what we mean by the word ‘city’. Cities have traditionally been defined in spatial and numeric terms. Cities were things you could draw or count. Cities initially formed when people, tribes or towns got together to share resources, and to benefit from shared ideas, such as agriculture or shared defense.

We need to redefine our thinking about cities as collections of interactions, rather than just physical spaces.

To support this view, Batty defines cities as “…aggregates of multiple decision-making processes that generate designs and decisions pertaining to the way we organize our social and economic activities in space and time.” This is the definition we will use throughout the paper.

What is the city, then? Cities are us. Cities change over time in response to their environment, and the rate of change affects their ability to adapt, both socially and physically. People's expectations of cities change quickly, as does their need to move around. Infrastructure is slow and costly to adapt, furthering the mismatch. The processes by which we make decisions are also slow to adapt. Democracy, voting, the courts and the municipal approval process operate on long cycles.

Tools that once were helpful in managing change are made obsolete as the rate of change increases. The glacial pace of human evolution has struggled to keep up with the rapid technological change. We will address this in detail later. In the same way, Christopher Alexander explains how our cities could adapt to slow, methodical change. Add a storey to your house here, add another building over there, and the city would keep pace with social change. This is no longer the case, as digitization, new construction techniques, new social norms and mass migration change the fundamental parameters of cities in real time.

A city is a thing in motion, constantly shaping its network and in turn, being shaped by it.
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Broken Cities

"Cities have the capability of providing something for everybody,
only because, and only when, they are created by everybody."
Jane Jacobs, *The Death and Life of Great American Cities*

Our cities are broken, and our attempts to fix them have consistently failed.

We feel it intuitively. It seems like the only thing that everyone—from developers to communities, politicians to voters, rich to poor—can agree on is that the system is neither working as it should, nor for whom it should. Our cities do not seem to serve our needs. If they did, this project would not be necessary, nor would the countless conferences, working groups, councils or legislations focused solely on fixing the mismatch between expectation and reality in our cities.

If our cities reflect us, as they did not build themselves, then we are playing a part in our own misery. Our deeper human desires are ignored, except for fleeting moments, when we sense that there must be a better way for communities to live, love, work and play together. But how, exactly?

Before we can even hope to design a solution, we need to find and frame our problem. We need to pinpoint exactly what is going wrong, why, for whom and in what ways.

For as long as cities have been magnets for civilization and engines of culture and innovation, critics have lamented the inequality and division that inevitably come as part of the package. From Plato to Jane Jacobs to Sidewalk Labs, cities have always sparked worried commentary and hopeful speculation.

For better or for worse, cities amplify our individual proclivities, as peer pressure and social norms become more powerful in larger crowds.

To set the stage, we start by examining civic thinking to date, aiming to answer the following questions:

- How have cities evolved to date? (meaning physical cities themselves, our social relationships with them, and how our ability to alter our cities has changed).
- What problems do modern cities (including communities and collections of physically co-located people) face, and what is causing these problems?
- What are the dominant philosophies in urban planning today?
- What has been tried before, did it work and why or why not?
- What are the crucial questions we are not yet asking?

This section will leave us with many more questions than answers—and that is by design. We will cover a lot of historical ground quickly, summarize the key philosophical trends of our time, find the deficiencies in them, and put forth a set of guiding rules to address our current challenges with urban design to propose a ***new***, new theory of urban design, to paraphrase architect-philosopher Christopher Alexander.

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A Brief History of Cities

The story of cities, their evolution, and our place within them is a long one. Melvyn Bragg (2010) covers 10,000 years in three paragraphs.

> "The story of cities is widely held to begin in the 8th millennium BC in Mesopotamia. By 4000 BC, there were cities in the Indus Valley, by 3000 BC in Egypt, and by 2000 BC in China. What happened in the west was the furthest ripple of that phenomenon. In 1000 BC Athens still only had a population of one thousand. At its height, Athens' position as a powerful Mediterranean trading city allowed it to become the birthplace of much that would later characterize western cities, from politics through architecture to culture.
>
> Then, early in the first millennium AD, the world saw its first million-strong city: Rome. Maintaining a population of this size needed stupendous feats of organization and ingenuity. But in the following centuries, as Rome declined and fell, the city itself, in the west at least, declined too; power emanated from kings and their mobile courts, rather than particular settlements. In China, urban trading posts continued to flourish, but their innovative energy dwindled before the end of the first millennium.
>
> Between 1150 and the onset of the Black Death in 1350, the city underwent a resurgence in Europe. City-states developed in Italy and in Germany. At this stage, there was no omnipotent power-centre to match Ancient Rome. But with the growth of sea and then ocean trade, and the

> centralization of power in capitals ruling nation-states, cities like London, Paris, Madrid, Amsterdam, and St. Petersburg became increasingly wealthy, dynamic, and ostentatious. By 1801, one of these—London—finally matched Ancient Rome's peak population of a million. Along the way, the city had become an ideal to be revered and a spectre to be feared." (Bragg, 2010)

The history of cities is the history of inequality. On one hand, cities have been civilizing influences and engines of human progress. Aristotle and his contemporaries praised cities as the perfect environment for humans to express our full potential. On the other hand, cities have been great sources of corruption, greed, and vice. By their very nature they enhance our collective and individual characteristics, tempting our better angels like charity, collaboration and creativity, and our darker demons like corruption, rent-seeking, and power politics.

Many of the problems of urban planning have replicated themselves repeatedly. Many of the same mistakes continue to be made in cities today, creating inhuman streetscapes and inhospitable public spaces. Jane Jacobs' work would not be out-of-place in Roman times, where emperors routinely demolished neighbourhoods to make space for gaudy construction projects.

We have arrived at a fundamental mismatch between our abilities (i.e. the 30,000-year-old hardware that is the human brain) and our technologies (i.e. autonomous driving software). This combination causes a new blend of problems for us as individuals, and collectively as civil society, never faced by cities before. The rate of change has increased exponentially while the pace of our adaptation has stayed relatively constant. All the old challenges are there, only now they are amplified many times over with modern technology.

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What challenges do cities face today, and what is causing them?

Civic Challenges

This historic fracture and cause of many problems is best defined by Richard Florida as the "New Urban Crisis" (Florida, 2017). Florida argues that the challenges faced by cities today are different from cities in the 1970s. Cities faced 'white flight' to the suburbs creating rapid deindustrialization and rising crime as a result. Rising home prices and inequality were factors, but for exactly the opposite reasons of today's cities. See Fig. 1. Hollowed Out Cities."

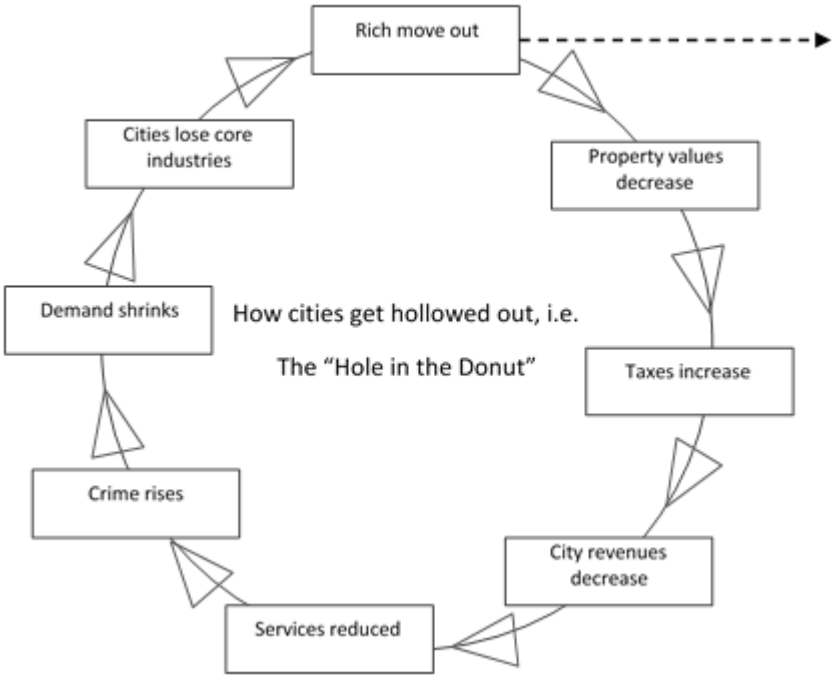

Figure 1 – The Hole in the Donut (Author's, based on work from Florida, 2017)

The New Urban Crisis is a far greater threat to cities because it is paradoxically a result of solutions to the problems of earlier decades.

Florida sees five key dimensions of the New Urban Crisis:

1. The increasing gap between "superstar" cities and the rest.
2. The "crisis of success" in these superstar cities, often called "plutocratization".
3. Growing inequality, segregation and sorting taking place in *all* cities, superstar and otherwise, creating a "patchwork metropolis".
4. The suburban crisis increasingly mirroring the urban crisis, often as result of the above.
5. Urbanization without growth in the developing world.

What drives these five dimensions? In Florida's estimation, it is "winner-take-all urbanism". A function of our supercharged globalized version of capitalism for which cities, as they are structured today, are unprepared to deal with. Simply put, cities "are not just the places where the most ambitious and talented people want to be—they are where such people need to be." (Florida, 2017, p.15). Florida says

the fifty largest cities produce 40% of the world's economic activity, despite being home to only 7% of the world's population.

This clustering causes downstream effects at the root of the rest of our major urban issues. Building on Thomas Piketty's landmark formula for inequality, r > g, (Piketty, 2017), illustrating the propensity for the return on capital to outpace the rate of overall economic growth, Florida zeroes in on premier real estate in superstar cities as the primary driver of this outsized growth, even more than equities and bonds. The Economist's Ryan Avent dubs these "parasitic cities", where "*landlords*, not corporate overlords… are sucking up the wealth in the economy." (Avent, 2016). As an extreme example, Florida states that as of 2015, the value of New York real estate totaled $2.9 trillion; or, about the same as the GDP of the United Kingdom.

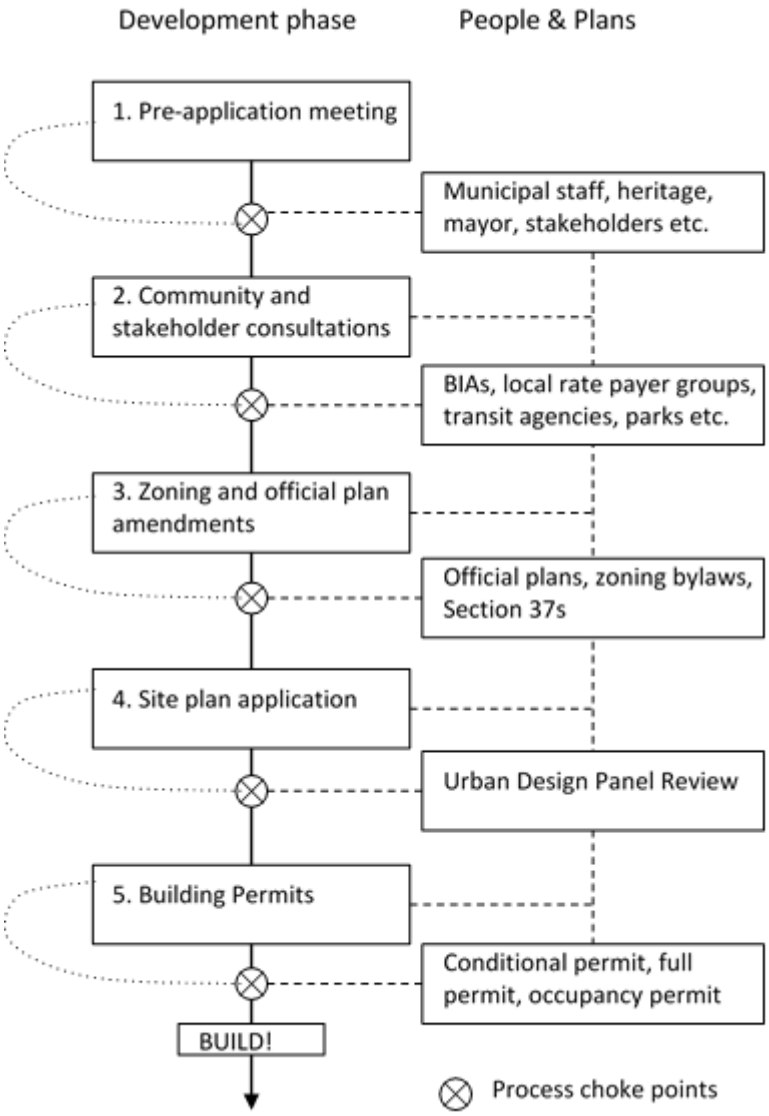

Figure 2 – The Complex Thicket (Author's, based on industry experience)

To paraphrase William Gibson, the value in cities is already here. it is just unevenly distributed.

This is not simply a matter of NIMBYism run amuck. It contributes to the problem, but is not the entire problem, as other commentators have suggested. Florida labeled the winners in superstar aggregator cities the "New Urban Luddites", people who have created "complex thickets" of zoning bylaws and other barriers to growth which serve to protect their investments at the expense of more inclusive growth. (Florida, 2017, p.27) See Fig. 2. "The Complex Thicket."

This is an important distinction to note when we come to addressing the problem. Real estate is becoming an investment product with market value decoupled from its *use* value. Though the underlying asset stays the same, the way we think can radically alter the way we behave in relation to it, causing all manner of downstream consequences. Real estate is particularly sensitive to this shift since it is one of the very few assets that are fixed in supply yet face almost unlimited demand.

The problem works in two ways. Not only are less affluent folks priced out of the neighbourhoods, but the "lucky" buyers of the expensive real estate are often "house-poor." They technically "own" a house, through a series of leveraged financial instruments (a.k.a. other people's money) but may not be able to afford to furnish it. Worse yet, they are unprepared for any slight jolt to the house of cards that is their debt and income. As one veteran real estate broker joked, "you can't eat a house." A system where even the "winners" lose is surely the mark of something gone wrong.

Florida shows that these problems are not limited to cities. Surrounding suburbs face many, if not more of the same forces driving inequality. Workers are priced out of the cities where they work. They move into the suburbs, enticed by cheap land, and in turn displace the existing residents. For this reason, I will use the term community to indicate a group of people in an urban or semi-urban environment. Cities are systems of multiple communities. Our unit of focus will be on the community, with the understanding that community level actions will bubble up and impact the city as a whole.

The Capitalist Class

With vast sums of wealth flowing to new-economy superstars in startups and tech giants, then in effect, is capitalism the root problem? Paul Graham, an outspoken and successful venture capitalist illustrated that inequality is a symptom, not the root cause of market-based economies. He readily admits that innovation clusters in superstar cities are "manufacturers of inequality", but says it is impossible to separate that outcome from the great benefits that the free allocation of capital has produced. "You can't prevent great variations in wealth without preventing people from getting rich, and you can't do that without preventing them from starting startups." (Graham, 2016) See Fig. 3. "Unaffordability Loop". This is a clue that we need to look outside urban design for answers to these knotty questions. It is also clear that we cannot stifle inequality without stifling cities, and vice versa. The assumption in this cycle is that neighbourhood community is desirable. That balance between residential, retail, parks and

markets, as well as social amenities and places to work is a good thing. Research in the next few sections shows that it is.

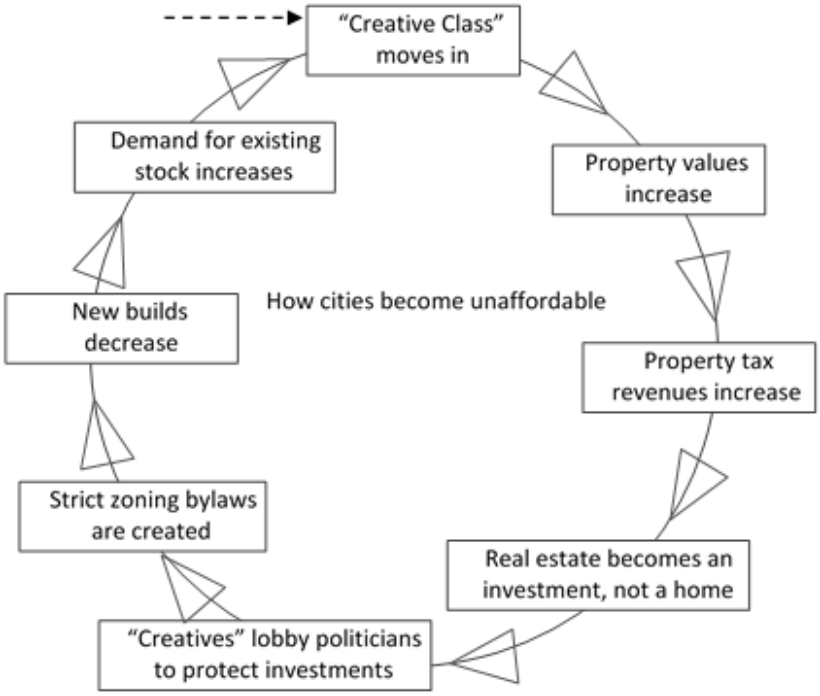

Figure 3 – The Unaffordability Loop (Author's, based on work from Florida, 2017)

Charles Montgomery takes a humanistic look at the mess we have created for ourselves in his book, *Happy City*. "Is urban design really powerful enough to make or break happiness?" (Montgomery, 2013). There is a paradox at the heart of this question, which reverberates from our city cores to our suburbs, and from our minds to our bodies. On one hand, we North Americans have never been wealthier, safer, fuller, or more entertained. On the other hand, in the same period, self-reported rates of personal and mental problems have risen to all-time highs, (Faris, 2012) obesity is skyrocketing (Statistics Canada, 2001) and trust of our neighbours is at an all-time low. (Zlomislic, 2009)

What is driving this? Montgomery's research shows that we have created a "hedonic treadmill" in structuring our cities the way we have. "Too many rich societies have used their wealth in ways that exacerbate urban problems rather than solve them." (Montgomery, 2015, p.12) We keep giving ourselves more of what we *think* we want (gated suburban communities, freeway lanes) at the expense of what we *need* (social interaction, walkable communities).

Humans have trouble assigning correct values to the factors that truly affect our lives. This is why people in landlocked, cold, Midwestern communities are just as happy as coastal, sunny Californian compatriots, despite expectations to the contrary. According to a large-scale study, "Judgments of life satisfaction in a different location are susceptible to a focusing illusion: Easily observed and distinctive differences between locations are given more weight in such judgments than they will have." (Schkade and Kahneman, 1998)

We keep creating the problems we are trying to solve. Montgomery outlines two predominant philosophies of urban planning at the turn of the nineteenth century. These two schools of thought sprung forth as an answer to the horrid conditions of inner cities. Slums in London and New York City in the late 1800s were so bad that one commentator wrote at the time that, "it was almost a matter for

congratulations that the death rate among the inhabitants of these tenements is something over 57 per cent." (Montgomery, 2015, p.64)

The first was *separation:* dividing distinct functions of a city, for example residential, commercial, and industrial areas. The second was *speed:* building exit routes for people to get out as fast and as far as possible, and to move between work, life, and recreation, entertainment, and so forth. Both schools of thinking left an indelible legacy on our cities today: strict zoning bylaws on one hand and massive arterial freeways on the other.

Their legacy is one of rent-seeking, racism, and subsidized suburban sprawl. (Montgomery, 2015) Urban planning has become such an insidious and entrenched power that we do not even realize we are told what we can do, and where. "No housing on employment lands or employment on housing lands" we are told. "Industrial over there, entertainment over there, and light density commercial over here." Easements, eminent domain, and eternal ground leases are the invisible bonds keeping us tethered to a reactionary and outdated set of planning rules.
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Civic Solutions

If we can agree that the state of our communities today is less than ideal, surely there is some light behind the clouds. Proposed solutions come in two flavors: changes to how we think and changes to what we do.

Jane Jacobs was a fierce critic of poor city planning, but she also dedicated as much, if not more, attention to how we might solve for it. In the last chapter of *The Death and Life of Great American Cities*, Jacobs takes a systems thinking lens to figure out "the kind of problem a city is." Though it only gets a few pages in a 500+ page book, she was far ahead of her time and the idea deserves our attention (it is more impressive since her sophisticated systems ideas predated Jay Forrester's system dynamics, one of the fathers of formal systems thinking.) She argues that we need to understand exactly what type of problem we are dealing with when we talk about cities and in fact, we have been using the wrong mental strategy all along, actually causing many of the very problems we tried to fix.

> "Cities happen to be problems in organized complexity, like the life sciences. They present situations in which a half-dozen or even several dozen quantities are all varying simultaneously and in subtly interconnected ways. Cities, again like the life sciences, do not exhibit one problem in organized complexity, which if understood explains all… The variables are many, but they are not helter-skelter; they are interrelated into the organic whole." (Jacobs, 1961, p.564-565)

No solution will be successful unless it takes this deep system view of the wicked problems that face cities today. In many cases, the best first step in approaching a systemic problem is to do the exact

opposite of what you think you need to do. Paradigm shifts are the longest-lasting and most impactful leverage point, according to Meadows (2008), but also the hardest to achieve.

Reframing the type of problem a city is will help us to see a completely new set of tools, issues and questions in our design of a solution (paradigm shifts can also work in the opposite way, as with housing-as-habitat vs. housing-as-investment.) Batty's definition of a city as a collection of individual, self-interested interactions shifts our paradigm towards complexity.

There is an irony with cities and systems. Most people in casual conversation can correctly sense that a community is a complex social organism with interlaced nodes and emergent properties. Yet, in trying to 'solve' its problems (the first clue to a misguided approach), is that they adopt a limited mechanistic view of the community as a series of levers, inputs, and outputs, land use, rent, GDP and property tax.

This is how we get very clever people doing very clumsy things at the planning office. It is hard to blame them. They are given low-leverage tools and expected to move mountains.

A thriving community cannot be planned top-down any more than a lush coral reef can. There is no greater advocate for the systems approach to urban design than philosopher/architect Christopher Alexander.

Alexander takes the torch from Jacobs in his rules-based approach to urban design. In *A New Theory of Urban Design*, his philosophy is based on the idea of a growing whole, rooted in a series of nested 'centers'. Alexander boils his philosophy down to one rule: "every new act of construction has just one basic obligation: it must create a continuous structure of wholes around itself." (Alexander, 1987 p.22)

Urban theorist Sarah Perry elaborates on Alexander's work and how it might apply both to our cities and our lives; which, as we are learning, are inextricably linked. In her piece on "deep laziness", an exploration of nature's preference for the path of least resistance, she explains that "structure-preserving transformation" does not impose arbitrary (conscious, legible) order on the system, but takes its cue from the existing structure, and elaborates and strengthens it." (Perry, 2017)

Here Perry and Alexander both agree that truly holistic, beautiful, and human-centered urban design and architecture must take cues from nature. And nature, in its own way is deeply lazy. It slowly iterates

on itself, spending as little energy as possible, and never imposing a grand vision on subsystems. See Fig 4. “Centres and Wholes”.

This view is at odds with mainstream public planning doctrine today. In Alexander’s view, the “city” as we know it, is merely an emergent property of the system that enables the “unfolding of wholeness”, rather than the realization of an existing vision. This is a hint that the problem may not be that the process is broken and needs fixing; but that this is not a formal process to begin with.

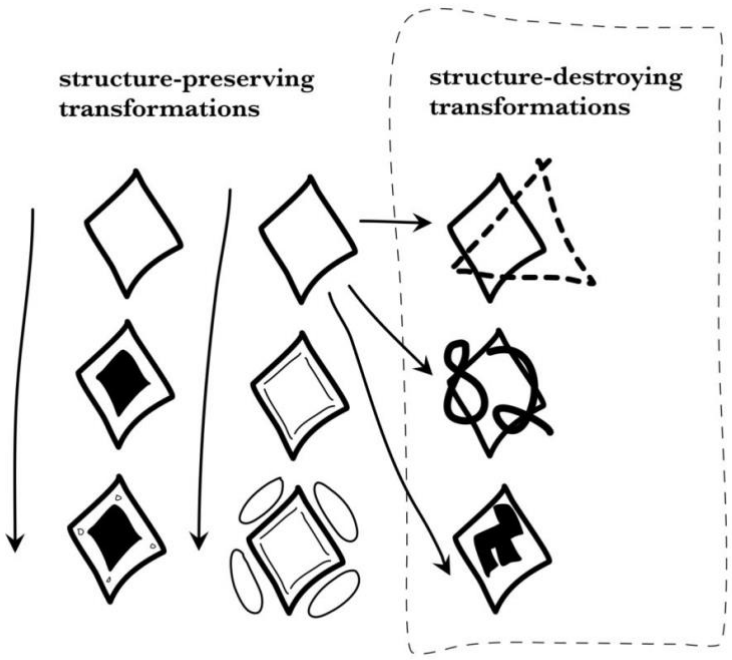

Figure 4 – Centres and Wholes (Perry, 2017)

The distinction is in contrast to Richard Florida. Florida wants to change what we do. In a *mea-culpa* to his earlier books, which some feel caused urban inequality and gentrification, Florida posits seven policy pillars for city officials to adopt: (Florida, 2017)

1. Reform zoning and building codes, as well as tax policies, to ensure that the clustering force works to the benefit of all
2. Invest in the infrastructure needed to spur density and clustering and limit costly and inefficient sprawl
3. Build more affordable rental housing in central locations
4. Expand the middle class by turning low-wage service jobs into family supporting work
5. Tackle concentrated poverty head-on by investing in people and places
6. Engage in a global effort to build stronger, more prosperous cities in rapidly urbanizing parts of the emerging world
7. Empower communities and cope with the challenges of the new urban crisis.

Florida’s approach is much more socially- and policy-focused while Alexander’s does away with top-down planning altogether. Many of Florida’s proposals need huge investments of time, money, and political capital. Even if legislation were put in place, the underlying values systems would need to be updated to ensure the “right” people end up in these houses and jobs. What is fair and ethical is an open question that prescriptive planning cannot solve by itself.

Florida's prescriptions also fall into the trap of assuming people act in idealized ways. Any solution that starts with "if only people would..." ignores the realities of human nature and is likely to fail. We must design for who we are, not who we aspire to be. We also need to consider other factors beyond the mere design of cities. Florida champions cities for their ability to drive economic gains through productivity growth in the knowledge sector.

There is more to the story than GDP. There is a difference between cost and value. We need to consider the human factor of our communities. Social interaction was the original magnet that drew us together in the first place; economic growth was an emergent quality of a healthy group of people motivated to create meaningful and valuable items for each other. It is a mistake to reverse the causal order.
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Where does this leave us?

We moved fast over 10,000 years of history, psychology, urban design, and economics. There are five lessons here, with a comment and an implication for each.

1. Cities and inequality are hard to separate.
2. Urban Planning may be focused in the wrong areas.
3. Our future lies in systems, not goals.
4. Big thinking causes big problems.
5. Humans are predictably irrational.

We will start by describing how and in what ways cities are not meeting the needs of their inhabitants and creating downstream problems for everyone else. We will look at the history of cities, the five big challenges they face and the five types of solutions trying to address them. And why none of them have worked.

Lesson 1: Cities and inequality are hard to separate.

Cities have always balanced civilization and corruption. On one hand cities allow humans to express our fullest potential, on the other hand, they exasperate inequality and power—they go hand in hand and you cannot have one without the other. Separating the two would be an attempt to separate human nature, never a productive project.

In short, cities evolved from villages to towns to cities where people now are doing something other than growing food. With that comes improving fresh water and cycling out waste material. As infrastructure develops and more people move to the city, we can afford to increasingly specialize in certain tasks. And with that specialization, certain leaders emerge in each field, allowing them to

command higher prices and reinvest in their own productivity, which widens the gap. This is not a new process. To quote Paul Graham again, speaking on the propensity for technology to drive differences in ability and thus inherent inequality,

> "While the surface manifestations change, the underlying forces are very, very old. The acceleration of productivity we see in Silicon Valley has been happening for thousands of years. If you look at the history of stone tools, technology was already accelerating in the Mesolithic. The acceleration would have been too slow to perceive in one lifetime. Such is the nature of the leftmost part of an exponential curve. But it was the same curve. You do not want to design your society in a way that is incompatible with this curve. The evolution of technology is one of the most powerful forces in history." (Graham, 2016)

Cities drive productivity, which drives technology, which improves progress, and inevitably, inequality. Will and Ariel Durant note that over the course of our millennia of civilization, inequality is the natural state of things. Extreme inequality in society grows until it is reversed through reform or revolt. But the respite is only temporary as the underlying forces which sort talent, drive and ability will continue to work. Without inequality, there is no progress.

Takeaway: what if instead of trying to end inequality, we harnessed it as a force for progress?

Lesson 2: Urban Planning may be focused in the wrong areas.

Today, most major cities see rampant inequality driven by a flight of the elite to superstar urban centres. The resulting suburban sprawl leaving the rest of us disconnected, disoriented, and disillusioned with our community. Yet there is no shortage of white papers on bike lanes, conferences about proper building setbacks, and focus groups on employment land use amendments to secondary plans. Alexander nicely sums up the tragic-comic scenario:

> "The welfare department is trying to build houses at low cost to help poor families. The Department of Transportation is trying to speed up traffic flow in the city. City officials are concerned with keeping disparate functions separate by means of zoning ordinance. The officials behind the counter are trying to follow the rules strictly so that they will not lose their jobs. House owners are trying to keep their houses in good order. Landlords are trying to make as much money as possible from their rents, and to spend as little as possible to get it. Sierra Club members are trying to make sure that nature is respected in the city." (Alexander, 1987 p.20)

This would read as a Laurel and Hardy-esque comedy of errors if it did not have such real implications on millions of people around the world. See Fig. 5. "Urban Planning and Its Discontents". We need to

rethink our focus on getting public planning policy and process right. It begs the question if the process itself is the problem.

Not in that it needs fixing, but that it should exist at all.

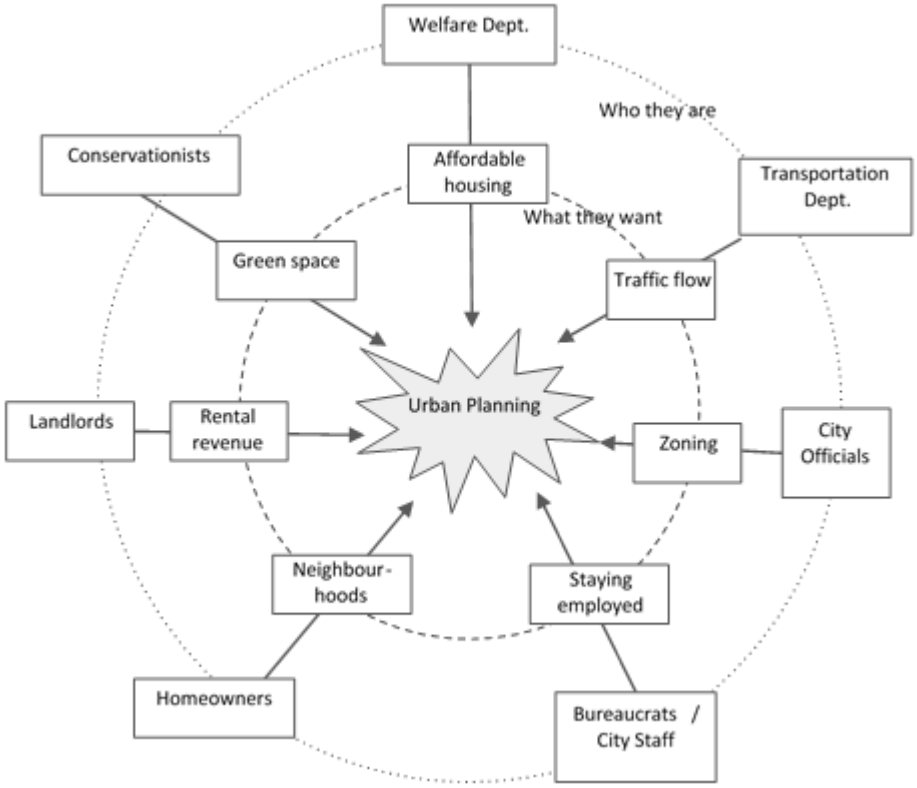

Figure 5 – Urban Planning and its Discontents (Author's, based on work from Alexander, 1987)

A team of researchers at OCAD's Visual Analytics Lab, for the iCity project, mapped out many of the large downtown development project heights over the last years which were granted exemptions from zoning ordinance, compared to those found to be within the guidelines, only to find that the exceptions outweighed those within the height

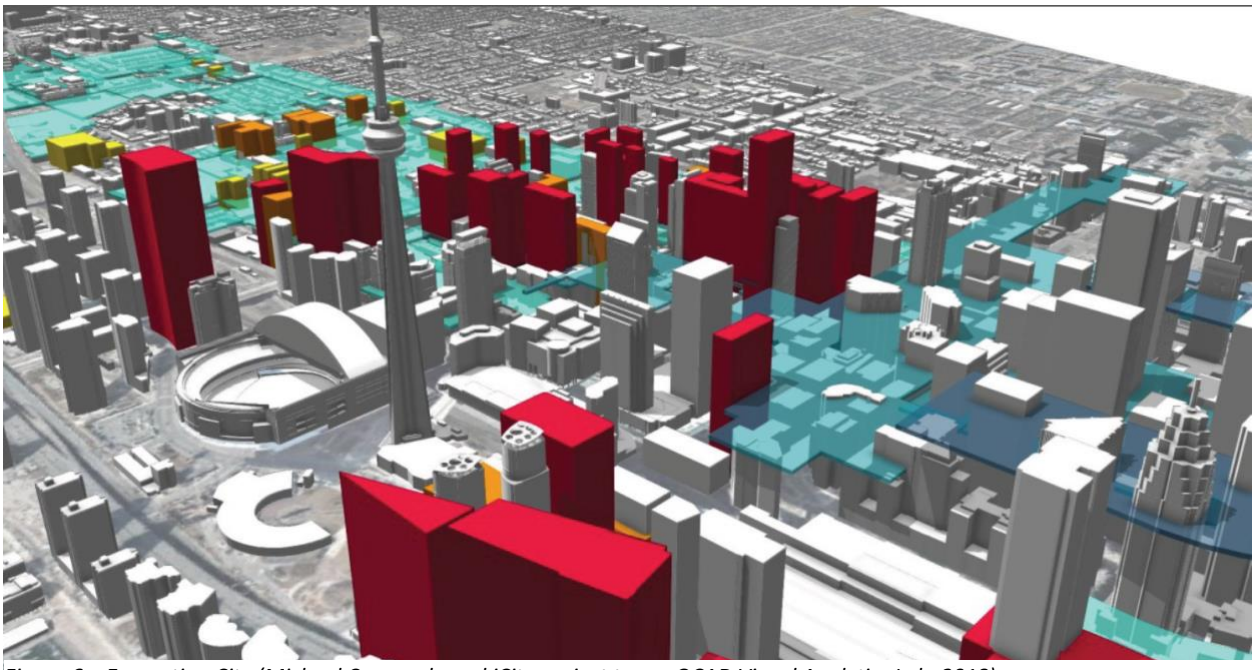

Figure 6 – Exemption City (Michael Carnevale and iCity project team, OCAD Visual Analytics Lab, 2018)

envelopes. See Fig 6. “Exemption City” (Michael Carnevale and the iCity project team, OCAD Visual Analytics Lab, (2018))

The exceptions are the rule. Current urban plans impose order at the expense of livability. Architect Jan Gehl has made a career of quantifying livability as ‘cohesive organic feelings.’ He sees urban spaces, makes human-friendly adjustments, and revisits again to make changes. He would define a cohesive organic feeling as the way people interact, stand and chat over a ledge, play chess, feed the birds, and operate freely and in concert with the built environment. Even then though, with the exceptions being the rule, traditional urban planning fails us, hence the opportunity for Gehl to make a career out of fixing broken spaces, usually in modern North American “masterplanned” cities, with solutions normally based on old European “unplanned” towns.

Takeaway: what if we ended top-down land use guidelines? What would we use in its place?

Lesson 3: The future lies in systems, not goals

According to Alexander, “the task for creating wholeness in the city can only be dealt with as a process. It cannot be solved by design alone, but only when the process by which the city gets its form is fundamentally changed.” (Alexander, 1987) Jamshid Gharajedaghi can illuminate our path here. In section 4.2 of his book, Systems Thinking, Gharajedaghi takes an explicit system view of development. Gharajedaghi is talking about development in a broad sense, though his theory applies to our specific frame of real estate development. For him, the development of an organization (of which our communities most definitely are) comes from the careful balance of *differentiation* and *integration.*

Differentiation is artistic and stylistic, trends towards complexity and looks for differences among similar things. *Integration* is scientific and measurable, trends towards conformity and looks for similarities in things that are different. As we will see below, examples of Houston and Brasilia represent the two ends of the spectrum, respectively. That said, if you lean too far to one side, you end up with utter chaos or complete impotence. (Gharajedaghi, 2011) See Fig. 7 “Development Balance”

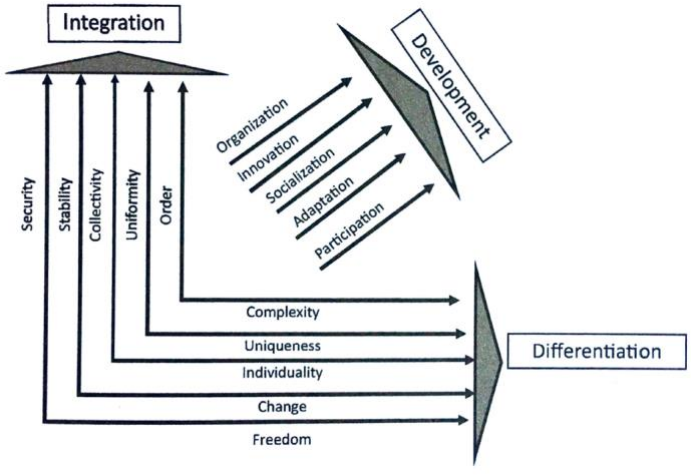

Figure 7 – Development Balance (Gharajedaghi, 2011)

Striking a balance between the two to achieve long-term sustainable community development requires us to understand the roles of *desire* and *ability*. A system must account for, and grant, expressions of both for the system to thrive. Desire exists when there is a shared and exciting vision for the future. People want to be a part of it and are willing to act to get there. Ability exists when people have the means to act, control or influence the conditions of a system, and its ability to achieve the goals.

In a thriving system, these two are perfectly aligned, but it is not hard to imagine a scenario where both exist but are not compatible. From a political standpoint, there is dictatorship, Venezuela for example. The leaders paint wonderful visions of the future. The desire for utopia is strong. Citizens are technically allowed to "vote" though their ability to influence is slim. Conditions of day-to-day life are grim, with food shortages, rampant inflation and mass out-migration. (Specia, 2019)

Conversely, in a western democracy, take Ontario's recent election, the ability to vote and change the outcome is quite high. And though each of the parties has their own vision for the future, none of them are universally desirable, which drives apathy. Yet conditions of day-to-day life remain some of the best in the world, relatively speaking. (Economist Intelligence Unit, 2017)

Gharajedaghi says knowledge is the solution. In physical systems, energy determines the state of the system. The most basic example is water. Add energy (heat) and water becomes steam; remove energy (cold) and it becomes ice. Each state of water has different properties. In the same way, knowledge determines the state of social systems. "The significant point is that knowledge, unlike energy, is not subject to the first law of thermodynamics. One does not lose knowledge by sharing it with others. On the contrary, its dissemination increases the knowledge level of the social system and helps increase the creation of new knowledge. It is this capability that enables a social system to constantly re-create its structure and redefine its functions. (Gharajedaghi, 2011, p.75) For us, this means that our urban design systems must prioritize the increase and spread of knowledge about the community, its development proposals, and their impacts.

To close this section off, we should note the intentional use of 'development' over 'growth'. Growth is central to many current municipal paradigms. Growth in jobs, growth in population, growth in GDP. As a resident, I recently took part in a survey to pick the title of the City of Burlington's 2040 Strategic Plan. The winning name? **Grow Bold.**

When the growth paradigm is baked into the language of municipal urban thinking, no wonder urban sprawl is king, and we might seriously consider paving over the green belt. Russell Ackoff has this to say on the difference between growth and development:

> "They are not the same thing and are not even necessarily associated. Growth can take place with or without development, and development can take place with or without growth. A cemetery can grow without developing. On the other hand, a person may continue to develop long after he or she has stopped growing, or vice versa. A person can build a better house with good tools and materials than he/she can without them.

> On the other hand, a developed person can build a better house with whatever tools and materials he/she has than a less developed person with the same resources. Put another way: a developed person is likely to be able to improve his quality of life and that of others more than a less developed person with unlimited resources. Constraints on a system's growth are found primarily in its environment, but the principal constraints on a systems development are found within the system itself." (Gharajedaghi and Ackoff, 1984)

We cannot hope to build thriving communities without considering how to develop the people within them. Therefore, this system needs to create active, engaged citizens who can then decide the desired states of their own communities, rather than accepting governance from the top down.

Cherish the day when **Develop Dynamically** becomes our common community rallying cry!

> ***Takeaway: what if we created a bottom-up, rules-based system to guide and govern city building? What or who would be the arbiter of the 'good'? How can the system prioritize development over growth?***

Lesson 4: Big thinking causes big problems.

This insight follows from the earlier one. It is also an uncomfortable and inconvenient truth for anyone trying to enact momentous changes to social systems. What if all our big and well-intentioned plans were hampering our ability to create livable neighbourhoods? What if by prioritizing growth, progress, and equality, we move further away from it with each sweeping reform? What if our provincial and federal governments are all but useless in helping cities fix themselves? The *Globe and Mail*'*s* International Affairs columnist Doug Saunders sums up our predicament:

> "From Beijing to Sao Paulo to Surrey BC, cities are facing challenges created by building forms that might have appeared utopian when they were built in the post-war decades. Wide courtyards and grassy expanses between apartment buildings were meant to be peaceful places removed from inner city crowding. Winding streets and parking lots envisioned a car centered life. Strict zoning meant that residential towers would be separated by wide spaces from commerce or industry. Suburban apartment tower neighborhoods and garden city low rises have, by design, relatively low population densities, usually too low to support mass transit. From these empty gaps flowed a suite of urban crises.
>
> When people do not want to leave their building—and when customers are afraid to visit the little shop they have opened—then they have become stuck, not just physically, but economically, socially and culturally. As cities in Europe and Latin America have discovered, these forms of isolation can lead to intergenerational poverty, educational exclusion, segregation, crime and sometimes extremism." (Saunders, 2018)

As the saying goes, all politics is local. It is a durable truism for a reason. People care more about potholes and school closures down the street than they do about tax reform or research agendas across the country. Rightly so. A gleaming office building will not do workers much good if they must brave two hours of grinding traffic to get there. Nor will a beautiful park be of much use to people who have no time to use it. Thinking small can counterintuitively address big issues. This is doubly true when dealing with where and how people live.

> ***Takeaway: what if we stopped all broad sweeping initiatives and instead ran on the smallest unit of human-environment interaction?***

Lesson 5: Humans are predictably irrational.

Cities can be great engines for happiness but cannot have happiness imposed upon them through design. Cities must be given a set of rules and parameters to design for themselves, neighborhood by neighborhood, the types of encounters it looks to produce. Repeatedly we have seen well-intentioned urban planning decisions meant to foster happiness do the exact opposite.

According to developmental psychologist Carol Ryff, happiness is an emergent property of human striving, challenge, failure, and success. It is far more than mere contentedness. “It’s about getting up every day and working very hard towards goals that make your life meaningful, sometimes in ways that are not all conducive to short-term contentment.” (Montgomery, 2013) Ryff calls this deeper form of happiness, *eudemonia,* and includes the following characteristics:

- Self-acceptance, or how well you know and regard yourself
- Environmental mastery, or your ability to navigate and thrive in the world
- Positive relationships with others
- Personal growth throughout life
- Sense of meaning and purpose
- Feelings of autonomy and independence.

Hold on a second, what does ‘feel-good’ self-help have to do with theories of urban design? Everything! Ryff has correlated this state of “challenged thriving” to many beneficial health outcomes, and as we have seen from Montgomery, Ellard and others, our cities can make or break our sense of self-worth.

Perversely, we have focused on promoting happiness by stifling or ending the very struggles that creates it. We see this in urban planning with large projects (prioritizing the Gardiner Expressway and the three minutes it saves on a commute from Scarborough at the expense of the future of the waterfront, for example) and with small projects (removing all but the dullest and safest playground equipment at the local park to reduce incidences of scraped knees at the expense of resilient, active kids.) We see it in

designing streets hostile to biking and walking, literally driving everyone towards their personal automobiles

The problem is that these changes occurred through the democratic process. We did this to ourselves.

There is an opportunity to nudge a system towards the best conditions for human thriving. However, the system must be designed as such that if someone really wants to do the 'wrong' thing, they can, given the impacts on others are priced-in, managed and accounted for. People must be able to make mistakes and be accountable for the consequences.

Humans are predictably irrational; *however,* we are also fundamentally self-interested in our own survival. However, we can make it easy to act in our own self-interest (to inspire action) and make being self-interested good for the system (to inspire change).

Now, for the ultimate in counterintuitive thinking. What if, in search of a cohesive vision for a building or a site, we let go of the controls completely? This involves an elevated level of trust in the system. This rule incorporates the earlier four rules. Implicit in it is an understanding that by doing the little things right, over and over, the result will be something more than usable. It will be deeply connected to our psyche and thus a true instantiation of the full promise of urban design. Like an old farmhouse, whose features and functions have been iterated and expanded over decades, growing and adapting to its inhabitants use, feeling uniquely 'warm' and 'right' in a way that could never have been blueprinted from the start.

Poetic as always, Alexander says that by letting go of the big master-planned vision "you merely become the vehicle, the medium, through which the demands of the site speak... But, to the extent that you can listen to what the project in its totality is calling for, you will produce something far more wonderful than anything you could dream of by trying to be original." (Alexander, 1987)

Takeaway: what if we discarded traditional metrics of growth? What would we measure?

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What if? Comparative Case Studies

We asked five 'what if?' questions. Now, another: what if we had some real-world case studies of what has happened in similar experiments around the world? What if the 'what if's' had concrete answers? In this section, we will look at several new attempts to re-think urban design challenges. We will look at how and why they have yet to succeed and finally, outline several rules that we can use to build a better solution.

1. What if instead of trying to end inequality, we harnessed it as a force for progress?

The purest example of unfettered free markets in action is our stock market, underpinned by the fundamental rules of capitalism. In pure capitalism, the market is the best and most efficient allocation of resources. Capital and labour flow to the best opportunities, while bankruptcy is a natural and positive reallocation of resources. However, as Piketty and others have shown, the rate of return on capital outpaces the growth rate over a long enough period. Inequality is a fundamental feature of capitalism because of the power of compound interest and the lack of a “reset” button.

The “reset” mechanism is an ancient idea which seems to have been lost in a “too big to fail” monopoly world. Ancient Christian cultures regularly practiced “jubilees” or debt forgiveness. The book of Deuteronomy (c. 650 BC) outlines rules for regular breaks from work and debt. The book calls for a break on every seventh day. In a great example of nested systems, “there is another injunction for a sabbath year every seventh year, in which people are to not work and on the year after the seventh of those sabbatical years , i.e. the 50th, (one year after the 49th) there would be a jubilee year during which any slaves would be emancipated and everyone would return to their land and family to live off of natural providence.” (Gordon, 2013)

This is equality “via negativa”; the absence of debt. But what if we could flip the model on its head and consider a mechanism whereby every year, populations were given a fresh set of tools to enact change in the world around them? We would call this “democracy” and the tool would be a vote. But each person only gets one vote, and the vote is only good for one issue, on a specific day. It would be like getting a gift card that could only be used on left handed golf clubs, at a specific store, only in August. Great, if you are passionate about the sport and can use the club; not so great if you play tennis or are right handed. Cash would be preferable. How might this fungible vote work in real life?

Enter Quadratic Voting. “Individuals pay for as many votes as they wish using a number of "voice credits" quadratic in the votes they buy. Only quadratic cost induces marginal costs linear in votes purchased and thus welfare optimality if individuals' valuation of votes is proportional to their value of changing the outcome.” (Lalley and Weyl, 2017)

In quadratic voting, voters are all issues a set number of credits at the beginning of the year. Rich or poor, everyone gets a pre-set amount, which levels the playing field and gives everyone equal voice. It ‘costs’ one credit for one vote, two credits for two votes, four credits for three votes, eight credits for four, sixteen for five, 32 credits for six votes and so on, with each incremental vote costing exponentially more credits. This ensures that people passionate about, say, zoning variances, can spend a lot more credits in fighting or supporting a policy, and can spend less on less relevant topics. It is a radical approach to democracy with massive implications for the rest of this project.

The lessons are that civic engagement can be completely reimagined with this mechanism. It gives citizens more skin in the game, and once we imagine tying allocation of vote credits to the performance of recent real estate developments, a whole new world of solutions is available to us. The future will be market-driven, but in an entirely unique way than today. Although this was not the sole focus of this MRP, there is an opportunity to bridge the conversation here and bring in experts on civic engagement.

2. What if we ended top-down land use guidelines? What would we use in its place?

James Scott wrote in *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (1998) how many grand, master-planned solutions failed because the 'state' imposes systems that are convenient for the state, not necessarily for the people. The state serves to create solutions that are 'legible' to it, for example standardized census data to tax and control the people, or grid-layout street patterns to ease mapping.

Planning tends to perpetuate itself. Once it is an institutionalized process, further efforts to streamline itself result in more entrenched planning processes, less flexibility. The result is that planners have an easier job and thus can justify their strictness as good for the entire system, regardless of the real-world impacts. When all you have is a hammer, every problem looks like a nail.

No discussion on the relative top-down power of urban designers is complete without two opposite and extreme goalposts: high modernist master planning on one side and libertarian deregulation on the other.

This first is Brasilia, the city that sprung up from the jungle, choreographed by architect Oscar Niemeyer in the 1950s. It was designed from the ground up, as a workers' paradise and the new state capital of Brazil. It was immaculately conceived and impeccably planned, right down to the spacing of the trees. Row after row of gleaming, identical apartment blocks would house the workers. They would all overlook vast gardens, all the better to contemplate the state's magnificence. From a bird's eye view, the city was designed to look like, well, a bird. From an urban design standpoint, it was a masterpiece.

"There was only one problem. The residents hated it. They grew disoriented by the sameness. The drab apartment blocks stifled inspiration. And the vast grassy gardens grew into disrepair. It turns out that people appreciate a bit of spontaneity and randomness in their day. This general malaise even has its own local slang: Brasilia-itis, or the affliction of "living without the pleasures—distractions, conversations, flirtations, and little rituals—of outdoor life in other Brazilian cities." (Holston, 1989)

In stark contrast to Brasilia, we have Houston, Texas. Houston is one of the least regulated cities in North America. The self-described "city with no limits." It is a sprawling expanse where land is cheap, and developers are untethered from the surly bonds of zoning. But it is not the free-market paradise it

might seem. According to Florida, it consistently ranks alongside New York, Los Angeles, and San Francisco in indicators of the New Urban Crisis, "[Houston's] housing is rather expensive compared to that of most other metros and Houston suffers from among the highest levels of inequality and segregation in the country." (Florida, 2017, p.1920)

The consequences of Houston's freewheeling land development came into sharp focus during Hurricane Harvey in August 2017. Record-breaking rainfall caused at least 22 deaths and flooded 30 percent of Harris County, where Houston is located. According to city officials, the extensive flooding was caused by a combination of chronically lax regulation, public opinion, and underinvestment in flood-relief infrastructure.

"Over many years, officials in Houston and Harris County have resisted calls for more stringent building codes. Proposals for large-scale flood-control projects envisioned in the wake of Hurricane Ike in 2008 stalled. City residents have voted three times not to enact a zoning code, most recently in 1993." (Boburg and Reinhard, 2017) A Washington Post investigation showed over 7000 buildings constructed on a "100-year" floodplain since 2010. One expert says many of these buildings should have never been built, and worse, the investments in protecting those homes were never made.

> "Houston is the Wild West of development, so any mention of regulation creates a hostile reaction from people who see that as an infringement on property rights and a deterrent to economic growth," said Sam Brody, director of the Center for Texas Beaches and Shores at Texas A&M University. "The storm water system has never been designed for anything much stronger than a heavy afternoon thunderstorm." (Boburg and Reinhard, 2017)

The question is not one of free market vs. government intervention. Too much or too little thought to the big picture is problematic. What good is a perfect city if no one wants to live there. What good is a libertarian city if no one *can* live there? Rather, our question is about exchanging planning for rules in guiding urban design and development.

As Alexander puts it, "even if we leave money and profit aside, it is still clear that the decision usually taken is one which looks inward, only to the good of the individual piece of land and does not look outward... to seek the good of the surrounding city.... This is not because motives are selfish...most actions are governed by concepts, by ideas of what may be good." (Alexander, 1987)

Our issue is not with all regulations. "Planners have a crucial role to play in the development of cities, in particular the development of their infrastructure. However, it must be clear that allocating land and floor space in specific locations is not their role." (Bertaud, 2018, p.28) Our intent is to focus on the right things and not try to control the things which are uncontrollable.

3. What if we created a bottom-up, rules-based system to guide and govern city-building?

Up to this point we have been hard on cities in general and Toronto specifically. We must give credit where it is due, and Toronto is the source of some new street-level initiatives. Toronto's Complete City Streets Guidelines (CCSG) were developed between 2014-2016 to encourage "complete streets". "Complete streets" are safe for all users: people who walk, bicycle, take transit or drive, and people of various ages and levels of ability. They also consider other uses like sidewalk cafés, street furniture, street trees, utilities, and storm water management." (Toronto, 2016)

The CCGS is extensive and exhaustive in recommending everything from specific sidewalk widths for pedestrians with strollers (0.9m) or shopping bags (0.7m+0.3m), to crosswalk signal timing for students (0.6m/s), and transit queue jump lanes. It is bottom-up in the sense that they start at the smallest unit of city-building and work upwards.

There are several rules that guide each element of a street (16 types in total), while several more rules for each use overlay on those streets (movement, placemaking, and "additional context.), and several more again for the various street users (bikers, pedestrians, transit etc.) The CCSG is laudable in its aim. The benefits of human-friendly streets are clear and verifiable. According to the city:

- "Complete streets encourage people to walk, bicycle and take transit. These modes correlate to better physical and mental health outcomes for people of all ages. Complete streets are also safer, reducing the chance of injury or death.
- Beautiful and safe streets make for desirable cities with a high quality of life. Businesses want to locate and stay where streets are attractive. Residents put down roots where they can walk and bike or socialize with fellow street users.
- Complete streets support a better balance between motorized travel and other uses, including more space for trees, which contributes to healthier air, lower summer air temperatures, more shade, and better stormwater management. This also makes our city more resilient to the effects of climate change." (Toronto, 2016)

Toronto is not alone in its pursuit. Over 700 municipalities are working on similar guidelines and sharing their lessons in global conferences. If our issue was a lack of thoughtful "outside in" rules and guidelines, CCSG would be the holy grail.

See Fig. 8. "Complete Streets".

However, for all the impeccable research and recommendations the CCGS afford, they still work within the traditional city-planning mindset where there is an 'objective' best street which can be planned for and executed. The idea for complete streets, in Toronto's Official Plan, was adopted by the City Council in August 2014, after in-depth public and stakeholder consultation.

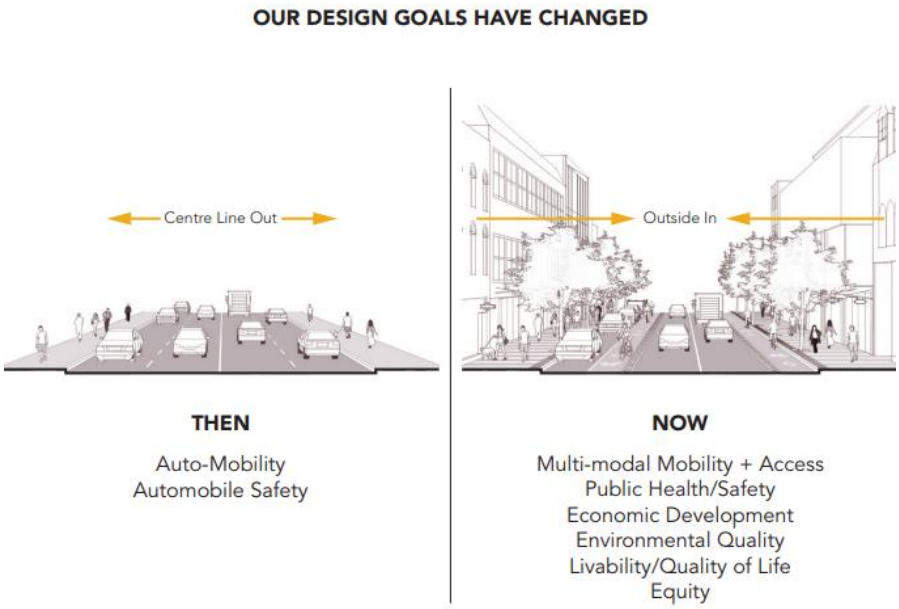

Figure 8 – Complete Streets (Toronto, 2016)

There are two problems with this.

The fact that this is part of the official plan is the first clue to the paradigm behind it. These rules are ideals, which could not exist if taken literally and all at once. There does not seem to be an overarching rule which overrides all others, as in Alexander's rule that any new addition must 'heal' the spaces it inhabits. The rules are prescriptions in disguise. The biggest hidden assumption is that there is a clear delineation between 'sidewalk' and 'street'.

A true rules-based approach would recommend that, for example, "the sidewalk takes precedence on any street, and may widen as and when needed to accommodate the volume of pedestrians". This produces a radically different result than the 0.9m prescription for individuals with mobility devices. The planners had the right idea but sandbagged the execution in the comfort of quantifiable guidelines.

The second issue is, as we have seen with exemptions, any guidelines that do not "bite" are just that: guidelines. There is no mechanism to incentivize adherence to the designs nor discourage blatant disregard for them, and any mechanism which is not tied to its surroundings is bound to produce a disjointed result.

Rather than prescriptive sidewalk widths, planning principles should promote the greatest flows of people, traffic, data. That is to say, the lifeblood of cities. (Batty, 2018 p.118) There might be multiple ways to do this, many of them not novel or innovative. Let creativity reign!

4. What if we stopped all broad sweeping initiatives and instead used the smallest unit of human-environment interaction?

Where big ideas have failed, small solutions have won the day. In neighbourhoods from Mexico City, to Amsterdam and Toronto, communities are thinking about small changes to the common spaces between buildings. These spaces, like Slotervaart, Amsterdam and Park Forest, Toronto, not only become havens for crime, but also extremism as many new immigrants live there. Lacking safe spaces to socialize, they turn to outlets for their alienation. Toronto has a legacy of over 2000 large apartment blocks with desolate spaces in between, the so-called “slab city” surrounding the downtown core.

In response to this, cities have devolved authority to the local level. “Residential apartment commercial” zoning is one such innovation. Developers can build shops and restaurants, in empty spaces without zoning approval. By filling broad spaces with playgrounds, benches, and community centres, tower blocks are becoming places of human flourishing.

This is just one example of creative small-scale solutions to large-scale problems. Most importantly here, is that these projects are community led. The city does not impose top-down rules on what should fill the spaces. The communities are heavily involved in selecting the amenities that should fill the dead-zones. And not surprisingly, the amenities are well used, like a communal living room.

For our purposes, we can go smaller still, and give power to the communities in which the developments are taking place. It would not be unrealistic to imagine a postal code-based voting system to replace existing top down city planning. It is too early to propose a solution here, but the rule of devolving power down to the smallest possible sub-unit (i.e. the immediate neighbours of a new development) is a sound one. Paired with quadratic voting and a view toward nested centres, we can start to see a powerful line of thinking around this problem of city building.

5. What if we discarded traditional metrics of growth? What would we measure?

Today, new developments are evaluated on the tax revenue and number of jobs they will bring to an area. This is a common line of reasoning, from big box stores on the fringe of cities or billionaire sports team owners lobbying the city for a new stadium at public expense, or housing developers looking to

edge into the greenbelt. “Let us build here” the argument goes, “and we will bring in all sorts of peripheral jobs and tax revenue.”

But this growth comes at a cost. What goes unsaid is that the city will also need to fund the construction of roads, sewers, and other critical infrastructure, and they must fund the ongoing maintenance of these systems, and also give fire, policing, hospitals, and transit to these increasingly dispersed areas. Services which, ironically enough, ended up being overburdened by the problems caused by this very growth: health problems from sitting in traffic traveling to far-off jobs, increased crime in bedroom communities abandoned during the day shift, mobility services for those unable to walk to distant grocery stores. Many city governments face math that does not add up.

Pursuing growth as our main metric of success leaves huge deficits in city budgets.

There is another way to measure progress and assess what makes for “good” growth. The founders of Public Interest Projects (PIP) wanted a way to convince governments to reinvest and revitalize aging Asheville, a town community in North Carolina, rather than funding new greenfield growth. But they faced opposition from the planning department who were used to seeing hard tax revenue projections from big box stores.

The city planning metrics had assigned such a low value to the downtown core that they were planning to build a prison there. The PIP team decided to frame the questions differently. They took a spatial systems approach to land value and asked themselves, “what is the production yield for every acre of land?” (Montgomery, 2013) The results surprised even them. To explain, Joseph Minnicozzi, an accountant and one of PIP’s members, gives a comparative case study, using two competing projects on the city’s docket at the time:

> “On the one side is a downtown building [PIP] rescued—a six story steel-framed 1923 classic once owned by JCPenney and converted into offices, shops and condos. On the other side is a Walmart on the edge of town. The old Penney’s building sits on less than a quarter of an acre, while the Walmart and its parking lots occupy thirty-four acres. Adding up the property taxes… the Walmart contributed only $50,800 to the city in retail and property taxes for each acre it uses, but the JCPenney building contributed $330,000 per acre in property tax alone. In other words, the city got more than seven times the return for every acre on downtown investments than it did when it broke new ground on city limits.” (Montgomery, 2013)

Traditional metrics do not account for the unfavorable relationship between energy and distance. In fact, the large sprawling edge developments can cost cities more to service than they return in taxes. When viewed through the spatial systems lens, an average old fashioned small-town main street with mixed use buildings no higher than three stories (the kind you picture when you think of small family owned businesses) bring-in up to ten times the revenue compared to big box sprawl. This does not account for all the associated intangible benefits of healthy “psychogeography”, walkability and neighbourly conversations.

Instead, we should look to increase flows between parts of a city: flows of traffic, people, data, labour, goods, and ideas. Alain Bertaud, former Principal Urban Planner for the World Bank, as well as resident urban planner in cities from Bangkok to New York, argues how land prices should guide all activities in a city. In his experience trying to limit the growth of Port Au Prince in Haiti, there is a fundamental information imbalance between citizens and planners. Despite the density and squalor of the port city, it was still better than citizen's rural environment. Despite urban planners' efforts to limit the growth of the city and move it elsewhere, people still made value judgements in their own lives and moved to be closer to jobs. Combining Batty and Bertaud's ideas allow for open markets and unimpeded flows to be our guide.
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The Democratic, Dynamic and Decentralized Future

Everything we have learned so far points to a new system of socio-economic development, a model for urban design with the following rules. The rules are prioritized so if there were to be any conflict, the higher-ranking rule would take precedent. The ranking gives preference to rules with the highest system leverage, timelessness (they will always be relevant no matter how they are defined), and dependency (by changing one rule, does this change others, or is it changed?).

To invent future cities, we must create a system that:

1. Operates on human-to-human market interactions, with regular resets.
2. Creates dynamic flows and interactions.
3. Self-adapts to find and keep equilibrium.
4. Is hyper-local and small-scale.
5. Prioritizes psychology over technology.
6. Decentralizes governance.
7. Measures a broad spectrum of specific metrics of human flourishing.
8. Gives access and information to all.
9. Encourages active participation and personal development.
10. Uses strategic human intervention with respect to infrastructure to support the above

How and why should we have any confidence that our new efforts will work where all others have failed? Dan Doctoroff, CEO of Google's smart city firm, Sidewalk Labs, speaks about why smart city technology fails; comments that technologists and urbanists speak different languages, so someone, or some language needs to bridge the gap.

> *"Think back to the promising collaboration between IBM and Portland, formed in 2011, to build a predictive model for urban planning. The idea was for thousands of algorithms to chew through a*

> *mountain of historical data and spit out imaginative policies that would serve the city for decades to come. Instead what we got was the promise that promoting active transportation would reduce obesity — an insight that "no one in bike-obsessed Portland needed three thousand equations to know."" (Doctoroff, 2018)*

Many novel solutions fail because they did not consider the human factor. As we saw with Brasilia, you cannot "out plan" the human desire for messy randomness. As we saw with Brexit, and the desire for the UK to leave the European Union, neither can you trust people to work in their own best interest. The path forward must blend the best of technology and psychology, new and old, city and suburb, community, and commerce, messy randomness with some wide guardrails.

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PART 2 // TESTING THE HYPOTHESIS

Cividend: proposing a new philosophy and mechanism to replace centralized urban planning

"What happens in the city, happens to us."
Christopher Alexander, *A New Theory of Urban Design*

The dominant urban planning philosophy of today assumes two contradictory stances.

On one hand, it assumes people know what is best for their life and can faithfully express it via the virtues of the free market. *If people want single family homes with yards, far from the activity of the city centre, then by rights the market has provided!* (Ignoring the five-decade legacy of race-driven zoning policies, loss-making municipal infrastructure subsidies, and hidden costs to health and wellbeing.)

On the other hand, contemporary urban planning assumes that people have no idea what is best for their life and must be saved from their follies by the maternal hand of strict zoning policies, design guidelines and municipal bylaws. *If we do not intervene, neighbourhoods will devolve into chaos; trust the experts to masterplan your streets and buildings!*

When zoning goes awry.
Why would the city need to get involved in matters of religion and employment?

Figure 9 – When Zoning Goes Awry (Author's photo)

(Let us ignore the irony of assuming a central bureaucrat deciding what is best for a neighbourhood that they do not live in, work in, or worship in. And the repeated failures of historically master-planned cities and the prevalence of bylaw exemptions. See Fig 9. for an example.)

Our new philosophy of urban design aims to bridge the gap between these two views: that individuals are the best judges of their own experience, and, with a little help from a well-designed system, individuals can faithfully express their preferences in a way that helps everyone.

The philosophy prioritizes development over growth, on both personal and community levels. Develop the person, and the community will grow in ways far beyond size and wealth; develop the community and the people will flourish.

The new philosophy is one where we thrive in our environment while our environment thrives.

The new philosophy aims to deliver emergent properties without directly trying to manipulate them. It engages people as they are, not as we wish them to be. It allows for the full expression of human emotion, where there are no wrong answers, only reasoned trade-offs. It is value-neutral, in a moral sense. It prioritizes the individual, with the understanding that improvement at one level will radiate outwards in concentric circles: first to the household, then to the block, then to the community and eventually to the city. Proposing to change a city by not directly changing it seems counterintuitive.

The new philosophy **uses innovative mechanisms for voting and giving input into local decisions.**

It empowers people to enact the change they want to see, where and how they want to see it, with skin in the game so they are invested in their decisions and their communities. It imbues everyone with a personal responsibility and agency to take ownership of the quality of their immediate surroundings.

The new philosophy is one of ruthless optimism, and radical pragmatism. We know that we will not always get it right, and that is okay. It believes that engaging in urban design should be rewarding and meaningful. It should be easy (but not oversimplified). Under the right conditions, thoughtful contributions to local urban design decisions can become everyone's responsibility, duty, and right.

We can call the set of rules the **Cividend**. Civic and dividend together act as a social currency and interaction system people can use to build the communities they want to live in.

If we take all the rules and run them in sequence, the process might look something like this:

1. At the beginning of each year, citizens are allotted a certain amount of cividends (the "civic" part of cividend.) One cividend equals one vote towards or against a development. The amount of cividends given is based on earlier votes (the "dividend" part of cividend)

    a. If a person votes *for* a development, YIMBY, their future allocation of cividends is tied to the success of that development, along to-be-defined metrics, but yield eudemonia and productivity per acre. This incentivizes citizens to not only vote for projects which will make a positive contribution, but also incentivizes them to patronize projects and support local businesses.

    b. If a person votes *against* a development, NIMBY, and the project still goes ahead, they get no cividends from the project. This ensures people are truly invested in their votes

and share in the downsides as well as the upsides of progress. It builds on the rule of making greed good for the system, rather than pretending people are altruistic.

2. A developer sends their proposal to the cividend system. A democratically-agreed-to algorithm assesses it along the Cividend rules, for example: does it create wholes and centres one level up and down; is it in line with community values (safe streets guidelines for example); what is the productivity yield per acre; does it provide for what the community needs (i.e. scores higher for providing rental and lower for providing condos, the further away from the desired range, the more incentivized/penalized the project is); does it increase flows of people, ideas, data etc.

3. The cividend score is sent to a human panel, made up of a local citizenry, a professional infrastructure planner and an urban economist. This "sober second thought", i.e. the Cividend Senate can only adjust the score up or down a maximum of 20%. This respects the integrity of the system and prevents us from outsmarting ourselves.

4. The development proposal, now scored, is put to a community vote. The higher the proposal is ranked, the harder it is to vote against.

    a. For example, a 5-star proposal, which meets all the human, commercial and infrastructural needs of the community, the best score, would take 5x the number of votes to decline.

    b. Conversely, a 1-star proposal could be declined with few votes. This ensures the best projects, as defined by the rules of human-centric spatial living take on a momentum of their own.

5. Voting with cividends is quadratic. Five votes for a project would cost 64 cividends. However, value generated from the project also increases according to voting quantity, so a person with many cividends invested in supporting a project would get multiples of cividends returned to them, compared with someone who invested one cividend.

6. Citizens can use cividends to vote on any project in their city. To ensure interests are kept hyper-local, cividends are worth more closer to your home. This is on a postal-code basis. As you radiate outward from the epicenter of development in concentric circles, cividends are worth less. Imagine a 2x multiplier on your vote if your neighbour wants to build something, and an 80% reduction in vote power for new tower 50 kilometers away. You can still vote for it if, but you will have to invest a lot more into the system to move the lever.

7. A small percentage of cividends are kept aside and collected into a pool which can be collectively voted on for what to do with them. This pool is primarily set aside to fund community structures like waterparks, jungle gyms and so forth, that may not get built by the market.

8. All cividend activity is managed and tracked on an open source blockchain. Where this would have been an administrative nightmare, keeping track of who is entitled to what cividends, a well-designed blockchain will make coordinating mass action much easier.

9. Citizens, wary of the time and energy involved in voting, may assign their votes to a trusted party to vote in solidarity, like proxy voting. They may also vote "with the system", which automatically votes for the most beneficial projects.

10. Repeat until you have a thriving network of healthy communities.

How might we design a system modeled on natural ecosystems to create cities that support human flourishing in cities without any centralized human intervention? Cividend is how. See Figure 10 – How Cividend Works.

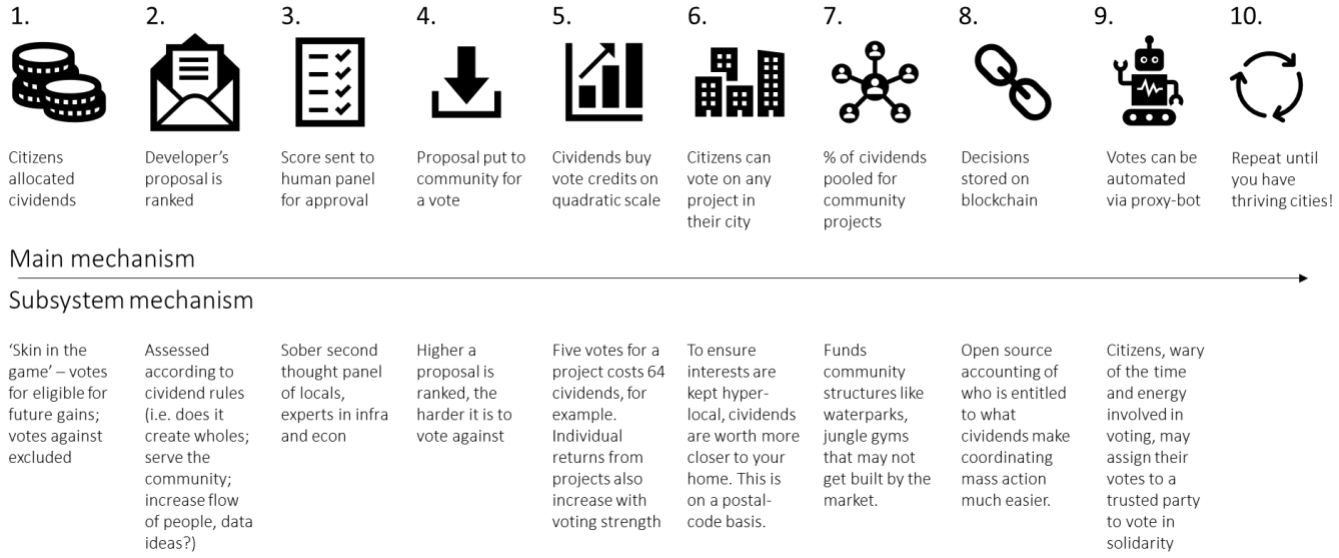

Figure 10 - How Cividend Works (Author's representation of process)

How might Cividend fare in the real world? A Systems view

"One of the greatest tragedies of life is the murder of a beautiful theory by a gang of brutal facts," Benjamin Franklin.

How does it compare to other urban development interventions?

How might we design and validate a systemic mechanism to replace centralized urban planning? To answer the main research question, we cannot avoid answering these secondary questions.

- What events or scenarios would have to happen for these new principles to take hold?

- How might it play out given different scenarios?
- What might the major opposition barriers be?
- How do we get cities and private property owners onboard?
- Can we account for unintended consequences?

In this section, we will answer all these questions. More importantly, we will see how Cividend fares against mainstream urban planning tools. It may work, it may not. Only an unbiased and thorough test will work. That test is made up of three complementary tools to thoroughly test, break, fix, iterate and improve the first set of city-building principles and mechanism design.

1. Method: systems thinking, specifically Donella Meadows' systemic leverage points and system archetypes.
   Rationale: Cities are one of the most complex systems-of-systems. Any single intervention has unintended consequences and counterintuitive effects. A systems lens is the only lens big enough to approach this problem.

2. Method: foresight scenario building
   Rationale: Several trends, drivers and forces are at play which differentiate cities. By articulating the key critical uncertainties and illustrating 4 plausible futures, we can start to design for the future we want.

3. Method: strategic wind tunneling
   Rationale: Strategic wind-tunneling allows us to take scenario building one step further. We can develop business strategies and run them through our scenarios to find the best fit. If this new framework have any chance of making it off the page and into reality, it must stand on its own merits.

System Archetypes

There have been many ideas aimed at fixing cities. They tend to fall into one of 4 archetypes, shown by Donella Meadows, Peter Senge, William Braun and others. Here we briefly describe the archetypal behavior and how a typical urban planning tool fits the archetype. Descriptions are borrowed from Daniel H. Kim's 2002 meta-summary of systems basics, "*Systems Archetypes 1 – Diagnosing Systemic Issues and Designing High-Leverage Interventions*", and Donella Meadows' 2008 "*Thinking in Systems – A Primer*". We selected the most representative or prevalent example of urban planning tools in each archetype for the competitive set.

Fixes that Fail

- "In a 'fixes that fail' situation, a problem symptom cries out for resolution. A solution is quickly implemented to alleviate that symptom, but the unintended consequence of the 'fix' exacerbates the problem. Over time, the problem symptom returns to its previous level or becomes worse" (Kim 2002.)
- Urban planning example: **rent controls**

As more people move into a city, demand outstrips supply of housing and the cost of living increases. Facing an outcry from citizens for more affordable housing, politicians try to override the market, to impose rent controls on certain buildings. While this benefits people currently in affordable housing, it harms those on the outside looking in. Developers of rental residential can no longer make the math work on new buildings. Future projections of rental income do not cover their internal return on investment and they shelve development plans. This causes even less supply of new housing, causing the cost of living to increase even higher. And so on…

Tragedy of the Commons

- "In 'tragedy of the commons' structure, each person pursues actions which are individually beneficial. If the amount of activity grows too large for the system to support, however, the 'commons' experiences diminishing benefits" (Kim.)
- Urban planning example: **property tax and undeveloped property.**

Property tax is based on the value of built structures on a given piece of land but does not value the land itself. An undeveloped piece of land is worth significantly less than the same piece of land with a structure. As property prices rise in an area, owners of undeveloped land share in the increase in value, without having to pay any extra tax. There is an incentive to let everyone else build, while they hold out on building. The more individual developers wait, the more the value of the land increases because the supply of new stock is so low. Thus, developers make money while nothing gets built and the cost of living continues to increase.

Rule Beating

- "Rules to govern a system can lead to rule-beating: perverse behavior that gives the appearance of obeying the rules or achieving the goals but actually distorts the system" (Meadows 2008).
- Urban planning example: **Zoning variances**

As illustrated earlier in this paper, exceptions to recent large Toronto developments outweighed those within the height envelopes. See Fig 6. "Exemption City" from earlier in the paper. The exceptions are the rule. The 'rules' of zoning are mere suggestions to those with the legal resources to navigate the

system. Beating the rules becomes the norm, and a gap widens between what gets talked about and what gets built.

Seeking the Wrong Goal

- "System behavior is particularly sensitive to the goals of feedback loops. If the goals — the indicators of rules satisfaction — are defined inaccurately or incompletely, the system may obediently work to produce a result that is not really intended or wanted" (Meadows 2008).
- Urban planning example: **growth mindset**

As illustrated earlier in this paper, city development plans (Burlington's Grow Bold) and a general obsession with growth rate, GDP and increased productivity has us chasing numbers at the expense of metrics that matter. The singular pursuit of growth has cities expanding into greenbelts, building suburban sprawl and forcing people into unlivable communities all to pad the stats in a claim to be the fastest growing city.

Give me a lever long enough…

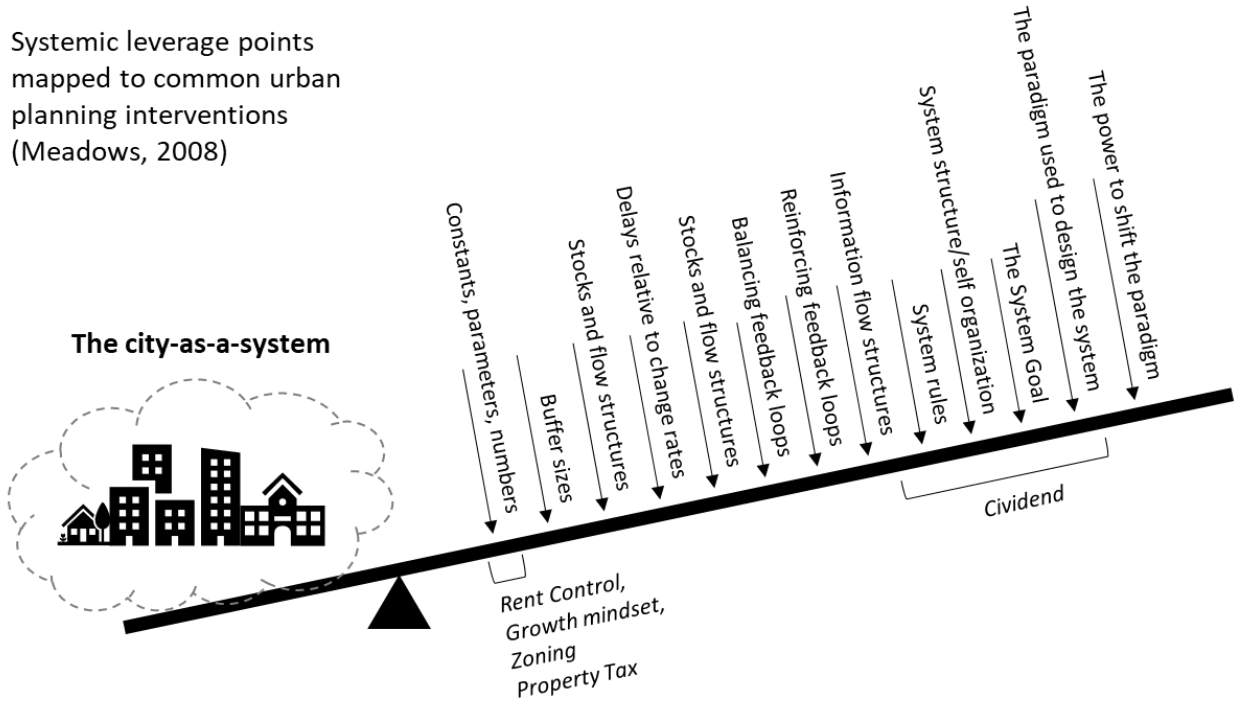

Figure 11 – The City as a System (Author's, based on Meadows, 2008)

And I can move the world.

By Meadows' account, most of the common tools in the urban planning toolkit are low-leverage at best. Cividend offers us a more powerful vantage point from which to change our cities.

Four Civic Scenarios from the Future

“We cannot predict, by rational or scientific methods, the future growth of our scientific knowledge… We cannot, therefore, predict the course of human history.”
Karl Popper, The Poverty of Historicism

If we are building a solution for the long-term, we need to invent the future. Past data can only tell us things about the past. Extensive work by N.N. Taleb has shown, through mathematics and philosophy, why we cannot predict the future. So why do we think that we can create land-use plans today that will be relevant tomorrow? If a city is a network of individual decisions, the implication is that we should look to dynamics, flows and interactions. We may not be able to predict where we will end up, but we can say with more confidence through what mechanism we will get there.

> *[Sidebar: A note about smart cities. What about smart cities, and how come they have not factored into our discussion? Because nothing about the way a city is designed is reliant on technology. The moment we make cities about technology, we commit one of Meadow’s category errors and begin to mistake the means for the ends.*
>
> *“If the essence of urban development is individual action, then a city can only be as smart as its citizens” (Batty, 2018, p.177). Batty says that our conception of ‘smart’ is fairly basic and centres around obvious things like traffic sensors and water meters. The conversation on smart cities has been mostly driven by corporations who have something to sell or a vested interest in generating data from citizens.*
>
> *Thriving, livable cities have been around for thousands of years, and if we want them to survive thousands of years forward, we cannot limit ourselves to the technologies of today. Without a well-functioning governance model like cividend, the number of sensors and smart-metering is irrelevant. For this reason, we leave the debate about smart cities for another time. It is periphery to the root problem that we are trying to solve here, and It is also why one of the core 10 rules states that we must choose psychology over technology.]*

What are the critical uncertainties facing cities 30-50-100 years from now? It is an impossible task to predict what the changes to infrastructure, mobility, technology, and construction will yield. There is another approach we can take, inspired by Jeff Bezos.

> *“I always get ask the question: 'What's going to change in the next 10 years?' I never get the question: 'What's not going to change in the next 10 years?' The second question is the more important of the two -- because you can build a business strategy around the things that are stable in time. It's impossible to imagine a future 10 years from now where a customer comes up and says, 'Jeff I love Amazon; I just wish the prices were a little higher,' [or] 'I love Amazon; I just wish you'd deliver a little more slowly.'” (Bezos, 2000)*

Foresight and scenario planning is the right tool for the job. The purpose is not to predict the future, but to create several plausible futures. We can see how different strategies or events might play out in

different scenarios, or we could pick a preferred future and work backwards to see what we need to do today to realize a better tomorrow.

This leads us right back to where we should be starting: with humans, with us. If we base our axes on spectrums of human behavior, we can reliably paint four pictures of the future that are within the realm of possibility. As outlined earlier, humans will always face change and adapt social relations in response. We are adaptable and social by nature. But not all at once, or for very long.

Yet it is human nature to try to control our environments in some way. As we have demonstrated extensively in this paper, urban planning has always tried to dictate the pace, type and scale that cities could grow—with mixed results.

This leads us to two critical uncertainties. We know that these drivers will continue, but we cannot be certain in which direction. They may continue, or they may reverse. All we know is that they are critical to understanding our future and uncertain in their outcome. See Fig. 11 for the 2x2 map.

Critical uncertainty #1: *openness to change.* In urban planning terms, are we BANANAs (build absolutely nothing, anywhere, near anyone) or YIMBYs (yes in my backyard)?

Critical uncertainty #2: *desire to control.* Are we intent on meticulously managing every aspect of our cities? Or happy to let the market shape where and how we work, live and play?

**Note, in this section, Cividend is a strategy. I am counting Cividend in the 'market' category. It is a 'smart market mechanism'. Fully managed implies us overriding market signals and doing something else. It is not a scenario in and of itself (though it would be a large factor in bringing a scenario to fruition.)*

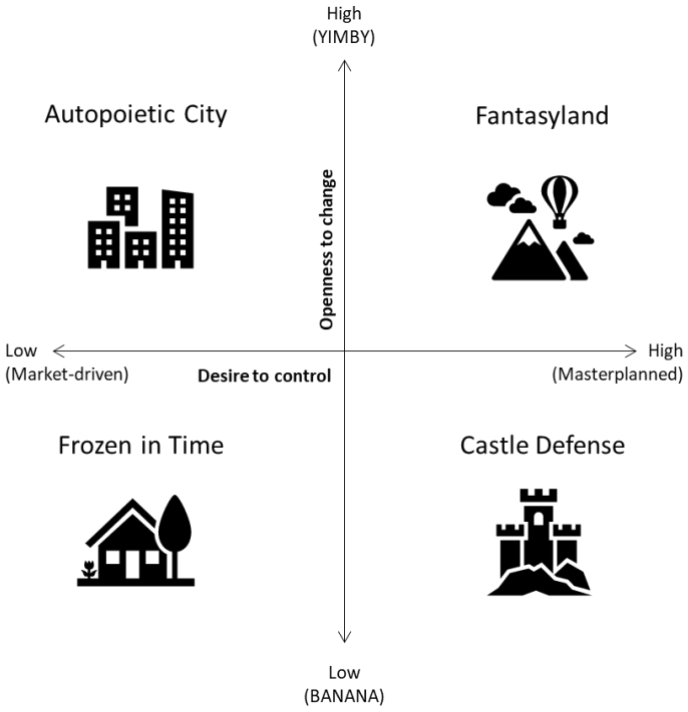

Figure 12 – Four Future City Scenarios (Author's scenarios)

There are several drivers that plan each scenario, and we can define in which direction they are headed. Climate change, urbanization, population growth and the rise of the global middle class will all play out differently depending on the scenario. Here is how they might look.

(Managed+YIMBY) Fantasyland

Description: Public engagement open houses are a fun affair. Everyone is in a good mood and open to new and exciting developments springing up. The planning department gives speeches on optimal population size, the perfect ratio of parks to parking spaces, street widths and number of residential units to 'walkable retail'. It seems like everyone can get what they want. But then reality hits. Developers back out when they see they cannot make a profit because they have been mandated to give half a site plot to daycare. Retail spaces go vacant without the foot traffic to support them. House prices continue to rise as single-family dwellings are built close to subways. Expectations fail in the face of market realities. The city grows out, perpetuating sprawl and all the issues associated with it.

- Winners: Urban planners, planning consultants, architects, and designers. All are kept in business churning out awesome visions of the future.
- Losers: Citizens, developers. Anyone who is relying on plans to be executed and neighbourhoods to be thriving.

(Managed+BANANA) Frozen in Time

Description: We are united by our nostalgia of the way things used to be. We can all agree that a hazily imagined version of our cities was the golden age and that our cities will never be as good tomorrow as they are today. So we religiously oppose any change, growth or regeneration to our cities. We double-down on historical preservation bylaws and limit any new development to faithful, period-accurate recreations of past facades. We see each other as partners in preserving the past. As a result, we are static as a society as progress and innovation are focused on how we can live in this moment forever. The city grows temporarily, as people retire, and support staff move in, but lacking any real activity, the core stagnates and eventually shrinks as they pass away, and pensions stop.

- Winners: retirees and long-time residents (temporarily).
- Losers: Young residents, immigrants and new citizens. Anyone priced-out of the market and unable to create a niche for themselves.

(Market+BANANA) Castle Defense

Description: Every person an island. The concept of cities is more of a loose connection to tribes and zones. We take any new development as an affront to our design sensibilities and spend most of our time opposing change. We study the fine print and deconstruct the algorithm, looking for loopholes and ways to manipulate the markets. A black market of vote buying emerges and two classes of people emerge: those who know how to play the system and those who get played by the system. Growth

happens, but it favours only a small subset of the population. Most everyone else spends time “metro, boulout, dodo”: commuting, working, sleeping – to quote student graffiti from the French Cultural Revolution of 1968 (Bertaud, 2018 p.19).

- Winners: Lawyers, programmers, hackers
- Losers: Everyone else

(Market+YIMBY) The Autopoietic City

Description: Cities are constantly changing in relation to what is built next door, and the built form is proportionate. Cities become engines for human progress, and while inequality is not eliminated, the system uses the generation of wealth to build structures that contribute to significant increases in quality of life. Markets define what is built, and where. Citizens chart their own paths, adding basement units and additional floors when residential prices rise. Corner stores pop-up in garages and offices are built right next to parks. Labour, ideas, people, goods and culture flows unimpeded throughout the city. The city is constantly changing, renewing itself, as old buildings get decommissioned for new uses. The city grows from within.

- Winners: Citizens, developers. Anyone who enjoys progress, productivity and the pursuit of a brighter future.
- Losers: Urban Planners. People whose jobs have been smartly automated, though they can retrain as infrastructure engineers and urban economists.

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Enter the Windtunnel

For decades, we have seen cities apply four archetypal strategies to address all the issues we have explored to this point. We also proposed the fifth strategy, Cividend, which has been illustrated above.

Despite the interventions, we still have unaffordable, overcrowded, unequal and unhealthy cities. Will the future be kinder to the traditional toolkit of urban planners? We do not have to guess, we can run them through a wind tunnel and see how they fare.

Below we test each strategy – the four most commonly cited urban planning tools – in each hypothetical scenario. We are testing for its suitability. Considering everything we have covered in this MRP, we ask one question of each strategy in each scenario: **will it make the city a better or worse place to live, as outlined in the paper so far, from the perspective of the statistically average citizen?**

**Note: see “Fixes That Fail” section for descriptions of the first four strategies.*

Windtunnel Table

	Fantasyland	Autopoietic City	Frozen in Time	Castle Defense
Rent Control	Worse – reduces incentive to build new housing, people live further away from work and land is underused	Worse – distorts people's ability to gain from future income streams, stifles movement of ideas as people stay in rent-controlled flats	Neutral – no one can move anyway, since nothing changes	Better – stabilizes some of the rampant market speculation, but stifles movement of people and ideas
Growth Mindset	Better – incentivizes some development to happen regardless of cost	Neutral – GDP is a byproduct of people living better, more efficient lives	Worse – forces people to build stuff no one wants, ends in compromise	Neutral –GDP goes up, but quality of life does not, economists are happy, citizens are not
Zoning	Worse – zoning cannot keep pace with changing wants of citizens	Worse – limits people's property rights and distorts the market	Worse – locks into place whatever was there, a time-capsule view	Better – provides for some necessary services in fiercely competitive and unempathetic market
Property Tax	Better – forces practical market considerations into what gets built	Worse – leaves surplus value on the table, which could be recycled into social benefit	Better – Forces some price on stagnation, provided taxes go up	Worse – leaves property undeveloped, worsening land prices
Cividend	Better – gives people skin in the game and ensures tradeoffs so things that get built are actually used	Better – assumes a cividend-like system is already in place, but does enhance human flourishing, innovation and progress	Better – breaks special interest groups hold on neighbourhoods, imposes a cost on 'saying no'	Neutral – open to the whim and will of the people, and only as benevolent as the people using it, but can be tweaked to correct for deviant behavior

This analysis leaves us with two options, not mutually exclusive.

We could take a passive approach and assume that each scenario is equally likely. If we go down that path, we should pick a strategy that has the best probability of a positive outcome in any scenario. In this case, Cividend wins for its ability to mitigate many of the negative aspects of each critical uncertainty.

Or, we could pick a scenario we would truly enjoy living in and influence the future in a way that makes it more likely to come about. In this case, the Autopoietic City ticks our boxes for true human flourishing. It is no surprise that a Cividend-like system would be necessary, but not sufficient, to bring about this world.

Collectively, what would need to be true to implement cividend and realize the Autopoietic city? For the answer, we turn to our concluding section.

PART 3 // BUILDING THE FUTURE

At the beginning of the last section, we posed a research question and proceeded to validate it using three different methods. There were five sub questions which we posed in anticipation of critics and skeptics.

1. What events or scenarios would have to happen for these new principles to take hold?
2. How can we turn the idea into a testable, real-world prototype?
3. What might the major opposition barriers be?
4. How do we get cities and private property owners onboard?
5. Can we account for unintended consequences?

Calling this section 'answers' to the questions posed here would be too generous given the hypothetical nature of our argument to date. Instead, consider this section to be a thought experiment, taking us into the unknown future, together, responding to the discussion points we have raised.

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When all the world's a city, what are we going to spend our time thinking about?

What events or scenarios would have to happen for these new principles to take hold?

As long as cities maintain their current trajectory, it is not inconceivable that activist groups reach for more radical solutions, like this one. If housing prices keep climbing, inequality keeps rising, commutes keep getting longer and municipalities keep raising property taxes, something has to give. To quote Rage Against the Machine's song "*New Millennium Homes":* "hungry people only stay hungry for so long // they get hope from the fire and smoke as the weak grow strong // a fire in the master's house is set" (De La Rocha, 1999). The recent global protests on September 27, 2019, from young people in favor of taking action on climate change are a good example of how increased activism and a coming wave of civic action are starting to force change. It is not hard to see how the revolutionary zeal spreads to young people who are priced out of cities.

How can we turn the idea into a testable, real-world prototype?

How can we 'experience the future' of this concept before it happened? Testing the concept in real life can be done in several iterative stages. On a small scale, the principles could be turned into 'rules' for a board game. Each use would propose a development, and the others would strategically vote on it. Actual mini city centres would then get built with additive block pieces, like Lego. This first step would

uncover any obvious glaring flaws and loopholes. The game could be played several times with several distinct types of players and see what types of neighbourhoods emerge. This “boardgame” development would be a beta testing of the Cividend protocols, principles, and rules that then could be implemented into an application.

Next, the refined principles could be taken to a game developer/programmer in hopes of converting the principles into an algorithm. At this stage we would turn principles into yes/no, if/then, and/or logic. We would also face decision points where we need to choose to prioritize one principle over another. Once a sturdy algorithm is built, we might again run the simulation hundreds or thousands of times in a virtual space and witness the types of cities that emerge. Decentraland could be a fertile testing ground, as could a SimCity engine. The cost of renting computing power has come down dramatically, allowing us to virtually test the framework several magnitudes more often than we could in reality.

Once these two phases of extensive testing are complete and improvements have been made, the logical step is to build the prototype at scale.

Building on the principle that the suburbs are the one key to fixing our cities, given the symbiotic relationships between them, their flows of people, information and currency, we could start in a rust belt town (marked by declining industry and falling population). Completely speculative at this point, but it is reasonable to think we could pitch towns on the idea and lobby for a special zoning exemption to test this. A team would raise funds through an initial coin offering on blockchain to buy, a) a forlorn strip mall or b) most of a downtrodden main street downtown in a small town. Developers could be tapped for financing, viewing it as a way to innovate and generate positive press. The Cividend Company could incent developers and citizens to start building and see what happens. The ideal scenario is that it works well enough to be adopted by other small towns, and eventually in certain forward-thinking cities.

What might be the major opposition parties and barriers to implementation?

In conversations with advisors, experts, and friends during the writing of this MRP, there are plenty of skeptics. To list a few:

- *Urban planners:* in disagreement that urban planning as a profession has caused many of the problems it has tried to solve.
- *Social activists:* worried for poor, uneducated or marginalized groups being taken advantage of.
- *Developers:* concerned that the development approval process becomes even more opaque and unworkable.
- *Homeowners:* confused over how the system works and nervous of an ambitious 4- story renovation next door.
- *Municipalities:* opposed to ceding control over their city/region/town to an algorithm, while keeping accountability to voters.

Each of these stakeholders holds valid and valuable concerns. The answer to the next question applies to how we might bring them along the journey with us.

How do we get cities and private property owners onboard?

Success of the system is not guaranteed without the ability of its citizens, users, to understand and the responsibility of citizens to use the system.

Our openness to change is the true uncertainty here. Without it, even the most well-designed system will be circumvented and hijacked by a powerful few. Only when all participants are truly invested in its success will it balance checks on power with demonstrable progress. Therefore, we emphasized value-free decision making and strong governance in the system. But even this is not enough.

For Cividend to thrive and create an Autopoietic city, people must be given the chance to 'experience the future' before it happens. They need to live in the desired city, experience the process of making decisions, feel the tradeoffs and see the fruits of their actions. They need to be rewarded for their time, effort and existence. All of this is necessary to getting Cividend□—an idea with some serious 'conceptual overhead' to manage□—off the ground. The experiential future's work needed for this to happen is outside the scope of this MRP, but worthy of a talented practitioner's time. Toronto's Laneway Housing project would be a good candidate to test this in the real world, even if hypothetically, to help make the ideas real and concrete.

Can we account for unintended consequences?

An advisor to this project asked this question another way: "In this world, how does this system completely blow up?" A fitting answer would be like Mark Twain's answer on how people go bankrupt: "slowly at first, and then all at once."

Luckily, we can learn from other's mistakes. A promising field is cryptoeconomics. Cryptoeconomics sits at the intersection between game theory, behavioural psychology, software programming, logic, classic economics, philosophy, rhetoric and governance, and much more. Blockchain, untethered from centralized, truth-anointing institutions, can cause all sorts of unpredictable behaviour. Ryan Zurrer, founder of Polychain Capital, a blockchain investment firm, describes the field as "the study of token representations of digital scarcity to incentivize a distributed network of actors, where the actors contribute a valuable resource to the network. These actors self-organize in a specific way, and then are remunerated for their contribution of resources on a network" (Shin, 2018).

As it relates to urban design, cryptoeconomics shines light on matters of governance, procedure and incentive when designing a successful system. Bitcoin is the first example of cryptoeconomics in action, resulting in a stable and trustworthy network. People are rewarded with bitcoin for their efforts in computing exceptionally complex mathematical calculations to verify and process previous transactions.

If we are to replace central city planning with some new solution, we need to replace all the committees, policies, and zoning documents with a set of principles and incentives to govern it. Savvy design is crucial in designing procedural governance mechanisms, otherwise, groups can vote themselves into a black hole with poorly designed voting structures, contracts, and mechanisms.

Zurrer recommends a phased approach to moving governance 'on-chain' (or, in our case, onto the cividend platform.) He recommends iterating voting structures with network participants slowly, and with a human hand on the wheel. The most famous case study is the first DAO, a lesson in what not to do. The DAO raised over $150 million U.S. dollars as an investor-directed venture capital fund. It was officially stateless, existing only on the Ethereum blockchain, and thus not tied to any sovereign nation. It had no employees; it was a set of programmed rules that would allocate its pooled funds based on the votes of those who owned tokens. An organization that anyone could join, without permission. A vote for an investment decision would result in a share in that company.

However, users exploited a vulnerability in the voting system code and made off with a third of the capital. What they did was questionable ethically but allowed technically by the rules as they were programmed. They voted to give themselves money. The DAO has since disbanded and is used as a case study for careful governance design.

Conclusion: When All the World's A City

"Inventing is a lot like surfing: you have to anticipate and catch the wave at just the right time."
Ray Kurzwiel, The Singularity is Near

We began this MRP with a hypothesis that there might be a better way to approach the planning and development of cities. We started with two fundamental truths:

1. Incredibly complex systems arise from a set of very simple rules, and;

2. We cannot predict the future, but we can invent it.

From there, we systematically looked at all the ways in which our best intentions were counterintuitively impeding our progress and making us less happy and healthy. We derived core principles from case studies in cities across the globe. From that, we proposed the framework of a system that might help to alleviate the problems we face today.

Using strategic foresight, scenario planning and systems thinking tools, we generated 'data from the future' to see how our system might hold up. Confident that it is better than our current approaches, we looked to head-off the key criticisms and concerns.

I hope that the reader enjoyed the journey and sees the implications. If we have made a business case to support further investment of resources to prototype these rules in a variety of applications for those who want to make a lasting impact on the next century of human progress, then the goal of this MRP has been met.

If not, I welcome a counterproposal for how we might achieve the same goal using different means.

Onward.

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