City Archetypes

How might specific needs of cities be best addressed in considering urban mobility?

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A collaborative look from ifmo and PCH Innovations

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Cities are the engines of social and economic development. High growth rates of urban populations have persisted even when overall population growth has eased off. Maybe even more strikingly, cities monitored by UN-Habitat grew faster in area size than in population. Globally, city sizes, on average, just keep on growing. Low- and middle-income countries, in particular, are seeing a relentless growth of their large cities and megacities – those having more than five or over ten million inhabitants respectively.

People move to the city because they are drawn by the promise of better healthcare, better education, and more and better job opportunities – which in turn hold out the promise of higher incomes and a better quality of life. Companies find it easier in larger cities to get hold of the workforce they need, modern specialised services for production, and technical know-how.

The larger a city is, the more it depends on a well-functioning transport system to ease the competition for urban space. This competition brings with it the risk of congestion, which reduces accessibility to services, qualified labour and intermediate goods. The resulting fragmentation often leads also to increasing internal inequality and environmental damage – factors that weaken the ability of the city to live up to its promises.

There is no shortage of ideas about how the social and economic composition of cities maps into what is a desirable transport system. The size and density of cities relate to their walkability, the opportunities they afford for individual motorised transport, and/or the need for public transport to get around inside them. When confronted with the enormous variety of city types, these ideas can at times appear overly simplistic.
This study has taken a different approach. It cuts through the confusing variety of city types by identifying indicators by which to classify cities. Carving out archetypes of cities based on economic characteristics, it reminds us of the importance of infrastructure decisions and, therefore, the governance of cities. The modal split of urban transport, the space available for individual versus public transport, and for motorised versus non-motorised transport – all of these depend not only on the sectoral basis of the urban economy, but also on the quality of public policy.

This report helps us to grasp of the complexities of urban structure and transport by using novel and suggestive methods of visualisation. These methods protect us from taking simplification too far, by depicting city archetypes as unity in variety. The differences between them are indicative of differences in urban transport needs, and of the size of the markets for various modes of transport.

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The aim of study is to frame the scope and content.

Archetypes serve as a standard of reference. Jung defined them for our psyches. Odysseus undertook his heroic journey, mirroring our own personal journey through life. And although archetypes can seem far away, they’re at the same time close enough to feel. We recognize archetypal patterns and behaviors in our daily lives – especially as lived in living, breathing cities.

More than half the world’s population lives in cities, and that figure is continuing to rise. Cities are supremely where we discover the distinguishing characteristics of human interaction, and the primary influences driving environmental change (McKinsey, 2017). Cities are also places where efficiencies of scale in modern-day production – both the industrial and the knowledge-based – are realized, requiring the development of a strong transportation infrastructure. With their digitization and connected services, cities serve as the incubators for innovations, and the canvasses on which new digital ecosystems are painted.
Cities, like individuals and organizations, have their own defining features, struggles, and goals (McKinsey, 2013). In the context of urban mobility, we find ongoing competition for common resources – primarily in terms of space and patronage, as applying to publicly organized transportation, to individually organized transportation based on the private vehicle, and (more recently) to services provided by private enterprise: ride hailing, car/bike sharing and the like.

As cities grow in size and also density, individually organized transportation that is based on ownership of a private vehicle carries ever-increasing individual costs – in time, in money, and so on – and simultaneously generates high social costs, especially in the form of emissions and congestion. For these reasons, city planners and legislators strive to proactively shape the mobility market and its ecosystems (Future Cities Catapult, 2017). At a time when neglect is causing stress to our environmental and geopolitical ecosystems, finding effective, optimized, and sustainable mobility solutions is paramount (McKinsey, 2018). Moreover, the necessity of localizing all such solutions never goes away. It’s a timeless notion of effecting change from within, which then ripples out into the larger world.

The way we get around, and where we go when we do, frames our experience of reality. When it comes to mobility, cities across the globe show us several versions of reality. How do different cities arrive at these different mobility realities (IESE, 2018)? And how is mobility in cities likely to evolve in the future? While primary geography, density effects, and production economics are all important for understanding why cities exist (Clark, 2017), the tendencies of cities to be always addressing the constant dynamic between individual motorized transportation, public transportation, and private-enterprise-led mobility (Bär, 2018) can help provide answers to these questions. Differing players, offerings, and regulations give rise to dynamics that vary from one city to another, even within one country (IESE, 2018; McKinsey, 2018). Whereas we used to look at entire nations for market insights, we can now think much more specifically about mobility demands and opportunities by detecting and decoding patterns within and throughout the world’s cities.
The tendencies that various cities display toward different models of mobility can be decoded by looking at indicators which may lie outside the landscape of traditional transportation indicators. Various factors – from the presence of institutions of higher education, to the way in which different legislation determines different regulations – create climates and the ultimate compositions of a given city, and its innovation pathway. In looking into these factors as a means of understanding tomorrow’s mobility market, existing city benchmarks (IESE, 2018; Clark, 2017; Future Cities Catapult, 2017) and reports (McKinsey, 2013; McKinsey 2017; McKinsey 2018; Bär, 2018) were helpful for signaling the nuances of city life. Research conducted for this study began with a focus on city clusters. Yet in examining materials, it became evident that no existing study or approach to cluster cities went deep enough to yield a helpful means of differentiation between or investigation of cities that could fulfill the ultimate aim of guiding strategic collaboration with cities. This lack of depth motivated efforts to create new groupings of city qualities based on informed assumptions, and also on patterns unearthed through further research.
For the purposes of this study, a city, including its surrounding areas, is defined in a way that permits the assessment of the full economic impact arising equally from its citizens and its commuters. In the EU, this definition is called a ‘functional urban area’. In the USA it’s known as a ‘metropolitan statistical area’, while in China it’s an ‘administrative division’. The terms may vary, but the concept is the same.

*see figures 1 and 2*
Looking at a cross section of cities, hypotheses were formulated as to what certain city qualities mean for market investments. For example, cities which cap (or even ban) ride-hailing services while at the same time investing in public transportation will most likely be more open to new services supporting the same service quality provided by public transportation than to services offering alternatives. After the establishment of hypotheses on the basis of city qualities, indicators for measuring those qualities were collected and refined, ultimately leading to the creation of a statistical model that analyzed the qualities of 25 sample cities. Those 25 cities were chosen to cover Asia, Africa, North and South America, Europe, and Australia, and represent the 25 cities providing the most datapoints across a range of readily available published research. This initial set of data from corresponding cities became the foundation for hypotheses, which were then enhanced by acquiring datasets from IESE, Euromonitor, Oxford Economics and 2thinknow for the study described here.

As this study will show, the model has proven effective, and it continues to be used to process data for a growing sample of cities.

Analyzing indicators of different city characteristics enables the complexity of patterns and qualities that are found throughout cities to be grasped. What becomes clear is how a group of cities with a considerable variance can still be examined through a relatively tight collection of archetypes, which then avoids the difficulty of looking at many different cities one by one. This process produces tools which yield a better, more granular understanding of target mobility markets and a superior scope of city archetypes.

Just as literary archetypes offer readers a metric for understanding their personal journeys, city archetypes prove to be a great metric for potential partners to improve decision-making, mitigate risk, and forecast probable futures.
City behavior tends to be clustered in patterns which recur globally. These patterns can be described with analytical data. Three patterns can be differentiated (see Figure 3), and these form qualities of urban organization.

**Figure 3.** Qualities 'A', 'B' and 'C' of Urban Organization

**A**
**Controlled Optimization**
- Top-down holistic system approach, favoring public mobility
- Highly regulated, scaled, and standardized city-systems, streamlined for collective efficiency

**B**
**Competitive Innovation**
- Open-market approach, supporting innovation and competition
- Liberal and highly diversified ecosystems, maximizing individual effectiveness and comfort

**C**
**Bottom-up Innovation**
- Bottom-up markets without clear strategy and constrained by a limited budget
- Highly diverse, informal, unorganized, emergent-world settings
II Urbanization and City Qualities

Explaining the methodology and terminology

Rapid, widespread, and intensified urbanization highlights certain highly pertinent conditions which impact mobility. From the walkability of a city, or its tendency toward high regulation, to its population growth, various conditions affect how participants in the mobility ecosystem and market define, approach, and implement their initiatives.

The team behind this study designed a model to examine an initial 25 cities from several continents, observing specific urban features. Preliminary investigations of these cities included an analysis of various indexes of mobility, transportation, government, and business. Patterns were found to form, arising from repeating factors of city struggles, strategies, and solutions, culminating in three groupings, expressed as 'A', 'B' and 'C' qualities.
Urbanization and City Qualities

Figure 4. Overview of Analysis and Archetype Definition
For a city to feature an ‘A’ quality, it must include a combination of strong administration, robust public finances and reserves, strong legal rights, low corruption, modernized digital government, a large number of public transportation options, short driving times, and a low number of accidents. A given city can potentially score highly on only some of these elements to possess an average or above-average ‘A’ quality – that is to say, not all the elements described need to be high for a city to have an ‘A’ quality attributed to it. Altogether, these features demonstrate a climate of Controlled Optimization.

In this kind of climate, administrations typically seek top-down systematized approaches to highly regulated, scaled and standardized city-systems streamlined for collective efficiency. Solutions are designed to benefit the masses. Buenos Aires, with its dynamic public transportation options, exemplifies an ‘A’ quality.

The driving hypothesis behind an ‘A’ quality is recognizing an atmosphere in which mobility demands are clearly defined and solutions must be highly controllable. This climate is good for carving out an influential position in a steady market.

Data shows that a city with a ‘B’ quality is found to be highly walkable and also have a large number of cars, along with numerous universities, museums and start-ups, and a population with a high disposable income, associated with high rates of car purchases. These qualities promote a climate of Competitive Innovation. Academic research, financial maturity and an appetite to take creative risks all attract further investment and talent. Cities with a strong ‘B’ quality are set up for liberal and highly diversified ecosystems, enabling them to pursue open-market approaches aimed at maximizing individual effectiveness and comfort.

The overall hypothesis for a ‘B’ quality envisions a city which might be good for experimenting with bold initiatives, as well as for locating talent to push projects forward a significant distance with speed.

‘C’ qualities are indicated by influences ranging from large population growth and household size to high illiteracy and murder rates. ‘C’ markets are highly diverse, informal, and unorganized. Emergent-world settings give rise to this Bottom-up Innovation climate. In these markets, limited budgets and urgent demand constrain strategy.

For cities with a dominant ‘C’ quality, the hypothesis is based on the assumption that these markets create bottom-up mobility solutions which relieve, somewhat, the distress created by their developing high-density environments.
Combinations of ‘A’, ‘B’ and ‘C’ qualities can be present within individual metropolitan regions. In order to form an ‘AB’-dominant archetype, ‘A’ patterns have to feature more strongly than ‘B’ (but ‘B’ will be more strongly present than in an average city), while ‘C’ is below average. see figure 5

Figure 5. Definition and Illustration of Archetypes (example: ‘AB’
The guiding principle throughout this study is that different city qualities will inform a general approach, which can then be applied to various different mobility initiatives in different locations.

Various combinations of 'A', 'B' and 'C' qualities can also be present within individual cities. For instance, Toronto possesses 'A' and 'B' qualities, yet its 'A' quality is more pronounced. Perhaps the clearest evidence of how Toronto and New York City (NYC) reveal their 'A' and 'B' qualities respectively can be seen in the rollout of Alphabet’s ‘Sidewalk Labs’ urban innovation organization in each city. In Toronto, Sidewalk Labs was given the task of connecting districts, by means of automated pods, to public transportation without the need for building parking lots, to make this offer attractive for everyone. In this situation, Alphabet is forced to apply its tech in the way that the city wants. NYC, on the other hand, is glad to give Sidewalk Labs an open opportunity to showcase its ingenuity without administrative intervention.

Depending on the range and concentration of qualities, a city’s needs and dimensions change. Different cities formulate different responses to common challenges such as congestion, pollution, and an aging population.

Possible initiatives range from regulating traffic flow by commissioning low-emission zones and road pricing, to investing in changing infrastructure elements such as parking prices, and public transportation routes/schedules. Some other cities might focus more on allowing or denying access to service providers in pooling, sharing and hailing, or managing their traffic sensing, optimization, and prediction systems.

Of course, city qualities may change over time. This study takes a snapshot of city qualities as at 2016/17. In the model, the strength of ‘A’, ‘B’ and ‘C’ values for a particular city is always relative to the average among the chosen pool of cities under analysis. It’s worth noting that as we add more cities, ‘A’, ‘B’ and ‘C’ values might also change for some cities owing to a reformulation of averages.

On the basis of how ‘A’, ‘B’ and ‘C’ qualities are distributed, more specific city archetypes emerge. The resulting archetypes provide a more detailed account of a particular place, and reveal how to promote and benefit the mobility-related atmosphere of each urban environment.
The sample of 25 cities across 'A', 'B' and 'C' qualities suggests five major archetypes, although in theory nine archetypes are possible. The more cities we incorporate and the more detailed the overall resulting picture, the more the archetypes might continue to consolidate.

Each city will have its own unique composition of qualities that can be addressed more individually. There is sufficient overlap of dominant qualities, however, to generate solid archetypes. The different archetypes reveal different market levers and approaches.
Even given a noticeable variance, cities which appear distinct from one another can still be examined through a relatively tight group of archetypes. Out of the possible permutations, the current sample of cities provides the following archetypes:

* see figure 6
In these cities, dominant ‘A’ qualities such as strong regulation result in public authorities being actively involved in designing and managing them. This top-down arrangement is only possible when populations are willing to live with and support a dominant public sector in exchange for the benefits to their well-being.

Buenos Aires fits into this archetype. The city’s mobility policies favor pedestrians through its municipally run bike-sharing service and its use of open data to boost citizen empowerment. It champions public transportation through its trams, subways, and buses, as well as having also implemented time- and area-based usage restrictions on private cars. Buenos Aires’ ‘parking minimums’ policy is not geared toward creating a car-based city. At the same time, the city displays limited activity when it comes to car sharing, and manifests a positively hostile attitude to ride hailing. Meanwhile, on-street parking in the city remains cheap and unregulated.

This type of city might present the best opportunities for complex new infrastructure projects, especially since such undertakings will cross sector boundaries. Indicators suggest opportunities for a clean single point-of-sale market for multimodal mobility offers; a systematic open data platform for community and citizen engagement; and a data tracking and controlling mechanism for efficiency.
It would be wise for initiatives aimed at integrating into such cities, which also include Nanjing and Montréal, to deal directly with local administrations, avoiding market mechanisms or campaigning.

Nanjing presents a striking example of the way in which strong regulatory intervention can reveal the ‘A’ quality of a city when it may have earlier displayed behavior evidencing more in the way of ‘B’ qualities, as shown by how the city blocked any increase in capacity for for-hire vehicles (including taxis), and is now contemplating license plates for shared bicycles.²

Montréal has put a car-sharing policy in place, and also operates a municipal bike-sharing service. Some districts in the city have started eliminating parking minimums, which makes car use unattractive, though no formal restrictions on car ownership or use exist as yet.³

As Determined Regulation cities pursue reduced emissions and improved performance standards, a lean autonomous vehicle fleet could complement the multifaceted personal and public transportation systems so as to accommodate changing patterns of demand. To illustrate further, cities with a dominant ‘A’ quality might immediately build a zero-occupant surcharge into their commercial robotaxi policy, whereas cities with a dominant ‘B’ quality may choose to introduce regulations later, and only if a problem arises which makes that step appear necessary.
These cities feature strong regulation, yet direct it toward managing open-market options that promote individualized mobility and mobility-related aspirations. Governed Success municipalities are seeking to attract private initiatives, while at the same time elevating key public policies.

In contrast to Determined Regulation cities, Governed Success cities feature more efficient multimodal mobility options, and have the ability to create their mobility system using more strategic foresight and financial muscle, and, moreover, can empower private initiatives to bring new building blocks to life. Innovation tends to occur throughout both public and private sectors.

Within this archetype, Toronto stands out as one of the most multicultural and cosmopolitan cities in the world. Its highly diverse, well-educated population and many cultural institutions create a vibrant atmosphere where finance, business, and the arts intersect.

To help citizens connect to public transportation, infrastructure can be enhanced by smart parking systems. Imagine intelligent mobility hubs that merge autonomous vehicles (AVs) and private vehicles with city transportation. The solution also calls for a multimodal planning tool and a convenient multidimensional parking lot to service the vehicles. Highly attractive public transportation systems and strong regulations governing use of space and emissions will be major pillars of the future-based approaches to policy found within these cities.
These cities are beacons for independent thinking and also feature robust foundational public policies. Ecosystems form and reconfigure around privately generated initiatives. Finance and business sectors rub elbows with arts communities in these highly walkable, dense cities stacked with multi-story buildings and high traffic volumes. Proximity helps fuel these urban incubators.

Factors such as commuter demand and strong government support, backing up an innovative culture, make these cities ideal test grounds for smart, privatized transportation modes, as well as novel approaches to public infrastructure solutions.

NYC demonstrates the mold, given its highest total values in ‘A’ and ‘B’ qualities among the 25 cities. Picture its diverse population living on top of each other, bounding across town along shared roads and through its subway tunnels. One of the richest cities in the world, its elaborate ecosystem of start-ups makes for a dense, competitive market. The city’s high ratings in governance and public management indexes indicate that it’s a good place to test bold initiatives that go beyond pure efficiency.

An ultra-smart robotic solution for all types of mobility problems might play well within this archetype. Robotaxis could address first- and last-mile problems, and exoskeletons could help people up all those flights of stairs.
Innovation Hub cities are early adopters of new systems, and show an ability to act fast and efficiently. Their criteria for optimization involve innovation over mere efficiency. It’s common to find investors and start-ups voluntarily contributing in showcases in these cities – especially since strategic evolution here is achieved in a spirit of cooperation between the private sector and civic administrations. Whereas Governed Success cities innovate through strict control, Innovation Hub cities facilitate and foster innovation.
Welcome to ‘Congestion City’. Large populations living with little regulation means the current infrastructure is burdened and needs alleviation from its open-market ills. This archetype reveals an opportunity for high-tech large-scale investments enabled by public–private collaborations.

While these cities work with private partners to innovate, and are open to a variety of partnerships, there’s not much of a competitive landscape for innovation here. Companies not already present in these cities typically don’t tend to choose these cities for pilot projects with the same enthusiasm they might have for engaging with Archetype 2 or 3 cities.

For the companies that already do have a presence in one of these cities, however, conditions are ripe to test new solutions that provide a strong potential for large-scale change.

In a Car-Driven city like Shenzen, the next mobility concept might involve a new layer of infrastructure to ease the tension that has built up on the existing one. The opportunities for a private player to come in and solve this kind of infrastructure problem are immense. Imagine multi-seated smartpods capable of connecting to each other, morphing into larger bus or train-like vehicles and thus widening the availability of mobility options.
Defining City Archetypes

Challenged Cities experience quick growth, with little regulation to hamper it. Their neighborhoods and markets feature vibrant bottom-up cultures propelling change through organically designed, adaptive, customized responses to increasing demands.

A pressing concern for Challenged Cities such as Delhi, Jakarta, Cape Town, Alexandria, Lagos, and Johannesburg is overburdened infrastructure. Limited experiments with initiatives such as high-occupancy vehicle lanes in Jakarta have shown the difficulties of solving these challenges.

Along the spectrum of this archetype, Lagos shows a dynamic infrastructure. Extensive road networks, trains, and ferries accommodate one of the fastest-growing cities in the world. Mobile, adaptive kiosks serving as medical clinics, repair shops, or commercial vendors might benefit underserved communities. Or perhaps smartpods might be the next innovation to enhance mobility throughout these diverse environments. Approaches require resourceful solutions at human scale.

While these markets are not typically attractive to international corporations or investors, Challenged Cities do provide conditions ripe for experimentation. Additionally, daring innovations have the potential – when they go well – to dramatically improve people’s everyday experience.
Figure 12. Archetypes 6 - 9
Archetypes 6–9 involve other possible configurations and intensities of ‘A’, ‘B’ and ‘C’ qualities (see Figure 12). If more cities were analyzed and their values taken into account when assessing the average values for the ‘A’, ‘B’ and ‘C’ qualities, cities representing these archetypes would likely be found.

It is a key conclusion that the five archetypes described in the previous subsections will probably make up the major share of cities assessed, meaning that priority should be given to developing strategies, solutions, and tactics for collaboration, business, and research for each of these five core archetypes.
Cities contain the most concentrated energies of people and industry to be found anywhere on our planet. Each city has its own distinct characteristics, environment, and culture. Yet various cities also share certain qualities, behaviors, and tendencies.

Mobility markets come into focus through the archetypal power of a city’s configuration. Certain mobility initiatives for a city like Buenos Aires, for example, might also be well suited to Montréal, which, in similar fashion, satisfies the requirements for high levels of regulation and governmental control. Despite the geographical distance separating them, a strategic market approach to generating mobility solutions for these two cities might be closely linked.

A single player can navigate urban landscapes that are, on the face of it, widely differentiated, by adjusting one set of concepts and initiatives along the archetypal lines set out above. A mobility entrepreneur wanting to test an experimental new initiative would be attracted to an Innovation Hub city, whereas another initiative focused on enhancing a more traditional and widespread modality might direct its efforts toward a city of Governed Success.
An autonomous fleet built for a city with a dominant ‘A’ quality would be promoted as a system making public transport safer and more efficient for fast-growing regions and people facing mobility limitations. Yet for a densely populated ‘B’ quality city with highly efficient public transportation, an autonomous fleet would be presented as fulfilling a service niche, and marketed as the ideal way to commute.

As another example of distinguishing city behaviors, in a city with a dominant ‘A’ quality, traffic operators might actively guide the route choice for AVs, whereas for a ‘B’ quality city, it might be left to the private sector to optimize AV routes. Understanding the nuances of how these qualities are valued and managed helps create a clearer vision for how to approach any given city.

Each archetype defines a market identity through the types of actors and actions already present or soon to be incorporated in that kind of city. Conversely, those individuals, companies, partnerships and ecosystems then help in turn to define the atmospheres of the cities within those archetypes.
In a departure from the historic situation, where nations provided the primary indicators for business evolution, it is cities that are nowadays becoming increasingly relevant in shaping the activities, initiatives, and daily realities of global business players and citizens. Cities are more frequently asserting their individual mobility needs, and bringing their newly acquired legislative and governing powers into play to create mobility solutions.

City archetypes, as defined in this study, help to describe the varied and differentiated landscape of urban mobility. Making use of this concept means that forecasting future-based initiatives for cities and solution-providers becomes less complex. Cities are the sites where impacts of industry-changing innovations first become visible. Moreover, competition between individual cities will further catalyze developments in mobility.

By considering and using the appropriate archetype, strategic initiatives can be better tuned from conceptualization, through to implementation, and on to subsequent elaboration. The more data about a city we incorporate, the sharper the picture of what a city might need, and how that need might best be fulfilled, becomes.
The working model of city archetypes has the ability to inform a diverse range of mobility solutions, as well as to clarify how approaches can be designed for specific modalities. Ultimately, this study underscores the fact that cities have choices as to how they position themselves while they pursue new initiatives, create incentives, and attract various stakeholders. In turn, mobility players have choices about how they engage in activities appropriate to certain city conditions, and scale their models across multiple cities in the same archetype group.

The team’s efforts beyond this study are aimed at creating a canvas for locating ideal mobility partnerships, testing grounds, and solutions at various scales. We continue to be intrigued by the opportunities that exist to improve our understanding of the relationship between mobility innovations and the rising growth, importance and influence of the world’s cities, and are constantly inspired to do just that.
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