EMPOWER CITIES
TO FOSTER INNOVATION
POSITION PAPER

INTRODUCTION

This position paper aims at empowering city leaders to embrace innovation in their urban strategy and to enable sustainable, resilient and inclusive mobility solutions.

The paper recognises that innovation comes from the level of maturity of cities' ecosystems.

Fostering innovation requires from cities to review their organisation and institutions, to become more flexible and to have the capacity to adapt more proactively and rapidly to changes.

Although most cities leaders recognise innovation as one of the main tools to improve their competitiveness, growth and liveability, innovation brings more challenges for cities as it implies changes in the market and more importantly in the distribution of power and responsibilities.

To this extend, there is a need to understand what innovation means for cities and to evaluate and identify what are the key enablers for cities to foster innovation.

Being an innovative city doesn't necessarily call for the adoption of ground-breaking technologies. In many occasions, innovation can be enabled with the implementation of new types of governance, regulation framework, planning processes or any other new or significantly improved solutions or practices.

As a recent study showed [1], cities need to adapt fast to be ready for the "technological revolution in transportation" but they also need to get it right, as decisions made now could lock in the future of the city and its citizens.

Nevertheless, "innovation has increasingly a global character" [2]. Collaboration and access to knowledge are increasingly important ingredients of innovation. To improve their innovation ecosystems, cities need to learn from each other and to share the benefit of innovation while maximising its capacity. Creating a platform where Mayors and cities leaders can share knowledge and experience, and collaborate worldwide can play a crucial role in the development of more innovative and liveable cities.

Based on the findings of the Urban Mobility innovation index (UMii) - a framework that assesses the maturity of the innovation ecosystem in urban mobility of 30 cities worldwide, this position paper highlights some good practices and provides recommendations for Mayors and other decisions makers at all levels, to embrace innovation and challenge the way urban mobility has been traditionally planned, funded, operated and maintained. It provides key enablers to unlock cities' potential for innovation.

The UMii Forum was created as a platform to allow cities to exchange on how to foster innovation for urban mobility.

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[1] Edward Clayton, Senior Executive Director with PwC's Strategy&, "Building Sustainable, inclusive transportation systems: A framework for the future", August 2017. https://www.strategyand.pwc.com/media/file/Building-sustainable-inclusive-transportation-systems.pdf
[2] Francis Gurry, Director General, WIPO, Global innovation index.

Below are presented some of the key findings from the UMii project, from the 30 cities analysed. It is worth mentioning that as innovation is contextual, some cities are more advanced than others, so the findings are for the majority of the cities, although some cities may already have used those levers in their approach to innovation. The examples are there to illustrate the best practices.

CITIES' APPROACH TO INNOVATION FOR URBAN MOBILTY

CITIES' STRATEGY FOR INNOVATION

From the research made for the "Urban Mobility innovation index", it appears that whilst most cities do have an established strategy for urban mobility, these are frequently a statement of ambitions and guiding principles rather than a roadmap set out to address concrete local challenges, informed by comprehensive data.

> Barcelona has a very clear and established strategic focus on urban mobility and innovation.
> The city has developed a very comprehensive baseline that covers supply and demand of the mobility options available in the city, followed by a thorough plan of action that considers multiple scenarios and a magnitude of benefits across various urban systems.

More advanced cities are already breaking policy silos and adopting multi-disciplinary approaches, but examples of cities going beyond recognising it and effectively looking at urban mobility in the wider context of long –term sustainable city development are still sporadic.

Accessibility as the ability to reach opportunities is yet an unexplored concept to most cities as strategies are frequently standalone processes with relatively poor stakeholder engagement, particularly from non traditional mobility areas.

> The "Sustainable Mobility Plan" of Milan was published in 2015 and is the strategic document guiding mobility innovation in Milan. It prioritises the advancement of innovation in urban mobility as a key strategic objective to deliver more efficient mobility, for example providing automated vehicles in public transport and ride sharing systems.

In the case of cities in earlier stages of development, innovation is fundamentally incremental and frequently not even recognised as such. Cities where the mobility system is deficient have their (often informal) strategies revolving around the provision of core infrastructure.

Conversely, in the case of cities in advanced stages of development, there is a stronger manifestation of high-technology innovation to improve their urban mobility system, as strategies shift towards a more service based innovation focus to address the challenges of smart mobility.

CITIES' CAPABILITY TO ENABLE INNOVATION

Most cities refer to their limited internal capacity to address innovation in urban mobility effectively.

To cope with the demanding future of cities, and in an effort to build a network of talent they can draw upon, some cities have created autonomous structures dedicated to urban innovation such as innovation labs, and others stakeholder platforms

> Amsterdam recently invested €65 million to create the Institute for Advanced Metropolitan Solutions to attract and retain international students and strengthen technology. The AMS Institute is composed of science, education, government, business partners and societal organizations that are working together to create solutions for the complex challenges the metropolitan region of Amsterdam is facing across various urban systems. The institute focuses on developing research and innovation projects, especially on active modes to generate real time insight and predict pedestrian and bicycle movement.

that work together towards a common vision. Cities who don't benefit from internal capacity to enable innovation, have established partnerships or collaboration agreements with universities and industry.

Overall, research reveals the significant skills' gap and lack of capabilities as one of the key obstacles to address the challenges smart mobility impose.

Los Angeles Transport Authority has created a dedicated "Office of Extraordinary Innovation" (OEI) to drive mobility innovation in Los Angeles. The body aims to find and test ideas that have the potential to improve mobility for citizens across the city. They are tasked with identifying, evaluating, developing, and implementing these new approaches.

On the other hand, to counterbalance the deficit in city-level competences, cities have been seeking to create welcoming environments to enable experimentation by building an open innovation ecosystem. There are already some examples of cities that have embraced the concept of a living lab, promoting co-creation processes for innovators to experiment new solutions in a real-world context.

However, despite engaging the users in innovation processes, this is not yet an embedded approach for most cities.

CITES & DATA

Research shows most data collected by urban mobility authorities focuses on transport related data, most common being information on ticketing systems, vehicle location (GPS) and cameras (used either for licence plate recognition or for security purposes). There are also some examples of crowdsourcing through mobile applications, as well as some cities that extend data collection

beyond transport data to cover areas such as demographics and environment.

Examples of cities exploring data collected for internal purposes such as prioritising decisions or reviewing procedures are still limited. Data analytics capabilities in city authorities are rather limited and the extent to which data is used to inform city processes is not easily demonstrated.

The Land Transport Authority of Singapore (LTA) use several mechanisms to collect data across the city, providing a depth of information. For example, LTA crowdsource data from social media platforms and journey planning apps used across the city to gather insights on users' experiences.
Through 'DataMall', an integrated open data platform, LTA publishes a wide variety of live and static transport data to encourage third parties and citizens to develop innovative mobility solutions.
DataMall is hosted on 'MyTransportSG' which is a portal for users to find eServices for all modes of transport in the city, interactive maps, real time information and the top apps built with the open data.

However, high-performing cities are finding ways to turn this data into smart data for instance by providing open access in structured databases

Transport for London (TfL) also introduced its first technology and data strategy in April 2016 focused on harnessing technology and data to deliver improvements and foster innovation in the city.
By creating specific roles within TfL that are responsible for fostering mobility innovation, they have been able to provide easy access to real-time data for third-parties. An open, unified API presents all the real-time data that is semantically similar for each mode of transport, provided in the same format and structure. This is encouraging the market to produce new and innovative customer facing products for mobile smart phones.
Over 12,000 developers have registered for TfL's open data services which are powering over 600 apps, used by 42 per cent of Londoners.

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which can be accessed by external stakeholders through APIs. Similarly, cities have been promoting its usage for research purposes by establishing agreements with universities.

But while there are many interesting examples of how cities are collecting data and promoting data-driven innovation by sharing it to third-parties, evidence suggests an interesting paradigm: on one hand, there is an incredible value that remains untapped as cities are still relatively immature in using data to inform decision and policy making in the city.

On the other hand, there is a risk of data over-flow as considerable investments are being made in the 'instrumentalisation' of cities to collect the most diverse type of data when the full potential of its value is still to be established.

In Dubai, the large amounts of data collected by the Roads and Transport Authority (RTA) is being used internally to perform analytics and enhance planning. For example, RTA is using data collected from the taxi tracking system to improve transport planning by calculate KPIs related to average journey time, journey distance and speed. The taxi data is also used to understand trip origins & destination and to estimating estimate speed along different roadway segments

Although cases of cities encouraging data usage by communities of innovators are easy to find, there are yet not many concrete examples of the value added by such service in the development of new urban mobility solutions by third parties.
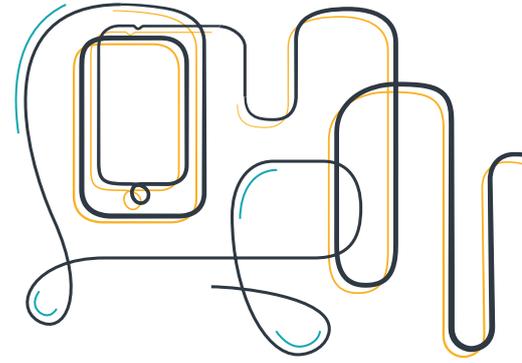
CITIE'S CAPACITY TO DEPLOY INNOVATION

REGULATION AS A TOOL TO SUPPORT INNOVATION

The majority of cities have a reactive and passive response to regulatory barriers, particularly towards more disruptive innovations as these explore new, unknown, ground which city authorities are not familiar with. Today cities have not only to face ground breaking technologies but also new business models. This type of innovation tends to be undertaken primarily by new entrants with whom they do not have pre established channels of communication.

> The very active approach taken in Singapore to encourage innovation is supported by the informal process LTA has in place to identify barriers to innovation (particularly regulatory barriers). LTA has established channels with policy makers and actively works with them to adjust policy to support innovation in the city. For example, small start-ups, developers or citizens were struggling to enter the market due to high set-up costs. As a result, policy was adjusted to significantly reduce set-up costs and new lines of seed funding were provided to those struggling to establish themselves. LTA has also recently amended the legislation to provide flexibility needed to assess the appropriate regulatory response to automated vehicle technologies more quickly. Singapore wants to ensure that the rules keep pace as the technology and trials advance. This new reguloty sandbox is limited to five years.

Given that most regulatory frameworks are designed at national or federal level, cities need to be creative to act within the boundaries of their institutional power. Several cities have been working with central governments, advocating for change at national level. One of the most common example was when Uber or Careem were starting their business in cities who didn't have the capacity to regulate.

Equally, cities have also been creative in adapting their own rigid and bureaucratic processes: challenge or outcomes-based procurement

> In Dubai, innovative ideas that are being developed and tested in Dubai are helped by the streamlined leadership and decision-making processes which facilitate easy leadership communication and fast decision taking, helping to limit the number of bottlenecks to innovation, in particular regulatory barriers. In RTA, current regulations and contract conditions have been tailored to allow RTA to work with innovative companies, start-ups and universities to be able to test and pilot ideas and innovations.

processes have started to emerge (including procurement of innovation mechanisms such as Pre-Commercial Procurement and Public Procurement of Innovative Solutions), though not commonly known.

It is worth noting the overall difficulty in assessing the indicators under 'Regulation' , as absence of information in this domain poses the question of how open and prepared are cities to disruptive innovations and the challenges that fast-paced innovation age cities face.

> To encourage third-party innovation in the city, Hong Kong government have set up the $300 million 'Pilot Green Transport Fund' to support the testing of green and innovative technologies that can help improve roadside air quality and reduce carbon emissions from the transport sector. The fund was started in 2011 and to date, 101 projects have been supported by the fund, amounting to a total subsidy of about $86 million.
> The city has developed innovative ways of generating funds that pays for many of the innovations and high quality services available to users. For example, MTR, Hong Kong's Public transport operator, receives a share of the retail profits or a percentage of property development fees, in return of bringing customers to retail shops and shopping mall.

INVESTMENT FOR INNOVATION

High-performing cities have a combination of dedicated funding for internal investment and grants for external stakeholders.

Ring fenced budgets for internal investment, when available, are often restricted to capital expenditure (for instance for the expansion of the cycling network, bus fleet renovation or core transport infrastructure), whereas other R&D investments are typically subject to funding on a project by project basis, either going through a local or regional/national approval process or a competitive innovation grant that also promotes collaboration with third-parties.

Budgets allocated to grants are usually channelled to local innovation competitions or used as kick-start money for start ups. Equally, some cities actively promote external innovation through the creation of innovation awards and other competitions.

Helsinki Regional Transport authority launched in 2012 a pilot for a new type of on-demand mini bus service to complement the subway and traditional bus route, called "Kutsuplus". Despite proving technology feasibility and user acceptance, the city authority decided to end the experiment in 2014, considering the investment foreseen to scale up the service, too important, as it was heavily subsidised.

Cities' ability to attract private funding for innovative mobility projects also varies significantly. Establishing close partnerships between the public and private sectors to co-create innovative mobility solutions is a key principle of many cities' mobility strategies.

ENGAGEMENT PROCESSES WITH USERS

User engagement has become an increasingly common practice among city planners, designers and many other professionals to harness the knowledge of communities by opening their processes to the different stakeholders. By user,

it is meant any person who benefits from any opportunity the city provides (incl. citizens, commuters, tourists).

Commonly, governments, businesses, civil society and academia, work together to tackle complex problems in a more effective way - though often a more resource intensive and time consuming one - gathering insights from the concerned parties, besides building trust and gaining support in the solutions proposed.

Overall, lots of engagement is happening but it is very difficult to assess the quality of the dialogue. Equally, active participation in which planning and decision making responsibilities are shared with the users - for instance by calling for ideas, through collaborative design methods or deliberative campaigns - is still an unusual practice among the cities.

Transport NSW place user engagement high on their priorities. The 'Join the Discussion' portal aims to function as a non-traditional engagement tool to give citizens a platform to share their views. Users can openly propose new ideas, feedback and provide recommendations on the cities 'Future Transport Roadmap'. Another innovative engagement tool driven by Transport NSW is the 'Future Transport Simulation' gamification tool. The simulation allows users to make decisions on where investment should be focused on the transport network over the next 40 years. They can then see the potential impacts of the interventions they have made on the city.

Likewise, feedback on user experience remains often collected through paper-based surveys as cities lack automated systems to capture this type data. Nonetheless, there are some examples of cities using this intelligence to improve local services and drive local innovation, although fewer cases exist in which these insights are fed into the planning process, creating a feedback loop to update the city's course of action.

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URBAN MOBILITY INDICATORS FOR LIVEABLE CITIES

Even more advanced cities still have a narrow conception of the user as the passenger or customer of the transport network, instead of looking at the user as any person who benefits from any opportunity the city provides, user or non user of the mobility services available.

Overall, most cities undertake some level of engagement, but there is lack of evidence of embedding user-centred design principles for innovation in urban mobility.

SEAMLESS & INTEGRATED MOBILITY

In order to develop innovative transport systems, the city must take a holistic approach to joining up infrastructure and services across the city, but seamlessness includes developing both administrative, physical, fare and technological/ integration.

Currently, most cities ensure physical integration through integrated, interoperable ticketing systems. Whilst it is relatively common for cities to have contactless ticketing systems and inter-modal transport facilities, research couldn't find evidence of cities investing in deploying barrier-free systems in the near future.

> Helsinki's innovative approach to data also made it possible to be one of the first cities in the world to have a Mobility as- a-Service solutions - 'Whim'. Whim is a mobility app that offers users different monthly bundles of mobility services provided by different operators and usually not integrated (public transport, taxis, car rental) that better suits their usual mobility profile. The user can also opt for a pay as you go variant.

As for digital integration, transport operators are using their data mainly to improve their operations, but technological/digital integration at transport authority level of the different mobility solutions offered (e.g. Mobility as a Service) is still at a very early stage of trialling or small-scale piloting.

> WienMobil, the Vienna MaaS set up by Upstream a subsidiary from Wiener Linien, offers simple and convenient access not only to bus, tram and metro but also to all publicly available mobility services such as e-loading stations, parking garages, taxis, Citybike, car sharing and car rentals. It gives multimodal real-time information about journeys and routing, and users can also book and buy tickets for their whole trip. Moreover it offers many options for personalization such as walking speed, walking distances, preferred modes or personal routing.

Similarly, in most cities wayfinding is a functional tool to ensure users reach their destinations rather than to actively promote an efficient and effective, or even healthier, end-to-end journey.

> MVG, the Munich public transport company, has a well-connected and seamless public transport network that integrates various mobility services both physically and in the mobility App "MVG more". 'Mobility Stations' are strategically located by major transport nodes and interchange hubs across the city, to provide users with a single place to access alternative mobility services such as car and bike sharing, bike+ride, charging infrastructure and taxis aiming to provide a last-mile solution and reduced use of private cars.

FAIR, ACCESSIBLE & HEALTHY MOBILITY

Most of cities recognise the societal value of healthy modes of transport for urban mobility, but as cities have until now been built around cars, efforts required today to ensure the security of pedestrians and cyclists are considerable.

However, safety along with fairness and accessibility are both key elements of city users' wellbeing and happiness.

Albeit in more advanced cities users have a relatively wide range of alternative mobility solu-
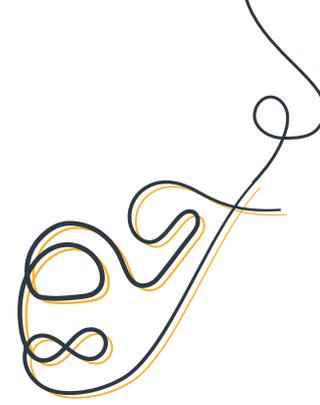
Chicago provides alternative mobility solutions to users. Implemented by Chicago DoT (Department of Transport), Divvy is a well-integrated, widespread bike sharing system with nearly 6,000 bikes available across the city. The availability of bikes at docking stations can be viewed in real time and booked through a mobile app which also provides feedback on user experience to the DoT. Other mobility services in the city can be purchased through 'Ventra', the cities smart, integrated ticketing system. Ventra can also be used to purchase goods and pay for bills.

tions at their disposal in addition to conventional public transportation, such as shared and community based solutions like bike sharing, car sharing, carpooling and pedibus. Coverage of such options is quite diverse among cities as well as the quality of the service provided.

Research shows there is a big gap in data collection, and in particular environmental performance, accessibility and fairness are overall very difficult to assess for urban mobility.

PRACTICAL RECOMMENDATIONS

Overall research shows that levers cities can activate more efficiently to support innovation are primarily the capability to plan, support and deploy innovation; the use of data to inform decision and planning process, and the capacity to influence their regulatory environment to make it more flexible to enable innovation.

Based on those recommendations listed above, some key enablers for innovation have been identified and represented as an "Urban mobility innovation wheel".

- Developing a comprehensive and sound urban vision and strategy is the beginning of an innovation process, as it offers a tangible commitment towards all city users, providing the space for meaningful dialogue with stakeholders in the search for common ground on mobility, alongside with achieving shared responsibility for a successful implementation of the strategy.

- To work towards a mobility strategy fostering innovation, a city must secure the appropriate institutional and human capacity and the right set of capabilities not only to create an innovation-friendly environment that invites innovators to experiment in the city but also to be able to apprehend innovation and assess its impacts on the city's ecosystem.

- In a fast-paced innovation age, cities must have a proactive approach in identifying new trends and in collaborating with new mobility providers. Cities should be ready to address regulatory barriers and adapt their regulatory framework to make it more flexible.

- Given that most regulatory frameworks are designed at national level, cities need to be creative to act within the boundaries of their institutional power, for instance by looking for alternative ways to procure innovative services, but also collaborate with national government to influence the change in regulations in favour of better urban mobility.

- Non-financial barriers to innovation, such as regulatory and contractual rigidity, hamper the development of new urban mobility solutions by increasing the burden and costs of innovation, which are particularly weighty on SMEs and start-ups. By adapting and making bureaucratic processes less rigid, in particular for purchasing, cities will be able to increase their capacity to develop innovative mobility solutions.

- Although Investment in Research & Development is critical to boost excellence and support innovation, investment can't come only from public funding. Cities need to search for a better mix of funding and look for alternative ways to invest. Cities can learn from each other on how to attract private funding as some are more successful than others, but they can also decide to cooperate and to replicate the same innovative solutions, to provide an economy of scale and become more attractive for the private sector to invest.

- Collaboration with private sector and new actors is key not only for financing, but also for co-creating and integrating new mobility services.

- While the lifecycle of user engagement should begin right at the beginning of the development of the city's strategic mobility plan, users should be fully engaged throughout the decision-making processes and not just consulted for validation.

- While quantity of data is increasingly available, cities must ensure the quality of the data collected and adopt standardised ways of collecting and sharing data. Data should be used to inform cities' strategy, but also to assess the performance of the cities to implement their strategy as well as for improvement of mobility systems.

- Engagement methods and tools may vary from a city to another but it should evolve towards more collaborative design and co-creation methods to ensure user acceptance of changes and guarantee a user centric mobility.

- Cities should adopt different types of indicators, which are not usually the ones owned by urban mobility stakeholders, for example, the quality of user engagement, the seamlessness and integration of different modes of transport in a comprehensive system, physically and digitally, publicly or privately run and the range of choice of mobility options offered by the city including active travel. Efforts should be made to develop data collection to measure those indicators at an urban level. Ideally those indicators will be made public to encourage organisational transparency.

- Cities should try to find various ways to assess the wellbeing and happiness of the city's users. Fairness, safety and accessibility to opportunities and services are key elements of those concepts, but it is today very difficult to use them as indicators as data is missing at a city level.

- Although a lot of cities seem to take into account the environmental impact as a way to recognise the benefits of new technologies and innovative solutions for urban mobility, improvements to collect and standardise the data in urban areas still need to be made. In addition, this data could be used to inform urban mobility actions.

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THE "URBAN MOBILITY INNOVATION WHEEL": KEY ENABLERS TO IMPROVE INNOVATION IN THE URBAN MOBILITY ARENA

This paper aims at providing a practical tool to empower cities to foster innovation for the development of their urban mobility systems. Based on those recommendations listed above, some key enablers for innovation have been identified and represented as an "Urban mobility innovation wheel".
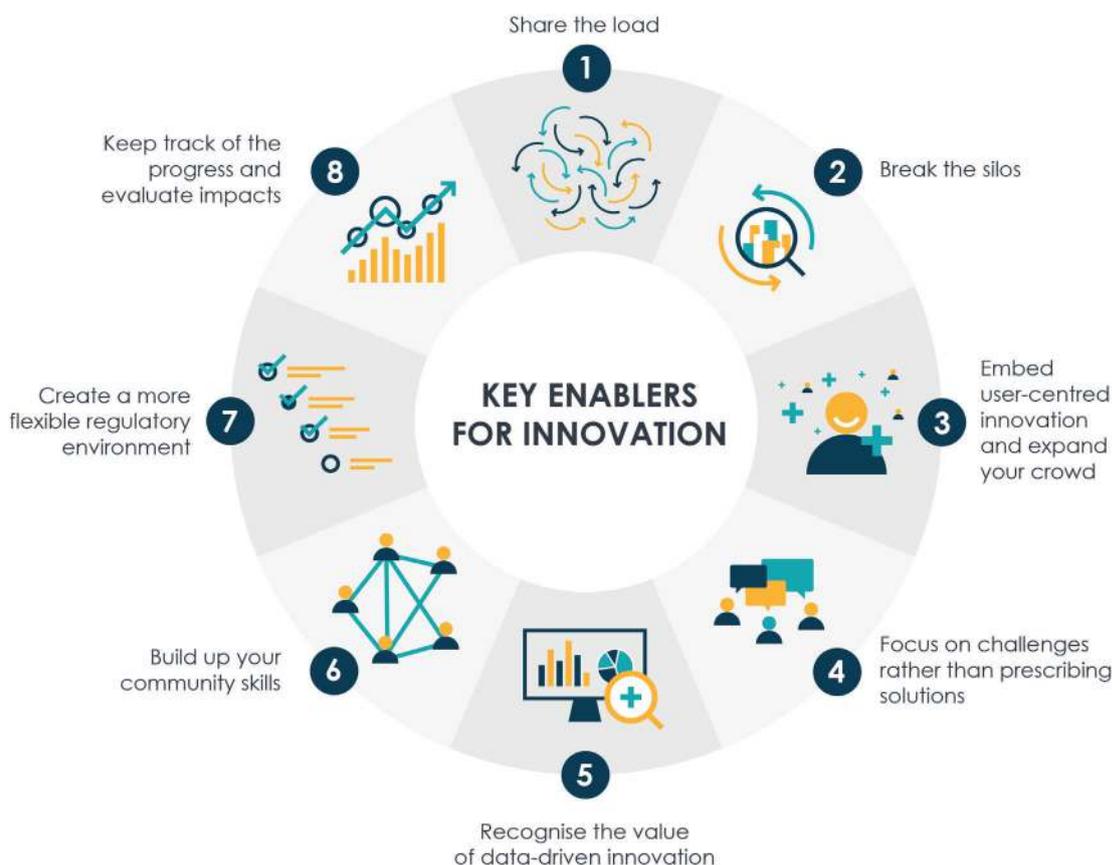
1. **Share the load.** Bring stakeholders together from both traditional and non-traditional domains to create an ecosystem and embrace co-design approaches. Innovation should be a shared process and you will gain from sharing the ownership of your city strategy with the ones that will benefit from it.

2. **Break the silos.** Look at urban mobility in the wider context of long term sustainable city development as it is not just a transport challenge. A multi-disciplinary approach is key to work towards more liveable and resilient cities. Cities must look at combined strategies to improve accessibility to jobs, services and facilities, which might not necessarily mean improving mobility.

3. **Embed user-centred innovation and expand your crowd.** Take the user as any person who benefits from any opportunity the city provides and focus on user needs and preferences.

4. **Focus on challenges** rather than prescribing solutions. Innovation comes from very different places and you don't always have to know the exact answer to every problems. Enable the community of innovators to help you by creating an open innovation environment.

5. **Recognise the value of data-driven innovation.** There is an incredible value that data can bring to support your decisions and development of

new solutions, but don't fall into the trap of big data. There is a difference between big and rich data.

6. **Build up your community skills.** Establish networks of capabilities you can draw upon you as you can't do it all by yourself.

7. **Create a more flexible regulatory environment.** It is important for cities to develop a proportionate and well measured response given innovations are quite often hindered by the existing regulatory environments.

8. **Keep track** of the progress and evaluate impacts. Be specific with your targets, monitor and follow-up.

CONCLUSIONS

Based on the research made within the framework of the Urban Mobility Innovation Index[3], this position paper should raise the awareness of cities and transport decision makers about the importance to integrate innovation as part of their strategy to define a bright future for urban mobility.

Identifying global trends while recognising the contextual character of innovation should guide cities in preparing themselves for the "technological revolution in transportation" and help them to deliver the level of quality of travel expected by users, despite mobility systems reaching their limits.

Today even cities who thrive should constantly assess their performance in deploying new mobility services as needs will continue to grow and expectation of users will become higher. Cities need to get ready for the new wave of innovation, by adopting those key enablers for innovation identified in this paper. This should help cities to find ways to maximise the benefits of new technologies.

The practical recommendations of this position paper and the "Urban Mobility Innovation Wheel" will hopefully empower cities to foster innovation and take thema step forward towards smarter urban mobility and greater liveability.

This paper has been endorsed by:

UITP (International Association of Public Transport)
UITP is a passionate champion of sustainable urban mobility and is the only worldwide network to bring together all public transport stakeholders and all sustainable transport modes. We have 1,400 member companies giving access to over 18,000 contacts from 96 countries. Our members are public transport authorities and operators, policy decision-makers, research institutes and the public transport supply and service industry.

Key Contributor:

Future Cities Catapult

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[3] www.umi-index.org