ERTICO

CITY MOONSHOT

Global survey on urban transport and mobility:

Results of Phase I

Understanding city authority needs, strategies and plans on transport and mobility in relation to the climate crisis, air pollution, data sharing and Mobility-as-a-Service.

ERTICO-ITS Europe

ERTICO- ITS Europe is a public-private partnership of around 120 companies and organisations working on and with Intelligent Transport Systems (ITS). ERTICO partners include public authorities (cities, regional and national road / transport authorities), service providers, traffic and transport industry, suppliers, user organisations, connectivity providers, research institutes and universities, and vehicle manufacturers. The partnership promotes and enhances the benefits of ITS, working towards zero road fatalities, zero transport inefficiencies and to eliminate road transport's negative impact on the environment and its contribution to the climate crisis.

The partnership researches, develops, evaluates, promotes and deploys smart mobility solutions in the field of Intelligent Transport Systems & Services (ITS) and aims that these solutions serve the needs of mobility users and enhance their quality of everyday life. The ERTICO partnership's work is delivered through various activities, including public-private ITS stakeholders' cooperation on European co-funded projects, self-funded innovation platforms, and other activities while also contributing to international cooperation. ERTICO brings the wider ITS and smart mobility community together by organising annual ITS Congresses in Europe and abroad with its counterparts in the ITS America and ITS Asia-Pacific regions.

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The success and outreach of the City Moonshot initiative is a result of cooperation between more than 300 public and private entities. This cooperation includes the representatives of the 150 interviewed cities, who have offered their time and expertise in these interviews.

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WELCOME NOTE

Dear Friends,

It is my pleasure to present to you the City Moonshot: “Global survey on urban transport and mobility” report as the incoming CEO of ERTICO-ITS Europe.

The ERTICO partnership is truly a community of public and private stakeholders and partners in the ecosystem of smart and sustainable mobility, hence it was of paramount importance to enable, establish and engage the dialogue with the cities, in Europe and worldwide. As far as we know, the City Moonshot is a unique initiative, whereby in the first phase we spoke with more than 150 cities and their senior representatives on topics of sustainability and air quality, data sharing and Mobility-as-a-Service (MaaS). The results of these conversations are in front of you. We sincerely hope you will enjoy reading, and perhaps come back to the report as a useful reference in finding out what are the main challenges and objectives of our urban agglomerations, what they think about data sharing and MaaS, and many more questions and answers.

The journey does not stop here. We are continuing the initiative, and we aim to interview, for example, all 100 climate-neutral cities as selected by the European Commission, and other cities and regions worldwide who want to share their views on the most pressing topics and challenges in the transport and mobility industry. I also want to pay my tribute to my predecessor, Mr Jacob Bangsgaard, under whom the initiative has been introduced and the first phase delivered, which concludes with this report.

A big thanks to the team and the participating city representatives for their time and endeavours.

Sincerely,

Joost Vantomme,

CEO

ERTICO-ITS Europe

EXECUTIVE SUMMARY

What is the City Moonshot?

The City Moonshot is an initiative launched and led by ERTICO- ITS Europe aiming to increase understanding on how cities worldwide are responding to current and future challenges in mobility and transport. More specifically, the initiative investigate how cites are addressing challenges such as climate change, air quality, digitalisation, disruption, multimodality and how they are meeting the needs of their citizens and economies.

Following discussions within the ERTICO partnership, the City Moonshot initiative was launched in early 2020 with an ambition to gather and share information on the needs, challenges and solutions of cities worldwide, for the mutual benefit of all cities as well as other actors in the transport and mobility sector, such as industry, service providers and researchers. To this end, the initiative has been structured as a series of semi-structured interviews with senior managers or directors responsible for transport and mobility in their city or metropolitan council.

In the first nineteen months of the activity (May 2020 - November 2021), the City Moonshot conducted 150 out of targeted 300 interviews with the cities. The achievement is a great success with more than 100 cities interviewed located in Europe, and approximately 50 cities dotted around the globe, from New Zealand to California, from South Africa to Japan. The evidence of the successful completion for Phase I was an overwhelming interest demonstrated at the 27th ITS World Congress in Hamburg in October 2021.

During the Congress, the ERTICO Partnership was praised for opening an important dialogue between the public sector agencies managing transport and mobility in cities and regions around the world and their counterparts in the industry. ERTICO has acted as a catalyst for this exchange of best practices and needs of cities, asking 58 questions relevant to the most pressing topics and giving voice to those with a mandate to implement mobility solutions at the local and city-region level.

Common challenges and shared goals

The data collected during the Phase I of the City Moonshot initiative demonstrate the reasons why cities located in different countries and continents are implementing similar measures: the underlying challenges are the same. Indeed, 61% of the cities indicated traffic congestion as their primary challenge in terms of mobility, followed by pollution and noise, lack of budget/resources, and resistance to change by their citizens. Unsurprisingly, similar challenges are reflected in the mobility goals shared by all cities interviewed, the top three being: improving the public transport system (79% of the cities), improving air quality (68%) and decarbonising mobility in the City (68%).

While air quality has been recognised as a key priority for cities for many years, the City Moonshot initiative shows that transport decarbonisation needs, driven by the climate crisis, are considered equally important by the city transport and mobility professionals.

Climate crisis, air pollution and transport

The largest share of cities interviewed agreed that the best way to deliver on their carbon neutral targets is through collaboration with citizens in co-creating policies and actions, as well as by introducing green incentives and setting those targets as a priority in the city's agenda. It is encouraging to see that 92% of the interviewed cities are already undertaking transport-related actions to address the climate crisis.

There are many different examples of initiatives implemented by cities to tackle the climate challenge: adding bicycle lanes (implemented by 85% of the interviewed cities), further investments in the public transport system (75%), and installing charging infrastructure for e-vehicles (72%) are just some of the actions cities are already undertaking.

One of the ways to highlight the need for real action in cities worldwide has been to declare a climate emergency. Close to 2,000 authorities, mainly local ones, have already taken the step. The findings of the City Moonshot initiative show that 70 cities out of 150 either have already declared or are planning to declare climate emergency. On the other hand, 61 cities stated that they do not plan to declare a climate emergency. However, it is worth noting that, even if some cities have taken a decision not to declare climate emergency that does not directly mean that they are not active when it comes to climate actions. Some of the cities have decided not to declare climate emergency, but still have a target to become carbon neutral.

Air quality is one of the key policy priorities for city authorities. The interviews highlight that a vast majority of cities (89%) are measuring air quality. In the 59% of cases, this is done (59%) on a daily or hourly basis. A majority of cities (52%) share the results of their air quality measurements with citizens. In 37% of cases, cities change and adjust their transport policies depending on air quality levels.

The impact of the COVID-19 pandemic on transport and mobility and its related CO_2 and pollutant emissions impact has been complex. While the

final longer-term effects are not known yet, the interviews indicate that the impact of pandemic can be associated with the accelerated deployment of some green and sustainable solutions. Especially the introduction of temporary bicycle lanes has been seen as a highly positive outcome from climate and air pollution perspectives (and some have been converted to a permanent solution), while restrictions in the operational capacity of the public transport services has been removed as soon as it was possible.

Role of data sharing

Another trend that emerged during the City Moonshot interviews reflects cities' awareness about the fundamental role that cooperation and data sharing play in addressing the climate emergency. Approximately 81% of the interviewed cities is already cooperating, or is willing to cooperate with private entities to jointly elaborate and build innovative solutions based on available data. 129 cities out of 150 are already sharing (or are willing to share) their data with transport providers in their city and other cities. At the same time, 122 cities share (or would do so) their data with private entities. Finally, almost all of interviewed cities would be willing to share their data with ministries, governments and scientific institutions.

Data sharing can however be a complex process due to regulations concerning data privacy. Another complexity is added by the different standards used by different organisations to share data. To enable data sharing, there is perhaps a need for better communication between stakeholders regarding the type of data in which they are interested, and which standards they use.

Mobility-as-a-Service (MaaS) exhibits untapped potential to improve mobility in urban habitats

Figures by relevant researches indicate that in the next few years MaaS business will be nearly 130 times[1] bigger than what it was at the beginning of the decade. Importantly, the interviews conducted by the City Moonshot Initiative highlight that cities in Europe (especially in Northern and Western Europe), stated that both studies and projects on MaaS exist and the mobility professionals interviewed have a very good insight into both the challenges, but also the benefits that can be accrued by deploying MaaS in the cities. Amongst 150 cities interviewed, 105 (70%) answered that MaaS should be deployed through a joint effort between city-led and private sector-led stakeholders. This once again shows that cooperation and coordination among mobility sector players is considered essential to the further development of the transport system.

Engaging citizens

Overall, cities deploy different activities to engage with their citizens and learn more about their transport and mobility needs. Some of the main activities and tools are public surveys, complaints handling, public consultations, and mass media campaigns. In general, most cities are open to collaboration with external entities regarding transport and traffic management. Regarding knowledge on and involvement in ITS and C-ITS, the vast majority (79% and 69% respectively) of the cities have previous knowledge and/or are involved in these two topics. Finally, cities are very interested in most of the topics regarded in the questionnaire, especially e-mobility and cooperative ITS services (C-ITS).

Finally, the report ends with suggested next steps. These include continuing to interview additional cities to complete the goal of gaining in-depth understanding of their needs, thoughts and plans by interviewing a total of 300 cities. The ERTICO Partnership will continue to organise events to share the results of the research, and further the dialogue on the climate crisis, air pollution, data sharing and MaaS implementations with cities and private partners around the world.

1 https://www.juniperresearch.com/press/mobility-as-a-service-revenue-to-exceed-$52

ABBREVIATIONS

CAD	Connected and Automated Driving
CCAM	Cooperative, Connected and Automated Mobility
C-ITS	Cooperative Intelligent Transport Systems
DATEX II	Exchange of traffic information between traffic management centres, traffic service providers, traffic operators and media partners
DG-MOVE	European Commission's Directorate-General for Mobility and Transport
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ERTICO	European Road Transport Telematics Implementation Coordination
EU	European Union
EV	Electric Vehicle
GDPR	EU General Data Protection Regulation
GHG	Greenhouse Gas
GTFS	General Transit Feed Specification
ITF	International Transport Forum
ITS	Intelligent Transport Systems
MaaS	Mobility as a Service
MoD	Mobility on Demand
MDS	Mobility Data Specification
OECD	Organisation for Economic Co-operation and Development
SUMP	Sustainable Urban Mobility Plans
TMDD	Traffic Management Data Dictionary
TN-ITS	Transportation Network of Intelligent Transport Systems
UN	United Nations
WHO	World Health Organisation

1. WHY A "CITY MOONSHOT?"

The idea of a City Moonshot was originated from internal discussions within the ERTICO partnership. In the pre-pandemic times, ERTICO experts and partners could already foresee that radical changes in mobility and transport were under way. Some changes had already been ignited by the climate crisis. Numerous cities started declaring a climate emergency and a need to respond.

Another driver that prompted cities to start an action programme is air pollution in urban centres. Poor air quality levels are known for leading to millions of premature deaths worldwide, as well as to illnesses that put an unnecessary strain on health services. At the same time, an increasing number of decision makers around the world started to recognise the immense opportunities to improve transport offered by digitalisation. while we have seen the arrival of new mobility services and concepts. As a result of these developments, a question emerged:

How can ERTICO, as a true public-private partnership, support and facilitate the mobility (r)evolution that these radical changes brought in urban environments?

The answer was clear: as a society, we need to gain a better understanding of how mobility in urban areas is evolving and ensure that the direction is both sustainable and effective. But then, another question emerged: what do cities define as 'liveable places'?

At ERTICO, we realised that this change has to be backed by solid knowledge and data, if the cities are to make informed decisions in their policy and actions. Regional and national public authorities, but also private stakeholders, should become aware of the real needs of the cities that are at the forefront of this mobility disruption.

In response to this, the City Moonshot was born: it was agreed among the ERTICO Partnership that we should interview a target of 300 cities worldwide to understand their needs, strategies and plans. A preliminary split of interviews was agreed upon: 200 cities in Europe; 25 in China & South-East Asia; 25 in North America; 25 in South America; 25 cities divided between in Africa, Oceania and the rest of Asia.

Three major topics were selected to serve as a focus of this survey that would be based on 58 questions in total. These topics were seen as mirroring the decision making priorities identified at international level. This also meant, that there would have been a high probability that cities would address them at local level:

> "The endeavour seemed daunting in the beginning, and hence the name of the initiative, but still, a target that all of us believed in and aspired to complete. The 150 interviews presented in this Report, clearly show that cities want to share their experiences and discuss their concerns in an open and fruitful way; they share the understanding that unless action is based on the cooperation between the public and the private sectors, no challenge can be successfully addressed in mobility."
>
> **Dr. Johanna Tzanidaki,**
> **Innovation and Deployment Director, ERTICO**

1. **Sustainability (climate change and air quality)**
2. **Data sharing**
3. **Mobility-as-a-Service (MaaS)**

The City Moonshot is, to the best of our knowledge, the largest set of interviews so far conducted with cities worldwide on transport and mobility. The first 150 interviews have given us unprecedented insights and knowledge, and the City Moonshot initiative is expected to continue to do so in 2022 for the further interviews that will follow in the second phase of the initiative.

2. INTRODUCTION TO THE TOPICS

Why cities?

According to the UN[2], 68% of the global population will be living in cities by 2050. Moreover, the world, and mainly the developing regions, will count more than 40 megacities, which are cities with over 10 million inhabitants, by 2030.

With a conspicuous and ever-growing share of the world population living in cities, it is key to focus on cities and on the pillars that sustain life in these environments. Transport and mobility are two of those pillars, being essential to the proper functioning of cities. Well-developed mobility systems encourage population welfare and, particularly, social inclusion by allowing access to a high concentration of opportunities usually present in urban areas like jobs, health, education, leisure and culture. The impact that mobility and transport have is so significant, that they can even be described as the lifeline of our society as they enable our economic functioning in societies by moving goods and people.

Sustainability (climate crisis and air quality)

While urbanisation and urban mobility schemes enable better standards of living for millions of people and open new opportunities in their professional and personal pathways, they also carry some unintended side effects that need to be addressed to reduce the negative climate footprint and guarantee long-term sustainability for both the urban areas and their inhabitants.

One of the first challenges to be tackled by city authorities in their efforts to make cities more liveable is Greenhouse Gas (GHG) emissions reduction. In the European Green Deal, the European Commission has set the targets of the European Union to contribute to a sustainable world: the EU aims for Europe to be "the first climate-neutral continent" by 2050. This includes a reduction of GHG emissions by 90% by 2050, with an intermediary target for emissions reductions set to "at least 55% by 2030"[3]. These targets are already highly challenging, but further delays would make the reduction targets increasingly more difficult to achieve. It goes without saying that the time to act is now. Transport represents about 25% of GHG emissions, and its share will rapidly increase unless polluting emissions are drastically reduced.

The climate crisis warning was issued through the 2018 IPCC report[4], which gave the 'code red for humanity', highlighting the need for mitigation efforts to be directed towards slowing down and ultimately end GHG emissions. Up to June 2021, more than 1900 local governments, mainly city authorities, had declared a climate emergency[5]. Many more are expected to follow, but what will the climate crisis mean for transport and mobility in the cities around the world?

The second important topic of concern for city authorities with regards to transport in urban areas is air quality. The World Health Organisation (WHO) estimates that close to 7 million people die prematurely every year due to air pollution and bad air quality. To those premature deaths, poor air quality determines additional illnesses, which impact on health services, economic productivity and quality of life. GHG emissions and air pollution are generated by multiple sources but in general, nearly a quarter of global emissions can be attributed to the transport sector[6]. As a result, transport emissions could be significantly reduced by transitioning towards cleaner mobility modes.

Data sharing

It is well acknowledged that digitalisation can to offer many opportunities to make cities smarter, especially when it comes to mobility. The penetration rate of smart phones is estimated to have reached 78% worldwide in 2020[7]. Our vehicles (cars, buses, bicycles, etc.) are increasingly connected to the smart phone of the users, with other vehicles (Vehicle to Vehicle) and to the road network infrastructure. To fully exploit this potential and develop dynamic and interactive transportation systems, there is a need for comprehensive mobility data to be shared among stakeholders. The insights these data would provide are the cornerstone to developing a well-adapted mobility system as they would allow planners and policymakers a good understanding of the needs of cities and citizens.

However, the collection and analysis of data can often be overwhelming, especially for sectors like mobility, where there is a large amount and a wide variety of relevant data. Data sharing is becoming increasingly popular within the mobility sector and has proven to have a lot of potential. Unfortunately, data sharing remains complicated and an underused resource for many organisations, both public and private. Integrating a section on Data Sharing in the City Moonshot survey has allowed us to better understand how cities feel about data sharing

2 https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html
3 https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/delivering-european-green-deal_en
4 https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf
5 https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/
6 https://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/sustainable-transport-and-air-pollution
7 https://www.statista.com/statistics/203734/global-smartphone-penetration-per-capita-since-2005/

and what is limiting its extensive usage. Are city authorities willing to share their data with the private sector, and what data would they like to receive from private operators in their city?

Mobility-as-a-Service

As a result of increased digitalisation and connectivity, the concept of Mobility-as-a-Service (MaaS) has gained traction in the past few years. Often, the goal by MaaS operators is to replace private car ownership and provide access to multiple mobility services as a part of one mobility offering. The predicted benefits of MaaS are considerable.

ERTICO is actively supporting the MaaS community and its discussion and guidelines on the creation of a level playing field for MaaS solutions as well as the facilitation of deployment initiatives for MaaS.

Nonetheless, the deployment of MaaS solutions is rare. Even where MaaS schemes are implemented, the uptake by users is not high and business models are not robust yet. Thus, it was deemed important to understand, how cities are viewing MaaS. Do they plan to implement MaaS in their areas and if so, how would they do it?

Additional questions

In the final stages of the City Moonshot preparation, COVID-19 emerged. The initial situation with lockdowns in almost all parts of the world, meant drastic changes to the transport and mobility operations in every country. Some of the cities responded by introducing specific measures to allow people to make use of a variety of alternative travel options, for example through the introduction of bicycle lanes, while introducing capacity limitations on public transport fleets. Hence we asked the question: “What measures were introduced due to COVID-19 and how long are cities planning to keep these in place?”.

It was always clear that one of the biggest challenges to improve mobility in our society is behavioural change. Citizen acceptance and engagement in all aspects of mobility innovation and change determine the success of measures and strategies implemented by decision makers. Therefore, the question followed: “How and how often do cities engage with their citizens when implementing transport and mobility changes?”.

3. METHODOLOGY

A well-constructed methodology is fundamental to balance interviewing 150 cities in an efficient, transparent and insightful manner, and produce scientific quality results.

The City Moonshot initiative adopted a three-step approach, which was specifically designed and deployed to ensure the best possible outcome. Each step is described in the sections below.

The first section describes the process followed to create the questionnaire. The second section summarises the plan for the interviews conducted with cities. Finally, the third section explains the analysis process conducted to deliver the results presented in this report.

The Questionnaire

Below are the steps followed to create the questionnaire.

Finding the right topics

As highlighted in the previous section "Introduction to the topics", three key topics were selected for the City Moonshot initiative:
- Sustainability (with focus on climate crisis and air quality);
- Data Sharing;
- Mobility-as-a-Service (MaaS) in European context, also known as Mobility on Demand (MoD) in North American terminology.

Topics such as electromobility, urban deliveries, Connected and Cooperative Automated Mobility (CCAM), freight data interoperability were also proposed for investigation but were not selected for this round of interviews to be conducted under City Moonshot (Phase I). Nevertheless, they may be covered in future rounds of interviews.

Next to the three key investigated topics described above, the interviews also featured other specific questions on mobility and transport objectives and challenges that the cities could identify.

Furthermore, to understand the cities' interest and knowledge on intelligent mobility, a few questions investigating the cities' involvement in ITS projects and their prior knowledge on and interest in C-ITS were added.

Finally, a specific set of closing questions was developed to explore approaches to citizen engagement, mainly focusing on how cities engage with citizens and how often; and how cities are cooperating with external entities on transport and traffic management.

Identifying the right objectives

For each of the selected topics, the team identified specific objectives on which the questions would be built. Identifying the right objectives allowed the study to obtain the most accurate and fruitful information for each section.

The selected objectives for the Sustainability topic were set to be:
- Understanding the city authorities' views on climate crisis and its relevance to transport and mobility
- Understanding air quality: transport measures planned or implemented by city authorities, expected impacts of city measures on air quality, etc.

The objectives for the Data Sharing topic were set to be:
- Understanding which mobility data is collected by the city authorities and how (type, quality, standards, etc.)
- Understanding the position of the city authorities towards data sharing (stakeholders, concerns, process…)

Finally, for Mobility as a Service, the following objectives were set:
- Identifying what is the city's perception on the right policy framework for MaaS
- Understanding the approach city authorities have towards MaaS and identify the stakeholders involved within the MaaS ecosystem

Analysing the local preconditions for the successful implementation of MaaS; more specifically, are the cities ready?

Developing the questions

Once the key objectives of the investigation had been identified, each one was analysed and broken down into several questions that would help collect the right information. As an example, for the "data sharing topic", five complementary questions were derived from the objective "Understanding which mobility data is collected by the city authorities and how (type, quality, standards, etc.)":
1. Do cities have a policy in data sharing?
2. Are cities sharing their data with the private sector?
3. With whom are cities sharing their data?
4. With whom do cities not want to share data with and why?
5. What standards do cities use when sharing data?

The same process was followed for each of the objectives of the initiative until a complete questionnaire was created.

When developing the questions for the survey, two main types of questions were used to build the survey: open-ended questions and multiple-choice questions.

While open-ended questions would bring the opportunity to get to know each city in a more detailed manner, the quantity of data that would have been generated had only open-ended questions been used in the interviews, would have been unmanageable. Therefore, the number of open-ended questions was limited and they were carefully used to gain more in depth knowledge and learning on specific topics.

Open-ended questions were complemented with multiple-choice questions, which allow for an easy, fast and exact response. Even though not as detailed as an open-ended question, a more accurate answer can be extracted if the response options are wisely selected. Furthermore, even multiple-choice questions allowed for a discussion between the city representatives and the lead-interviewer, with key points being recorded and analysed.

Likert scale questions were also considered but, finally, discarded since they only produce ordinal data and the respondents tend to agree with the statements. Furthermore, the main purpose was to ascertain the objectives, strategies and actions of the city, rather than the extent to which respondents personally agree or disagree with statements[8].

Feedback and questions revision

After creating the survey questionnaire, the document was shared with ERTICO's Innovation & Deployment experts and, afterwards, with ERTICO partners. ERTICO partners are a crucial element in all ERTICO's work: featuring a broad array of qualified stakeholders, such as universities, research institutes, public authorities and private companies, ERTICO's partnership brought unique insights and different points of view, key in creating the base layer for a complete and all-encompassing document that has the potential to make a concrete and substantial contribution.

The feedback received from the partners and from ERTICO team of experts was processed and integrated. Consequently, a few changes were made to the questionnaire and a few tailored questions were added.

Trial

Once the interview questionnaire had been revised and reached its pre-final form, a trial was performed by the ERTICO team. To carry out the trial, ERTICO involved some of its partner cities and asked them to participate in the trial to verify if the questionnaire was ready to be launched. Trials were successful and the survey was received positively by the cities that participated in the trial.

Transforming COVID-19 into an opportunity

During the process of creating the questionnaire, COVID-19 emerged on a global scale. The full impact of the pandemic on mobility is a topic that will be discussed in the years to come and it will need to be investigated in more details. However, when the objectives of the City Moonshot initiative were set, COVID-19 was included as a topic in the interviews. The opportunity lay in the fact that the pandemic and its accompanying measures were immediately acknowledged as an important factor in setting mobility targets and strategy in cities. As a consequence, three questions were created to address COVID-19 measures in the cities and its impact on urban transport and mobility.

Final version of the interview questions

After several months of preparations, the questionnaire was created, tested and finalised.

The final version of the interview outline features 58 questions, of which 42 cover the three main topics (16 questions cover sustainability, 16 covering Data Sharing, and 10 covering MaaS). In addition, there are seven introductory questions and nine closing questions.

With regards to the typology of the questions, there are 48 multiple choice ones and 10 open-end questions.

The final version of the questionnaire can be found in Annex 1 of this report.

Interviewing the cities

The process started with interviewing the cities that are members of the ERTICO Partnership as they were easy to approach. The second step was to approach the ones that are cooperating with ERTICO in various projects and activities, while also enlisting the support of additional ITS partners in various countries and regions, in particular to support gaining contacts with cities outside Europe. A further step included mobilisation of ERTICO partners for contacts to additional cities, and a campaign via the ERTICO Newsletter to inform the wider community about this initiative. A number of meetings were held with the European Commission (DG MOVE), which very much encouraged and supported this initiative. Also, a constructive dialogue was held with peer organisations in the field of mobility, such as EUROCITIES and POLIS.

8 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4833473/

The interviews

After creating the survey, the work plan to carry out the interviews was agreed upon. In the following paragraphs, the process of the interviews is explained.

Finding the right person

Identifying, reaching out to and involving the right stakeholders from the cities was, as expected, the most challenging and time consuming part of the process. This work was undertaken mainly by the ERTICO team, ERTICO partners and colleagues from ITS organisations. From the ERTICO side, a pre-analysis showed that at the end of 2019 ERTICO had contacts with more than 60 cities. 10 cities were already ERTICO members, while ERTICO cooperated with additional 50 cities through EU co-funded projects, ERTICO Innovation Platforms, ITS Congresses and other contacts. These were the initial cities to be interviewed. ERTICO partners, for example Arriva Group, Connected Places Catapult and Kapsch, also contributed by introducing us directly to their contacts in cities. Finally, cooperation with other associations and organisations, for example ITS national organisations, provided further outreach to cities in their regions. The full list of contributors may be found in the acknowledgements.

The second level of complexity in the process regarded reaching out to different city representatives that had knowledge on the various topics discussed, from environment to traffic management, from data collection to public transport. In most cases, this work was facilitated by the city representatives themselves. As the entire set of questions was sent to city representatives in advance, they were able to reach out to the right city departments and colleagues and involve them in interviews.

Conducting the interviews

Two ERTICO colleagues conducted a large majority of interviews (142 interviews, almost 95%). The first colleague conducted the interview, asked the questions and filled in the online survey. This very often lead to follow-up questions or clarifications. The second colleague acted as a rapporteur and noted all additional information which was mentioned in the interviews but is not noted through the official questions.

The number of city representatives per interview varied from one person to nine people. In total, 237 representatives were interviewed with on average of 1.6 representatives per interview. When there was more than one interviewee, they usually came from different branches of the city transport department that worked on topics related to the questions of the survey. This allowed the questions to be answered accurately. It also meant that the interviewees were able to answer follow-up questions and give further details when necessary.

In addition to this, not only did the majority of city representatives work directly on the topics asked upon in the survey, but also many of them held important roles within the transport department and within the city itself. Indeed, it was a privilege for ERTICO colleagues to interview five Deputy Mayors, 83 Heads/Directors/Chiefs, 58 Managers, 30 Advisors/ Strategists/ Experts, 21 Engineers/Technicians and 40 other public officers. The latter ranged from Sustainability and EU Affairs coordinators, to city and traffic planners. The many years of experience in the transport field of some of these representatives have allowed them to look back on how the transport industry once functioned and understand how it came to develop, as we know it today when answering the interview questions. Furthermore, the overarching roles of the deputy mayors, heads, directors, chiefs and managers gives them a comprehensive understanding of transport industry which also contributed to the high quality of their answers.

Interview languages

English is the main working language of the ERTICO City Moonshot. However, thanks to the diverse background of the ERTICO team, the questions of the survey were translated in different languages (Chinese, Croatian, French, Japanese, Russian, Serbian, Slovak, and Spanish). Some interviews were held in the above languages, as well as in German, Greek, Italian and Swedish. The main interviewer and rapporteur were chosen based on the city interviewed.

Limitations - Impact of COVID-19

The initial plan was that the City Moonshot interviews would be done mainly through in-person meeting interviews. These interviews would have taken place at key events and congresses, such as the ITS European Congress or at different ITS World Congresses, City Expo in Barcelona or at other occasions where city representatives join. Due to the restrictions related to COVID-19, these plans changed and the vast majority of cities were interviewed through online meetings. This had both positive and negative effects. The positive effect was that it was possible to have several city representatives join the interviews. This was often needed as some questions were related to cities environmental services, some to public transport, others to traffic management, etc. It was not unusual to have 5-7 city representatives joining the interviews, so improving even more the variety and quality of the responses collected. The main negative aspect was that the speed of work was slowed down and the initial timeline of the project had to be revised.

Limitations – regions

While the target was to interview 200 cities from Europe and 100 cities from other continents, the target was a guideline and not a hard requirement. As it is challenging to obtain correct contacts in different cities, the priority was to interview as many cities as

possible. Out of the 150 cities interviewed in this first round of the City Moonshot, 109 are located in Europe and 41 in order regions of the world, thus the balance of Europe vs. other regions is not far off our target. Looking at other regions, North American cities are well represented in the interviews, mainly thanks to an excellent cooperation with ITS America and ITS Canada. At the same time, Africa, South America and Asia-Pacific need to be better represented in the second round of the interviews.

Limitations – city size

When it comes to the size of a city, a minimum target of 50,000 inhabitants was set, since cities and towns with fewer inhabitants would typically have less transport options and traffic management operations. Still, nine cities with less than 50,000 inhabitants were interviewed to validate this assumption. These cities are: Slobozia (population of 48,241, in 2011), Guimarães (47,588), West Hollywood (35,757), Municipality of Rafina & Pikermi (20,266), City of Olympia (46,884), Faro (47,575), Lloret de Mar (39,245), Borlänge (44,927) and Novo Mesto (23,878). For several of these smaller cities, the wider metropolitan area (comprising adjacent municipalities) exceeds 50,000 inhabitants.

GDPR compliance: Almost all interviews were recorded for data analysis quality purposes. All recordings from interviews and all interview answers are treated as confidential. All data is presented only in aggregated form. No city specific data will be shared, unless it has been approved in writing by the city, prior to a publication.

Building a knowledge base: During the interviews, city representatives were asked to provide relevant public documents, such as Transport Management Plans, Sustainable Urban Mobility Plans (SUMPs) or other documents. A library including these documents is being created. This library will be accessible to all interviewed cities. The idea is for public authorities to learn from what has previously been done in other cities, what worked and what did not work, and inspire them to further develop the mobility system in their own city.

Analysis of the results

There are several methods and techniques to perform data analysis, depending on the aim of the research. For the City Moonshot initiative, and more specifically for this report, the team used a quantitative method. The techniques used have been mainly descriptive and explorative.

Given that the survey consisted mainly of multiple-choice questions, the breadth of the survey (150 cities to answer 58 questions) meant that a quantitative analysis of the results is most appropriate. Not only is quantitative data analysis compatible with the type of collected data and the resources available, but it also allows to create statistics that highlight patterns in the behaviour and needs of the cities. Nevertheless, since the ERTICO City Moonshot team also collected data from open-ended questions and the open discussions carried out with the cities, a future exhaustive qualitative analysis could still be pursued.

For each of the main sections/topics of the survey (sustainability, data sharing and MaaS) a specific number of questions were selected and analysed. Thanks to the implementation of descriptive and exploratory techniques, data points have been described, showed and summarised in a way that allows relevant patterns to emerge. Finally, a few indicators that were used to better understand the cities responses were selected:

Size of the city by population

The Organisation for Economic Co-operation and Development's (OECD)[9] classification of urban areas has been used to categorize each of the cities as a "S" small city, "M" medium sized city, "L" large city, "XL" city, "XXL" city and "Global city". In the table below the number of people for each category is presented.

Size	Population
XS[2]	0 – 50,000
S	50,000 – 100,000
M	100,000 – 250,000
L	250,000 – 500,000
XL	500,000 – 1,000,000
XXL	1,000,000 – 5,000,000
Global city	> 5,000,000

OECD's urban areas classification

Geographical location

The 150 cities that have participated in the initiative have been classified into five geographical categories: Europe, America, Africa, Asia and Oceania. For the propose of this report, the cities under the "Europe" category include part of Russia (Moscow) and Turkey (Ankara, Bursa, Gaziantep, Istanbul and Izmir).. The other two cities interviewed in Russia (Yuzhno-Sakhalinsk and Yekaterinburg) were included in "Asia".
Apart from geographical classification, other indicators have been selected and deployed. However, since the indicators only apply to European cities or regions only, most of them were not used in the current report. A few examples of the indicators selected: people killed in road accidents, European Quality of Government Index, green space in cities per capita, etc.

Geographical categories	No of Cities
Africa	3
Americas	25
Asia	13
Europe	107
Oceania	2

Geographical location

Once the selection of the questions and the indicators was finalised, a process of correlation between the questions selected and the indicators was carried out and the relevant outcomes have been included in the report.

Once all the data collected was described, presented, summarised and patterns were identified, conclusions were drawn and presented in this report.

As the ultimate goal of the initiative is to better understand the cities needs and the challenges they face, the methodology used for building the questionnaire, to conduct the interviews and, finally, to analyse the results is focused on this goal.

9 https://data.oecd.org/popregion/urban-population-by-city-size.htm

City Moonshot and the decision making tool for cities

Orestis Trasanidis, consultant for the Vice-Governor of Deployment and Environment in Central Macedonia and part of the City Moonshot team, created a tool to help European cities make decisions on topics related to mobility, such as sustainability, innovation, infrastructure, engagement.

From the data collected through the 150 interviews with cities, combined with data from different European institutions, Orestis created 16 indicators divided in 6 sectors (Environment, Strategy and governance, Mobility performance, Mobility infrastructure, Innovation, and Engagement) under which the cities were clustered. This created an interactive tool, a dashboard, were cities could see their position in the different sectors, which gives them an assessment (on their performance in each sector based on the indicators) based on quantitative data.

The tool allows decision makers and public authorities to identify easily the profile of their city and other cities and make data driven decision and policy making. It also allows citizens to comprehend their cities performance and raise their awareness on these topics.

The map of interviewed cities

Over 150 cities interviewed

Europe

City	Country
Graz	Austria
Minsk	Belarus
Antwerp	Belgium
Brussels	Belgium
Leuven	Belgium
Banjaluka	Bosnia and Herzegovina
Sarajevo	Bosnia and Herzegovina
Heraklion[1]	Crete
Zagreb	Croatia
Nicosia[1]	Cyprus
Brno	Czech Republic
Ostrava	Czech Republic
Prague	Czech Republic
Copenhagen	Denmark
Tallinn	Estonia
Helsinki	Finland
Tampere	Finland
Grenoble	France
La Rochelle	France
Paris	France
Strasbourg	France
Toulouse	France
Versailles	France
Bremen	Germany
Essen	Germany
Hamburg	Germany
Karlsruhe	Germany
Munich	Germany
Athens[1]	Greece
Lamia[1]	Greece
Larissa	Greece
Rafina & Pikermi[1]	Greece
Thessaloniki	Greece
Trikala[1]	Greece
Budapest	Hungary
Cagliari	Italy
Florence	Italy
Milan	Italy
Rome	Italy
Trieste	Italy
Turin	Italy
Verona	Italy
Reykjavik	Iceland
Dublin	Ireland
Limerick	Ireland
Riga	Latvia
Skopje	North Macedonia
Chisinau	Moldova1
Podgorica	Montenegro
Amsterdam	Netherlands
Enschede	Netherlands
Helmond	Netherlands
Rotterdam	Netherlands
Utrecht[2]	Netherlands
Utrecht	Netherlands
Bergen	Norway
Oslo	Norway
Stavanger	Norway
Gdynia	Poland
Warsaw	Poland
Guimarães	Portugal
Faro	Portugal
Lisbon	Portugal
Slobozia	Romania
Moscow	Russia
Belgrade	Serbia
Kruševac	Serbia
Novi Sad	Serbia
Subotica	Serbia
Martin	Slovakia
Novo Mesto	Slovenia
Barcelona	Spain
Bilbao	Spain
L'Hospitalet de Llobregat	Spain
Las Palmas	Spain
Lloret de Mar	Spain
Logrono	Spain
Madrid	Spain
Pamplona	Spain
Borlänge	Sweden
Gothenburg	Sweden
Malmo	Sweden
Östersund	Sweden
Stockholm	Sweden
Umea	Sweden
Basel	Switzerland
Bern	Switzerland
Zurich	Switzerland
Ankara	Turkey
Bursa	Turkey
Gaziantep1	Turkey
Istanbul	Turkey
Izmir	Turkey
Kiev	Ukraine
Aberdeen	United Kingdom
Belfast	United Kingdom
Cambridgeshire[4]	United Kingdom
Coventry	United Kingdom
Glasgow	United Kingdom
Hull	United Kingdom
Kent[4]	United Kingdom
London	United Kingdom
Manchester	United Kingdom
Milton Keynes	United Kingdom
Northern Ireland[3]	United Kingdom
Oxfordshire[4]	United Kingdom
West Midlands[4]	United Kingdom

North and South America

City	Country
Buenos Aires	Argentina
Sao Paulo	Brazil
Brampton	Canada
Toronto	Canada
Vancouver	Canada
Windsor	Canada
Winnipeg	Canada
Santiago	Chile
Trujillo	Peru
Montevideo	Uruguay
Pennsylvania1	United States
Eugene	United States (Oregon)
West Hollywood	United States (California)
Suffolk	United States (Virginia)
Boston	United States (Massachusetts)
Olympia	United States (Washington)
Chattanooga	United States (Tennessee)
Los Angeles	United States (California)
Alexandria	United States (Virginia)
Philadelphia	United States (Pennsylvania)
New Orleans	United States (Louisiana)
Minneapolis	United States (Minnesota)
Pittsburgh	United States (Pennsylvania)
New York	United States (New York State)
San Francisco	United States (California)

Africa

City	Country
Addis Ababa	Ethiopia
Cape Town	South Africa
Johannesburg	South Africa

Asia

City	Country
Qingdao	China
Nanjing	China
Shenzhen	China
Beijing	China
Jerusalem	Israel
Tel Aviv Yafo	Israel
Almaty	Kazakhstan
Doha	Qatar
Yekaterinburg	Russia
Yuzhno-Sakhalinsk	Russia
Sejong	South Korea
Ras Al Khaimah1	United Arab Emirates
Tashkent	Uzbekistan

Australia and Oceania

City	Country
Brisbane	Australia
Auckland	New Zealand
Christchurch	New Zealand

Scan the QR code to see the larger version of the interviewed cities world map

4. Key priorities and challenges

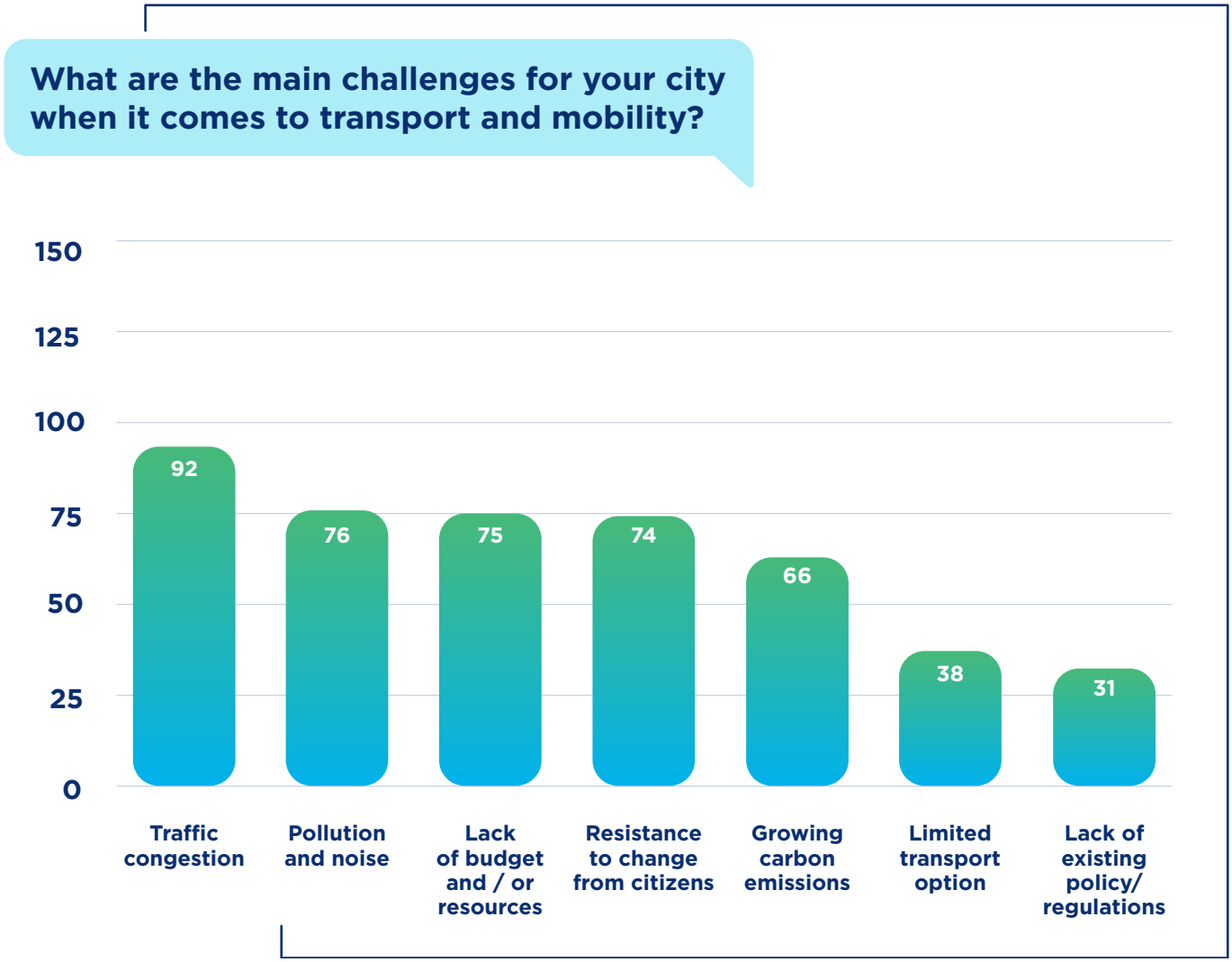
In order to understand how city authorities are thinking it is essential to understand their main objectives (priorities) when it comes to transport and mobility. The first content question asked in the interviews, was for city representatives to identify their key objectives and priorities. As cities usually have multiple priorities, they were given the possibility to choose multiple options. The results indicate that improving public transport was overall the key priority for cities. Public transport leads to improvement of all of the other priorities.

Key priorities for cities when it comes to transport and mobility

Key priorities

What is very interesting to point out from the priorities identified by the cities, is that improved air quality and decarbonising city mobility were equally important. This is a novel finding, since air quality has always been a key priority for cities, as it affects citizens in their daily life. Climate change has this far been perceived as an important aspect for cities to prioritise on, but it is first through these findings that we can see it on the same level of prioritisation as that of the air quality.

Road safety and increased inclusiveness are two other topics ranking high on the city authorities' agenda



Key challenges for cities when it comes to transport and mobility

Key challenges

When it comes to transport and mobility, city authorities state traffic congestion as the key challenge, followed by pollution and noise and lack of budget and/or resources. The vast majority of the cities find however that they do not lack policies/ regulations and that they feel that their citizens are not limited by transport options.

Sustainable Urban Mobility Plans (SUMPs) – a tool to deliver on the key priorities

One of the biggest challenges with regard to city-driven actions is that each city is unique: every city has its own specific geography, history and culture. While this plurality brings flavour to society, it also creates challenges for anyone operating across multiple cities, such as mobility or transport operators. To enable cities to keep adapting the solutions that are best suited for their particular circumstances, while at the same time empowering cities to use a harmonised approach, the European Commission has promoted "Sustainable Urban Mobility Plans"[10] (SUMPs) and their recently drafted guidelines.

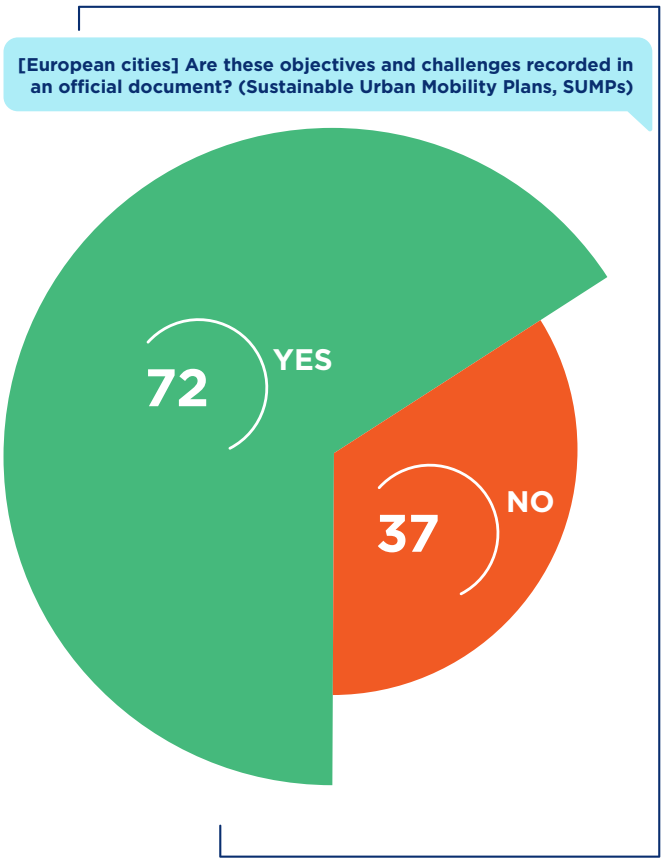
A Sustainable Urban Mobility Plan is based on the eight principles depicted in the SUMP poster[11] on the next page, developed by ©Rupprecht Consult, guiding cities and enabling them to develop sustainably in a comprehensive way.

SUMPs are perceived as the tool that cities can use in re-designing and optimising their transport systems addressing the needs of modern societies. This is why, it was recognised as important to include a few questions about SUMPs in the survey. Having an overview of the different cities that follow a SUMP and understanding how the SUMP has affected the sustainable development of their urban mobility allows a better understanding of SUMPs and their impact.

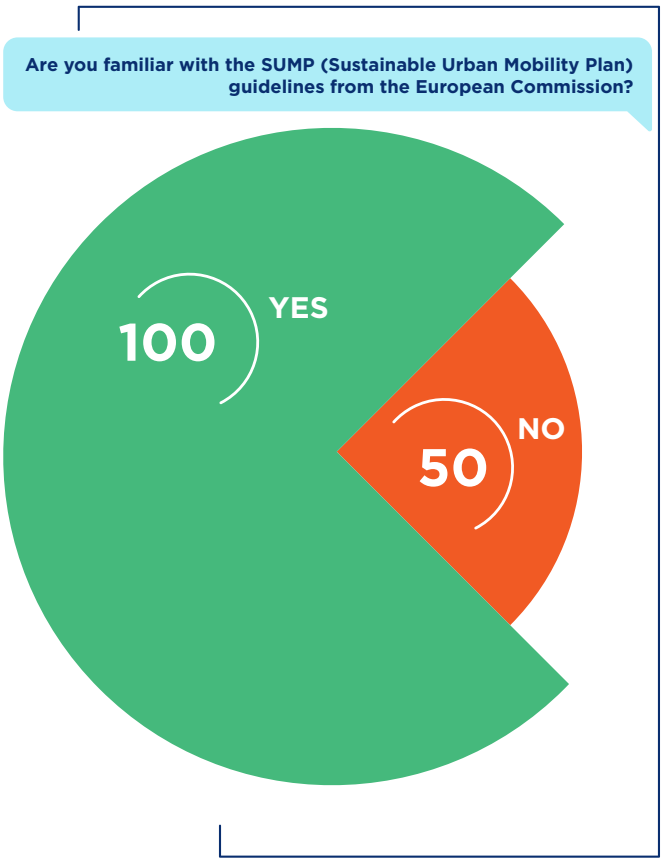
10 https://www.eltis.org/mobility-plans/sump-guidelines
11 https://www.eltis.org/sites/default/files/sump_poster.pdf

In the development of the three official SUMP guidelines for cities ERTICO and its partners have been involved:

- The role of Intelligent Transport Systems (ITS) in Sustainable Urban Mobility Planning
- Mobility as a Service (MaaS) and Sustainable Urban Mobility Planning[12]
- Urban Air Mobility and Sustainable Urban Mobility Planning[13]



European cities with a SUMP

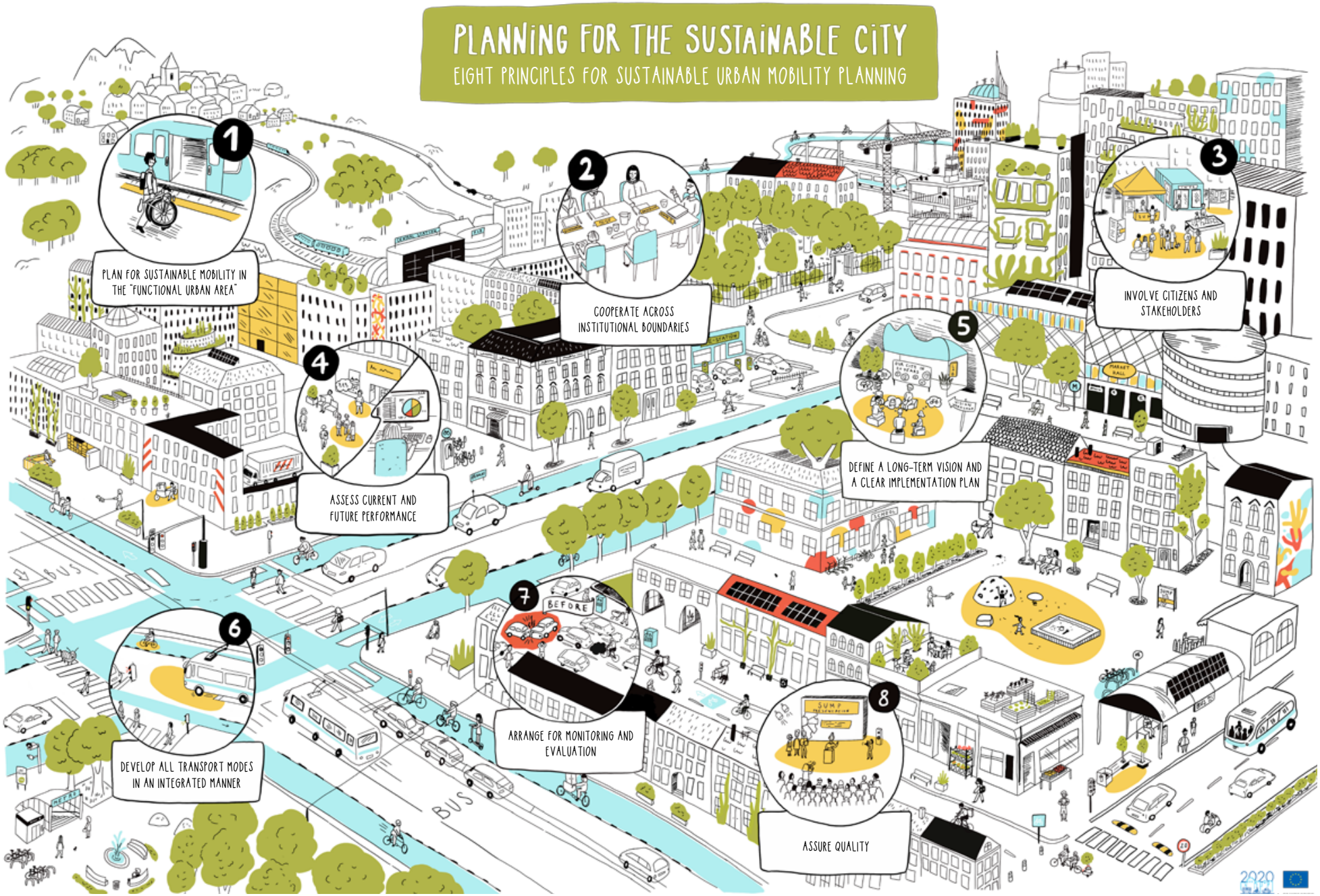


Familiarity of interviewed cities with SUMPs

At the same time, the results of the City Moonshot interviews indicate also that 100 cities out of 150 are familiar with SUMP Guidelines, while 50 are not.

We also know that 1,028 SUMPs have been adopted by cities in Europe, with over half of them in cities with over 100,000 inhabitants, and 122 SUMPs are under preparation[14].

12 https://www.eltis.org/sites/default/files/the_role_of_intelligent_transport_systems_its_in_sumps.pdf
13 https://www.eltis.org/sites/default/files/maas_sump_topic_guide_2021.pdf
14 https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/cities_mission_implementation_plan.pdf



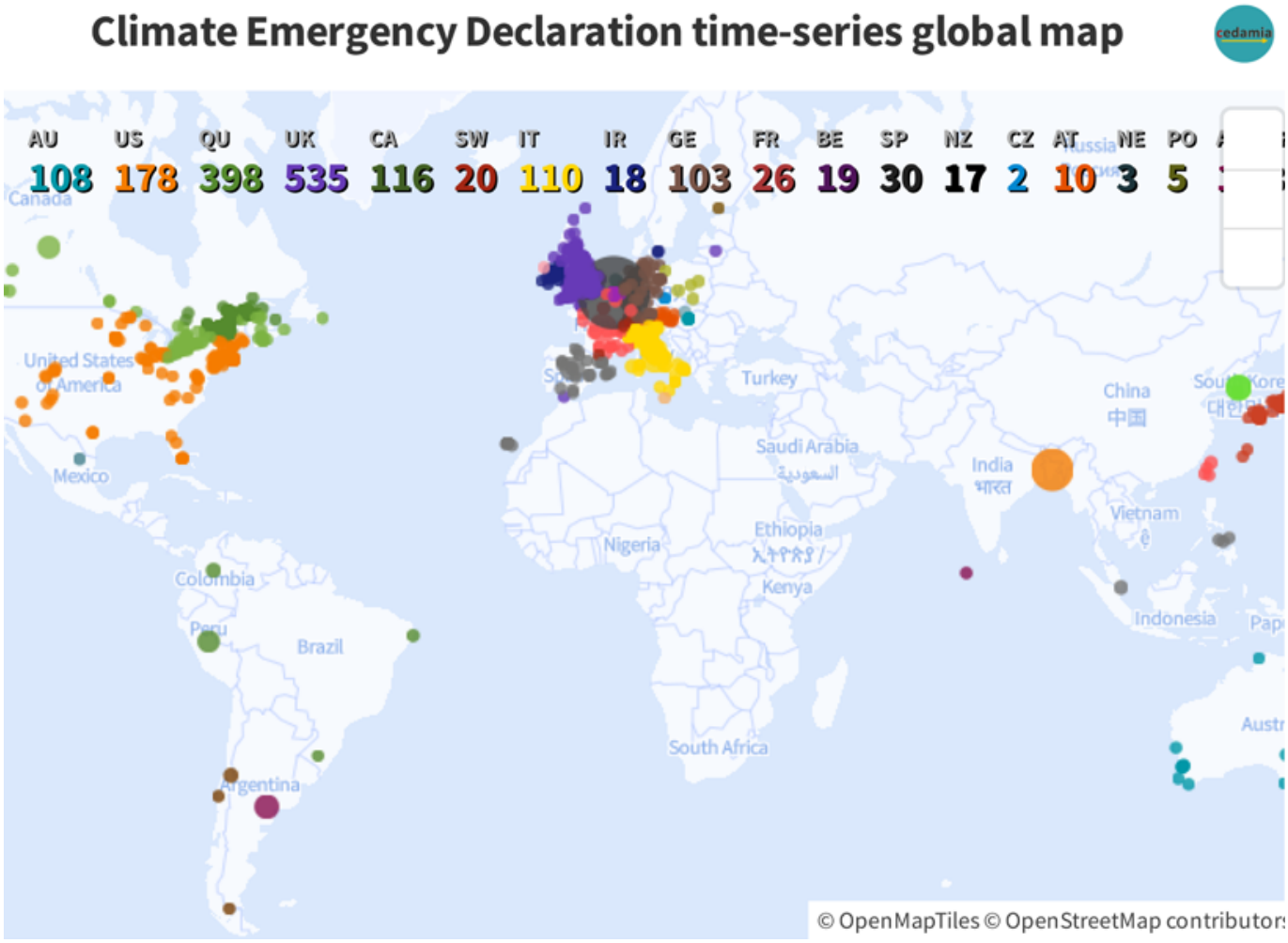
Planning for the sustainable city: eight principles for sustainable urban mobility planning[15]

15 https://www.rupprecht-consult.eu/news/news-detail/news/new-sump-poster-planning-the-sustainable-city.html

4. SUSTAINABILITY

Climate emergency

Many cities, regions and governments around the world are declaring a Climate Emergency, indicating their understanding of the seriousness of the crisis caused by climate change. Darebin City Council in Victoria, Australia, was the first city in the world to declare a Climate Emergency. This happened on 5th December 2016. According to the data collected by Cedamia[16], since that day more than 2,000 jurisdictions have followed their example, even though the geographical distribution is uneven across the globe. While the majority of jurisdictions that have officially declared a "Climate Emergency" are located in Australia, Germany, Canada, Italy, UK and US, cities in some other regions have been less forthcoming in making such a declaration. For example, there is not a single city in Africa that has declared a climate emergency while only three of the Nordic cities interviewed declared one (Malmo, Lund and Helsinki).

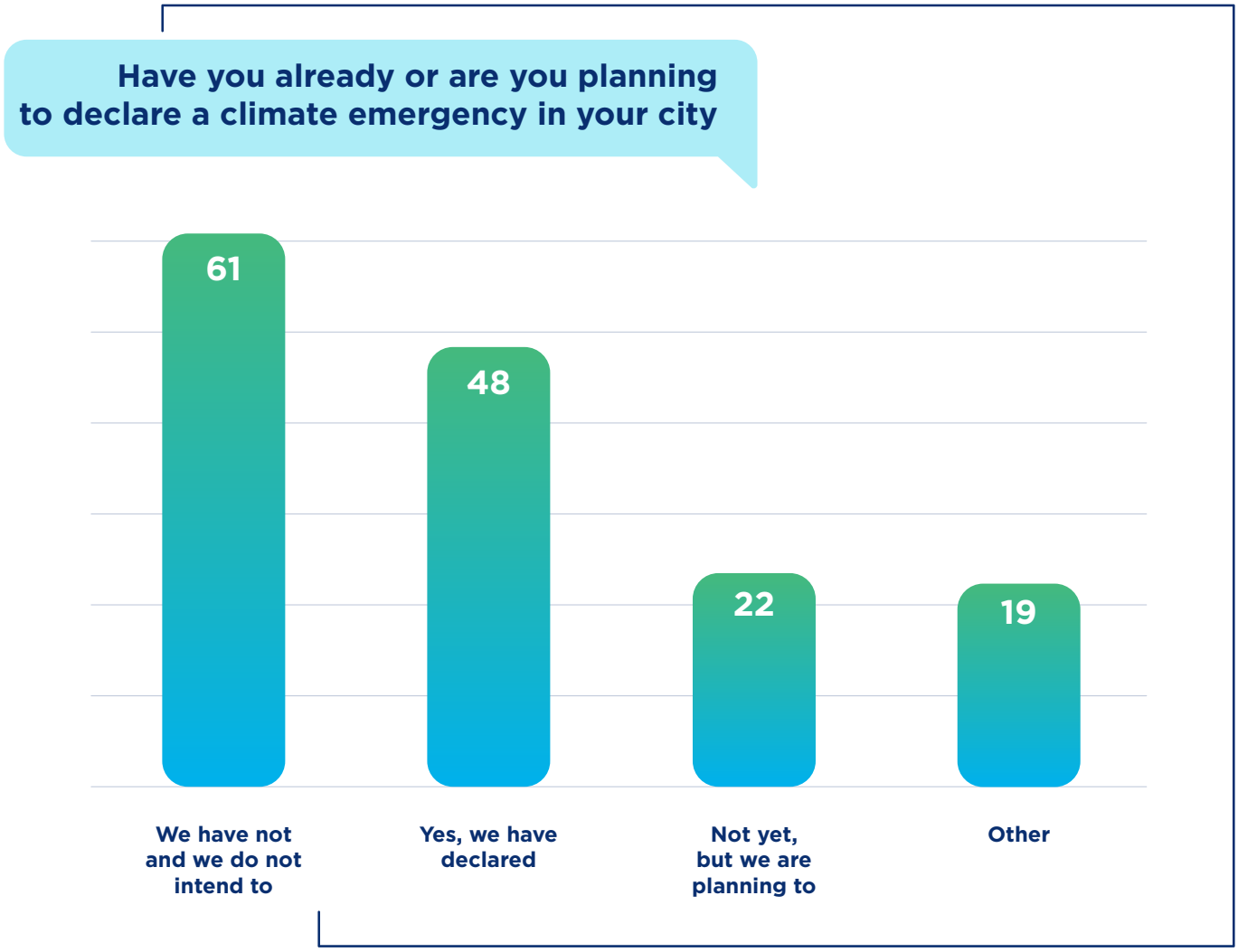


Climate Emergency Declaration time-series global map[17]

Recognising the state of climate change and how this is impacted by transport and mobility is important. According to the data collected during the ERTICO City Moonshot interviews, 48 cities out of 150 have already declared a Climate Emergency, while 22 additional ones have stated that they are planning to do so. Interestingly, 61 cities declared that they have not, and do not intend to make the declaration.

A number of cities, 19 to be specific, selected "other" as their answer, in some cases due to not knowing if their city has declared climate emergency or not (as another department is in charge of topics related to climate) or alternately had plans or policies to address the climate emergency but not an official declaration.

16 https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/#nationalgovernments
17 https://www.cedamia.org/global-ced-maps/



Climate Emergency Declaration

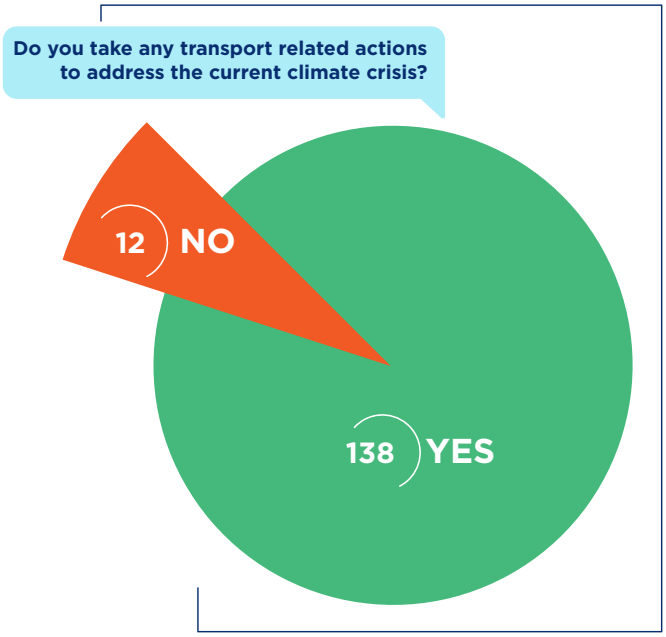
In fact, testimonials from a handful of cities indicate that they have considered declaring a Climate Emergency, but not done so. Nevertheless, even if a city has not declared a Climate Emergency, it does not mean that they are not taking action to mitigate the climate change. An example is Gothenburg[18], city in Sweden, where the City Council decided not to declare the Climate Emergency but already has a decarbonisation plan in place (Carbon neutral Gothenburg - Fossilfritt Goteborg[19]), which features 82 concrete actions aiming to support the goal of zero GHG emissions by 2030.

18 https://www.svt.se/nyheter/lokalt/vast/inget-klimatnodlage-i-goteborg
19 https://goteborg.se/wps/portal/start/miljo/det-gor-goteborgs-stad/fossilfritt-goteborg

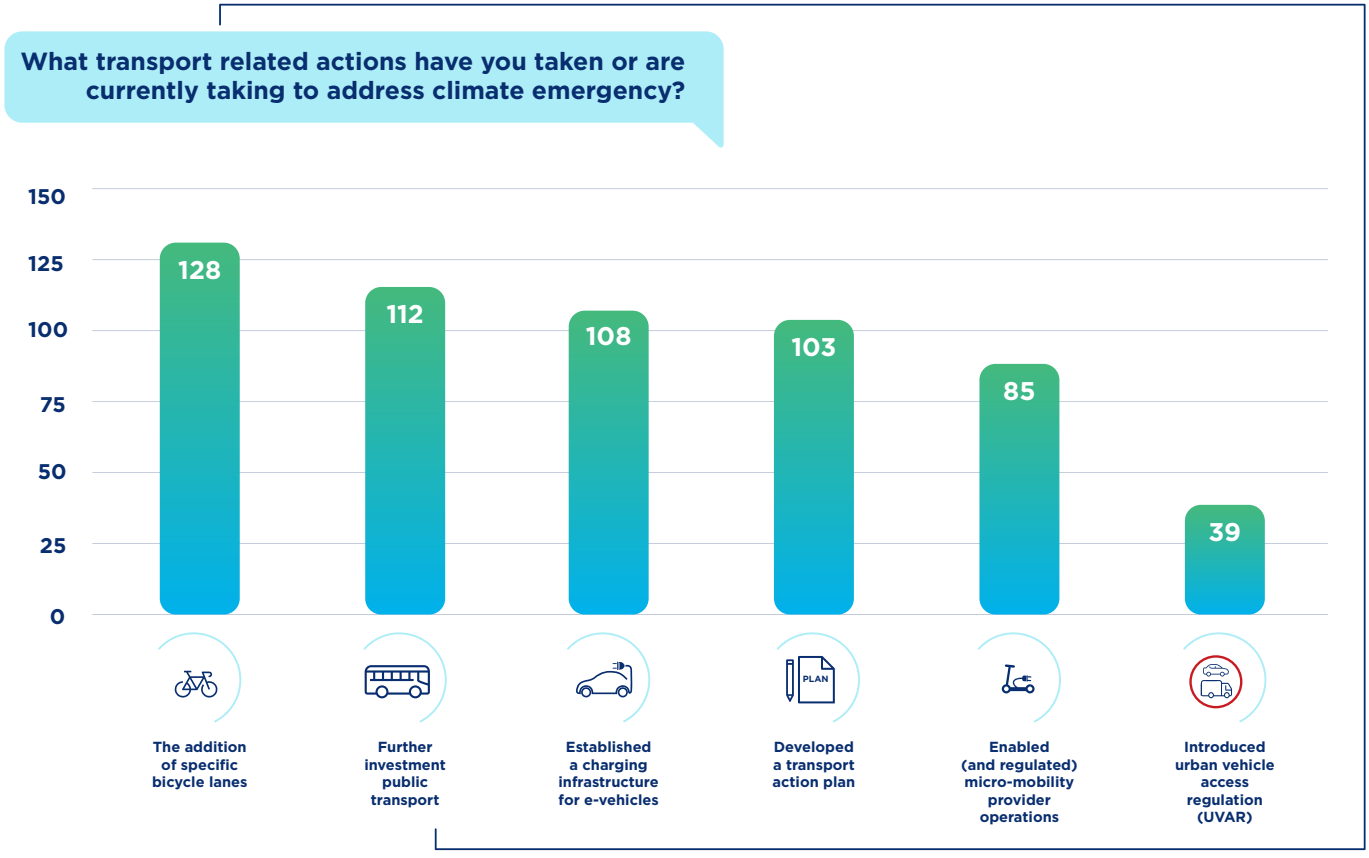
Transport related actions

On the positive side, a vast majority of cities state that they taking transport related measures to address climate change.

The most popular transport and mobility actions to address the climate change as stated by cities are the following. When selecting "Other", five cities mentioned increasing pedestrian space, one city mentioned increasing capacity of their public transport, one city mentioned providing free electric car parking and four cities mentioned introducing hydrogen vehicles to their public transport fleets.



Cities taking transport related climate actions



Transport and mobility actions taken to address climate change

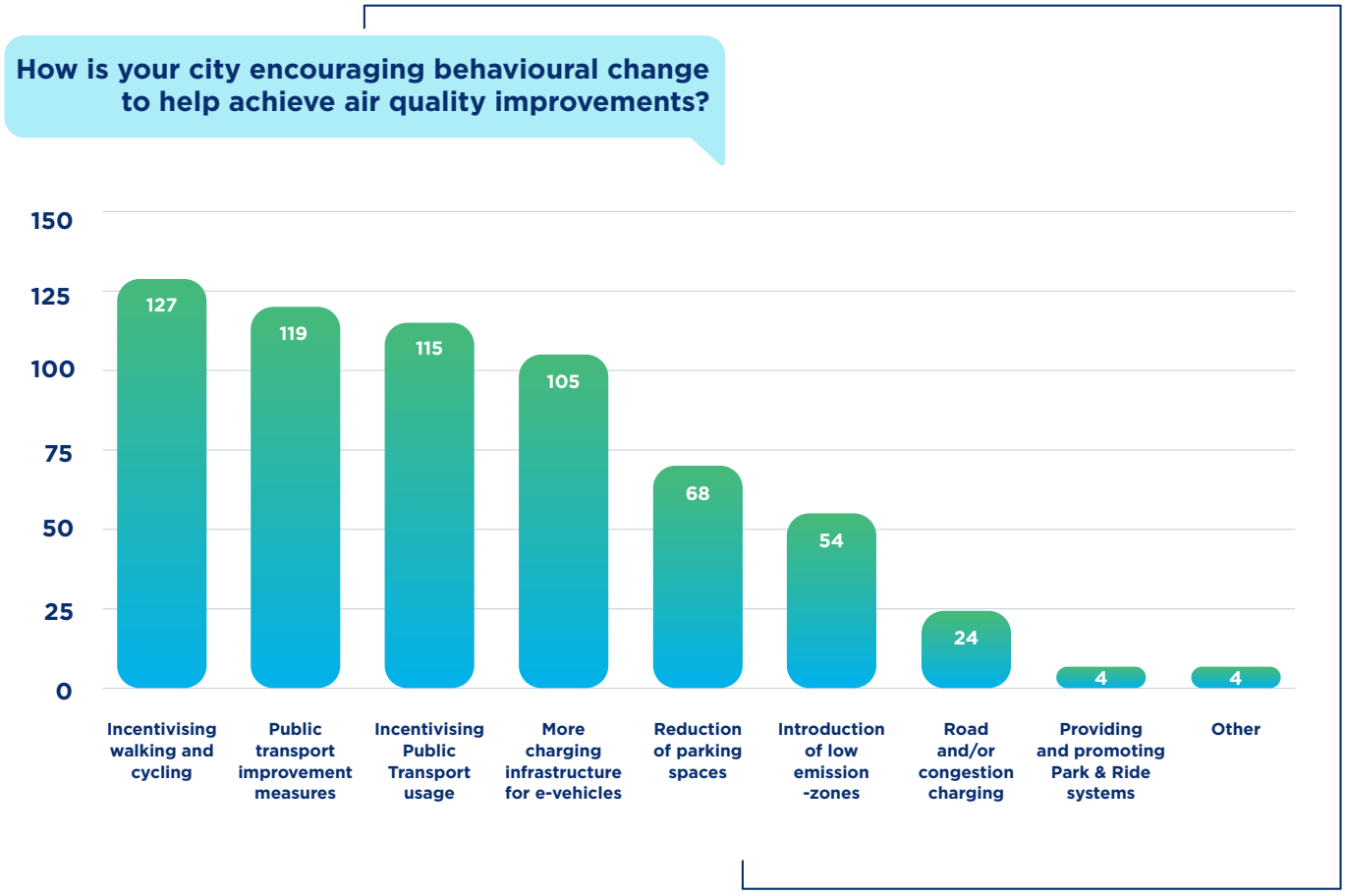
Finally, asking cities if they have legal obligations related to the climate crisis, 41% of cities responded positively, 41% negatively while 18% did not know. This often led to interesting discussions as for example some cities referred to the Paris Agreement, which is not legally binding. In some other cases, countries or regions have introduced decarbonisation regulations on their entire territory, which naturally includes cities as well.

A very positive feedback comes from the City Moonshot finding where 110 out of 150 cities (73%) state that they have estimated GHG emissions from transport. This is the first and foremost requirement for any transport improvement towards addressing the climate crisis.

Air quality

When it comes to Air Quality, the interviews found that air quality is measured in the vast majority of urban areas (133 out of 150 cities). This work is not always done by the city transport authority itself but is sometimes done by other governmental authorities or agencies. Having such a number of cities monitoring their air quality is not surprising as in many part of the world, this is a legal obligation that cities need to follow. The interview data also indicates that these parameters are presented on a frequent basis, often hourly (41%, 55/133) or daily (28%, 37/133). Furthermore, a majority of cities share such data with their citizens (59%, 78/133).

Going further, many cities (37%) change and adjust their transport policies depending on air quality levels.



Incentives to encourage behavioural change to help achieve air quality improvements

At the same time, it is obvious that cities have addressed air quality for a long time. Again, a vast majority of cities have performed projects and/or studies on this topic (119 cities corresponding to 79%).

It is also worth noting that 16 city representatives chose "I do not know" on this point (11% of all responses), while only 15 cities (10%) stated that they had not done any projects or studies on air quality.

5. DATA SHARING

Data sharing is the practice of making data available to others so that they may process them to, for example, conduct research or for other projects.

As described in the report by Sustainable Mobility for All: "Sustainable Mobility: Policy Making for Data Sharing"[20], data sharing has the potential to offer many benefits for the transport and mobility sector just like for any other sector. It allows stakeholders to save time and resources by reusing data that has already been collected and processed. Data sharing also encourages collaboration and fosters knowledge exchange between relevant stakeholders. More importantly, data sharing among mobility stakeholders can contribute to better analytics and better informed decision-making to respond to the challenges faced by cities in the field of mobility. This is also the case when it comes to responding to real-time events. For example, thanks to their integrated real-time data from smartphones, connected vehicles and infrastructure, in Las Vegas, Waycare's has achieved a 17% reduction in crashes and a 12-minute (50%) reduction in incident response time arriving at the scene[21].

These are only some of the benefits that data sharing can bring to the mobility sector. Given the undeniable importance of data sharing, the ERTICO team decided to integrate into the City Moonshot survey a section on it. This section aims to help better understand the position of cities around the world with regard to data sharing, what actions have they already put in place and/or what actions are they planning. This, in turn, would help promote data sharing according to cities' needs.

Benefits of data sharing

The results of the survey showed that a majority of city representatives believe that data sharing brings several benefits. In fact, 95% of interviewed cities (143 out of 150) stated that they believe that sharing their transport data (and receiving other transport data from other stakeholders) can help them reach their objectives and overcome some of the challenges they face. Most of these positive responses were given with little or no hesitation, considering the answer to be obvious.

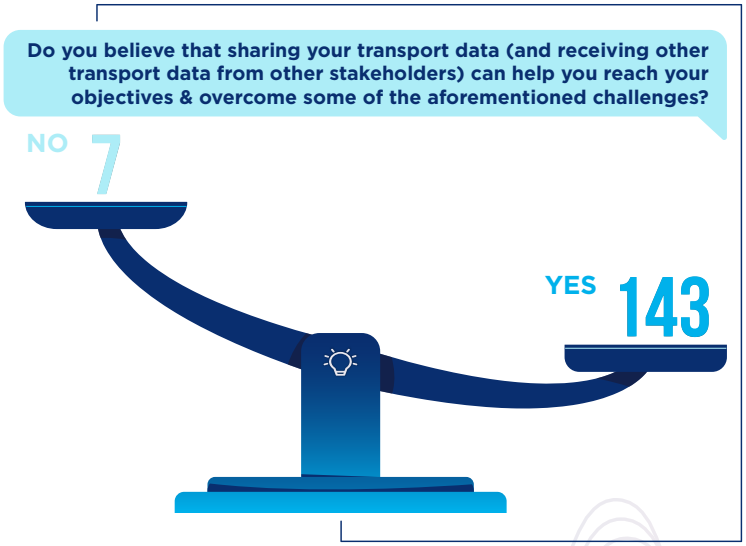
Data shared

It is of course, necessary to have data to share in the first place in order to be able to share it, in a usable format and with an acceptable level of quality. Data collection can be a lengthy and complex task depending on the structures put in place to perform the collection and the level of automation of the whole process. In any case, data collection requires significant mobilisation of resources including time, money and labour. Understandably, this means that cities are not always able to collect all the data that they wish. This leads to having to prioritise the collection of different types of data depending on their usefulness and the potential impact collecting them could have.

Type of transport data typically collected in cities

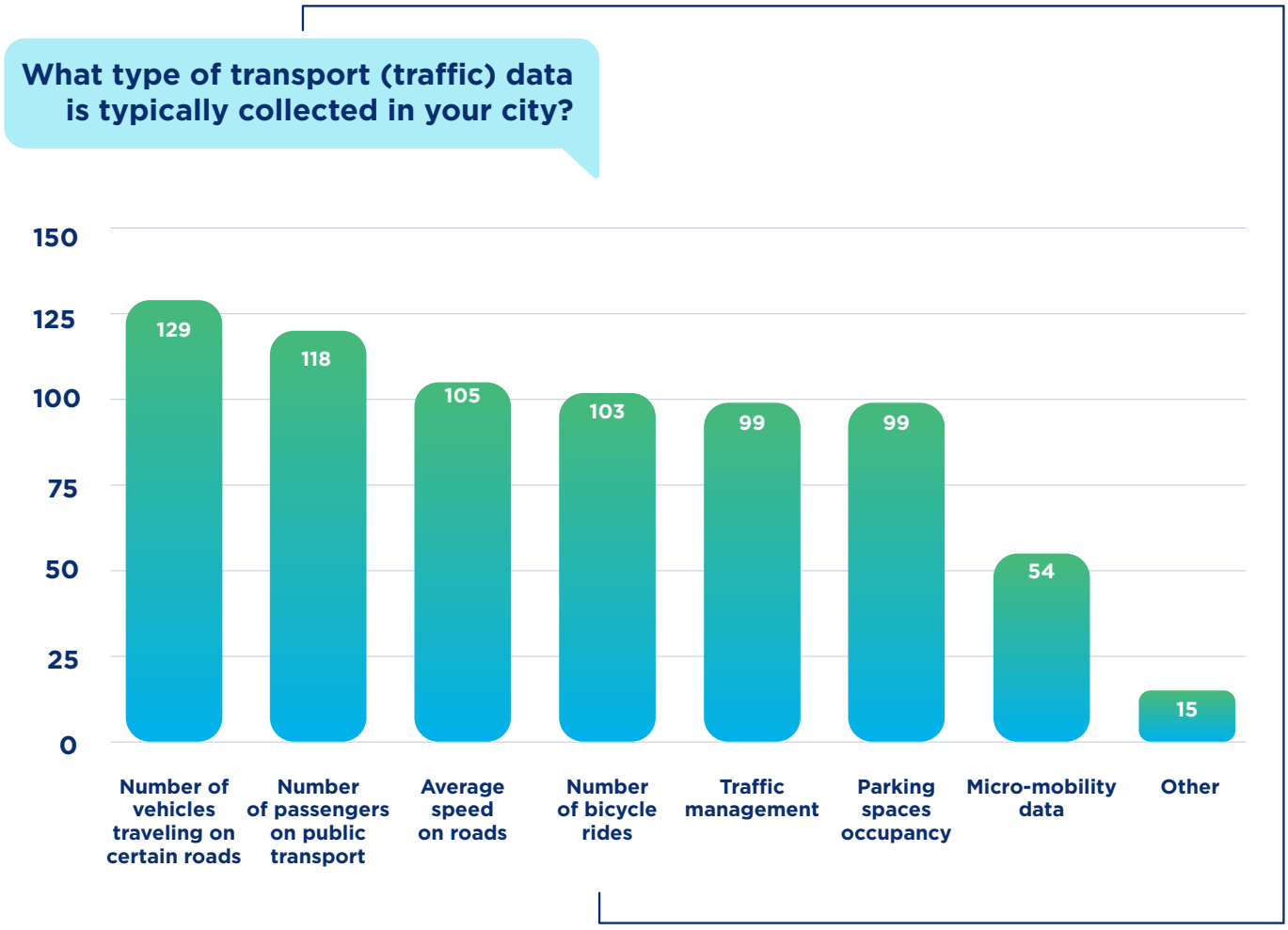
Data on the number of vehicles traveling on certain roads is the type of data most collected by city authorities with 86% of the cities we interviewed collecting this data already. The majority of cities we interviewed (66% and over) also collect the number of passengers on public transport (which is often not collected by the city itself but by public transport operators) daily, the average speed of vehicles on roads, the number of bicycle rides, traffic management and parking spaces occupancy (also, often collected by parking operators).

Micro-mobility data (here interviewees were asked not to consider bicycles as part of micro-mobility) is the only type of data which was an answer option that was not selected by the majority of cities.



Sharing transport data to reach objectives & overcome some of the aforementioned challenges

20 https://www.sum4all.org/data/files/policymakingfordatasharing_pagebypage_030921.pdf
21 https://www.sum4all.org/data/files/policymakingfordatasharing_pagebypage_030921.pdf



Type of transport data typically collected in cities

Only 36% of cities declared collecting that type of data. Although micro-mobility[22] has seen a steady growth in the last couple of years, it is still a relatively new concept. Many cities have not yet integrated micro-mobility modes or not significantly enough into their transport system to dedicate resources to collecting data on it. Furthermore, an additional complexity is added by the fact that extensive research on the best way to collect micro-mobility related data is still limited.

An important factor in the collection of micro-mobility data, is their format and how these data sets can be shared and exchanged among stakeholders (such as data providers and city authorities). An effort to standardise communication and through that, enable easier data collection is through MDS (Mobility Data Specification)[23] developed in the United States, through leadership of The City of Los Angeles. In Europe, Amsterdam and a number of Dutch cities undertook similar activity, producing a European version of the standard, City Data Standard - Mobility (CDS-M)[24]. Nonetheless, not all cities were aware of the existence of this standardization effort.

The cities that selected the answer "Other" to the type of data typically collected, highlighted the following types of data as being collected: collision data, road condition data, safety data; number of transactions in public transport; travel demand management data, household travel data; position, time, space data of public transport, space used for each structure; location of bicycle parking, EV charging stations; bus ridership information; number of pedestrians. This proves that there is a large variety of data, so cities, as well as other mobility stakeholders, need to carefully assess which data will be most useful to their work. Next to the difficulty of selecting the right datasets, it is often also necessary and interesting to compare data trends over several months and years in order to fully understand the functioning of the transport system in a city. Therefore, data collectors need to commit to collecting a type of data for a certain period of time, and this makes selecting the right type of data even more challenging. Although it was not asked to specify in this question the frequency at which the data is collected, this is an interesting factor that should be taken into account when analysing data trends.

22 https://www.eltis.org/resources/case-studies/rise-micromobility
23 https://ladot.io/wp-content/uploads/2018/12/What-is-MDS-Cities.pdf
24 https://www.polisnetwork.eu/news/dutch-cities-develop-new-mobility-data-standard/

Interest in data sharing with other parties

The next question that was asked to cities was "With whom are you willing to share your data?" As can be seen on the graph below, the majority of cities (64%) answered that they would be willing to share the data they collect with all the stakeholders mentioned in the question, which includes local transport providers, private organisations, other cities, scientific institutions, mobile telecommunication companies and ministries/governments. What city representatives often stated was that their work is paid by citizens, thus all data they collect is a public asset. Naturally, they do have to ensure that the data they share does not infringe any data privacy or other rules. 86% of cities said they would be willing to share their data with all the stakeholders mentioned except mobile telecommunication companies. When asked for the reason for this in the following questions certain cities answered that they mainly had privacy concerns about sharing data with these types of companies. More generally, concerning sharing with commercial companies, some cities considered it unfair for them to share publicly funded data with for-profit enterprises, while often there may be little or no data shared in the other direction from such enterprises to the public sector.

Stakeholders cities are willing to share their data with

In a subsequent question, privacy was declared to be a general concern when sharing all types of data for most cities; more specifically, cities were asked "What are your commercial, legal and funding concerns related to data sharing?". Ninety-eight out of 150 cities answered they had legal concerns about sharing data. Indeed, because of data policies and regulations applicable in many countries, all organisations, including governments, have legal obligations they must respect. One of the most well -known regulations is the General Data Protection Regulation (GDPR), which applies across all EU Member States. GDPR concerns the protection of people in terms of their personal data and how it is shared[25]. Falling under the jurisdiction of such regulations obliges data collectors, which in this case are local authorities, to guarantee that the way data is collected respects and protects the privacy of the people concerned. In some cases, this requirement forced cities to add extra verification processes, hence increasing labour and time for their civil servants. Although data privacy is, of course, of great importance and should be respected, it nonetheless has a limiting effect on the abilities of cities to collect and share data.

The cities that are most in the forefront of data sharing have launched their own Open Data Portals, such as London[26], Paris[27], Milan[28], New York[29] and Sydney[30].

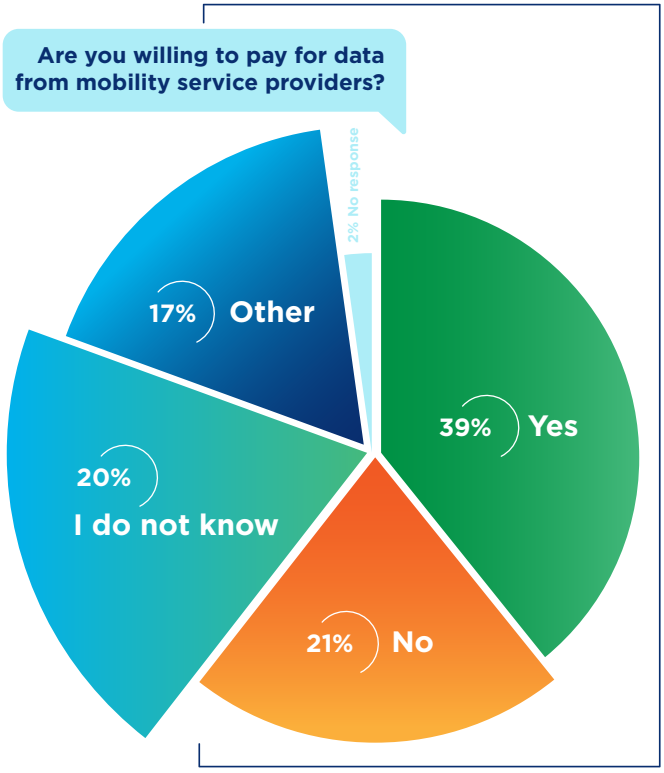
Through such portals, cities provide structured access to any data providers who sign up to data sharing rules. This data covers not only transport but often also housing, city administration, healthcare and other topics. Already in 2019, many major cities worldwide had developed their Open Data Portals[31].

Receiving data from third parties

During the interviews, several cities mentioned that after sharing data collected by them, they hope to be able to receive data from other mobility stakeholders. This two-way data exchange has the potential to assist cities in both the design and operations of their transport systems. Not only are there resource limitations to collecting all types of data needed by cities, but there are also certain types of valuable data to which simply cities do not have access. These are, for example, data about ride-hailing, e-scooters or last mile delivery data that private organisations may have already collected.

When asked "What kind of data would you be interested in receiving from mobility services providers?" 35 cities mentioned Origin-Destination (OD) data and routes used, 14 mentioned GPS location data and 13 said that they would be interested in all possible data related to the sector of mobility.

The ERTICO City Moonshot interviews enquired in case free data exchange is not an option, whether cities would be willing to pay for such data. Close to 40% of cities are willing to pay for data of high quality and have already mentioned cooperation with companies such as TomTom or Waze. In the graph below one can see that 17% of city representatives selected the option "Other". This was usually followed by saying that it depended on a variety of factors including how important this data was to them, the cost of the data and the funds available to purchase such data. Overall, only 1 in 5 cities responded that they would not pay to purchase data from mobility service providers.



Willingness to pay for data from mobility service providers

25 https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en
26 https://data.london.gov.uk/
27 https://opendata.paris.fr/pages/home/
28 https://www.cittametropolitana.mi.it/open_data/
29 https://opendata.cityofnewyork.us/data/
30 https://data.cityofsydney.nsw.gov.au/
31 https://rlist.io/l/major-smart-cities-with-open-data-portals

Data Standards

Another aspect that may limit data sharing and exchange are the difference in standards used to share the data. These differences can cause the receiver of the data to spend extra time formatting the data in order to be able to use it. We asked cities the types of standards used to share data giving the options of the most known and common ones:

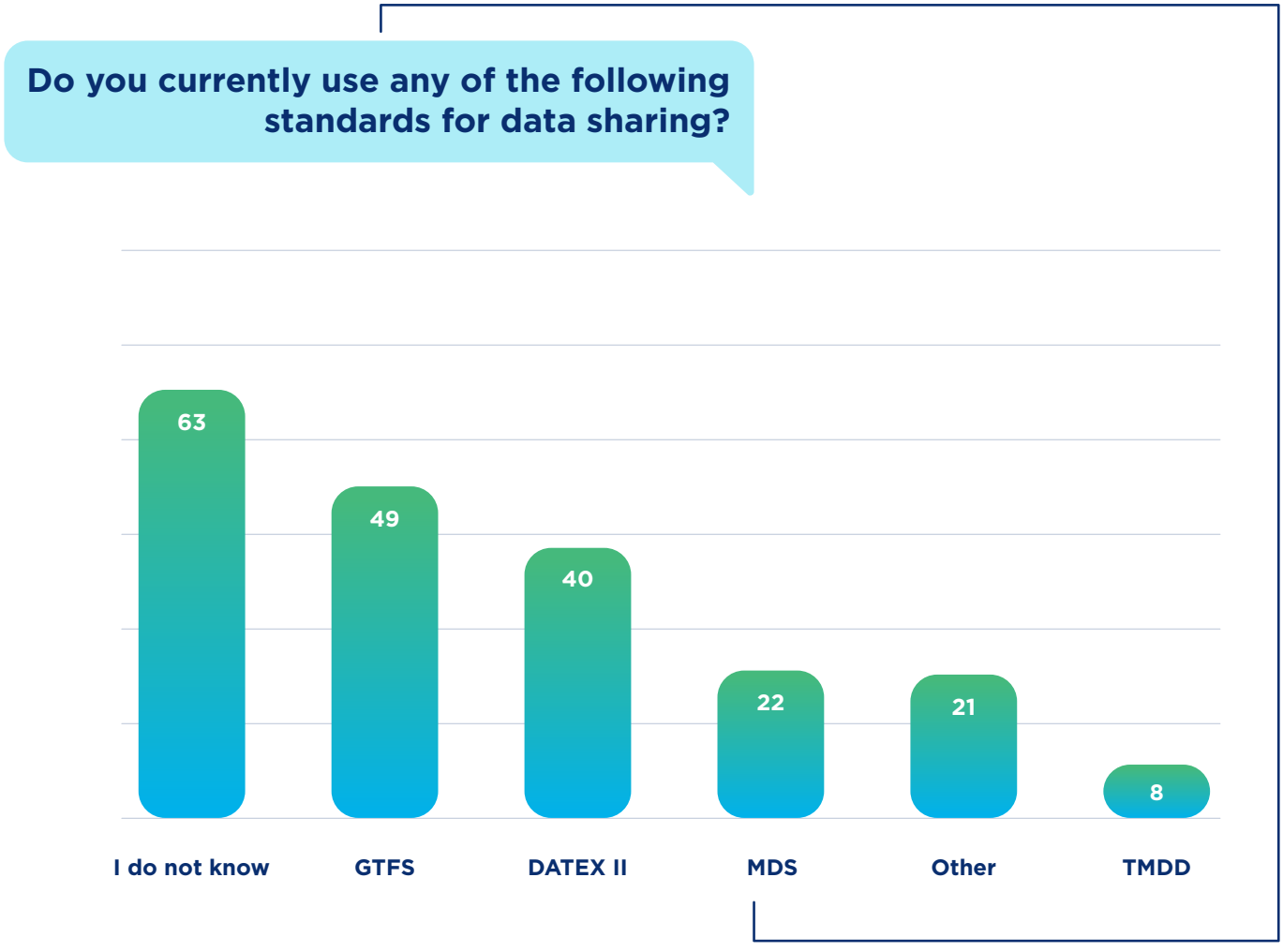
- **MDS**[32]
  - Mobility Data Specification.

- **DATEX II**[33]
  - Exchange of traffic information between traffic management centres, traffic service providers, traffic operators and media partners.

- **TMDD**[34]
  - Traffic Management Data Dictionary.

- **GTFS**[35]
  - General Transit Feed Specification.

Over 40% of the city representatives (63 out of 150) were not sure of the standards they use as it was not their direct field of expertise. However, it is still possible to see in the graph below that the most common standards used are GTFS and DATEX II. These standards may also be used in other fields of work than just transport and mobility. This allows cities to be able to use them throughout their different departments.



Standards used by cities for data sharing

32 https://www.openmobilityfoundation.org/about-mds/#:~:text=time%2520and%2520money.-,MDS%25E2%2580%2594%25E2%2580%259C-Mobility%2520Data%2520Specification%25E2%2580%259D%25E2%2580%2594is%2520a%2520digital%2520tool,scooter%2520and%-2520bike%252Dshare%2520companies
33 https://www.datex2.eu/
34 https://www.ite.org/technical-resources/standards/tmdd/
35 https://gtfs.org/

City representatives when selecting the "Other" option as an answer to this question also mentioned a few other standards that were not included in the multiple choice question posed to them. These include: Emergency Data Exchange Language (EDXL), General bike sharing feed (GBFS), CEN standard SIRI data and preceding German standard VDV 452/454, Alliance for Parking Data (UK standard), BODS - Bus Open Data Service (location, timetable and fare), FIREWARE models, TomTom Maps APIs, Talking Traffic, DVM-Exchange.

Overall, cities have shown interest in data sharing, either sharing their own data or receiving data from other stakeholders. Data sharing can however be a complex process due to the regulations concerning data privacy as well as the different standards used to share data from one organisation to another. In order to enable data sharing perhaps there is a need for better communication between stakeholders on which types of data they are interested in, possess and which standards they use.

Related Work:

As a part of its broader work on aligning data sharing between public and private stakeholders, ERTICO has teamed up with 27 EU member states, as well as England, Norway and Switzerland and peer organisations such as UITP within the scope of the **NAPCORE** project (National Access Point Coordination Organisation for Europe). The project is co-funded by the European Commission under the Connecting Europe Facility (CEF) framework. NAPCORE focuses on proliferating an EU wide methodology on data sharing and data accessibility using the federated National Access Points (NAP) EU infrastructures. Each national NAP is a single recognised access point that provides at least three data streams fully covering the mobility data space:

- the TN-ITS (Transportation Network of Intelligent Transport Systems) data stream, which addresses the map related 'static' "Map base layer" data,
- DATEX II, which shares the traffic information services;
- Public transport data, which complements the TN-ITS data stream and DATEX II

7. MOBILITY AS A SERVICE (MaaS)

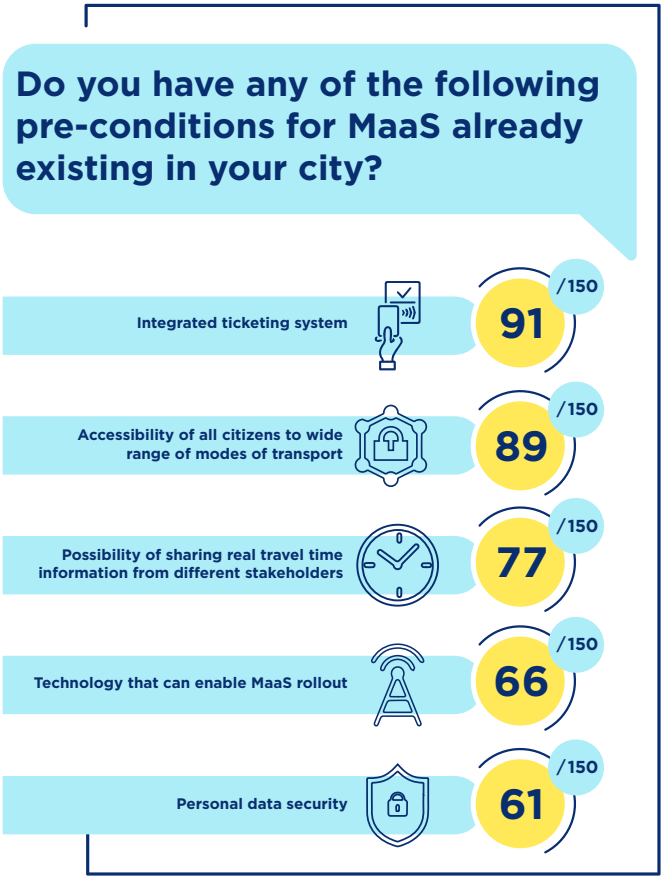
One of the key three topics explored in the City Moonshot survey is Mobility-as-a-Service, or simply MaaS. The full definition of MaaS is offered at the dedicated page of the ERTICO hosted innovation platform MaaS Alliance (since 2015), answering the question: "What is MaaS?[36]". We will simply take the short version to start with, and say that "MaaS integrates various forms of transport services into a single mobility service accessible on demand."

Truth is, the MaaS phenomenon was a long expected innovation in rethinking mobility for the (smart) cities of the 21st century. Today's passengers, their needs, behaviours and priorities are very different to the ones we know from the vehicle focussed mid-twentieth century, when most of current road and public transport systems were designed and deployed. What we found out in the survey, is that out of 150 interviewed transport and mobility professionals working in the cities across the world, about half (51%) confirmed that their cities have, or are developing, MaaS city policy. Let's explore other answers which provided further insights into the current state of play on the topic.

The second question is about the time plan for acting on the topic. Unsurprisingly, of those cities with a policy or even developing policy, a large majority are acting now or are set to act within the first five years. Reassuringly, an additional one third of the respondents are considering the topic and have plans to act within next five to ten years.

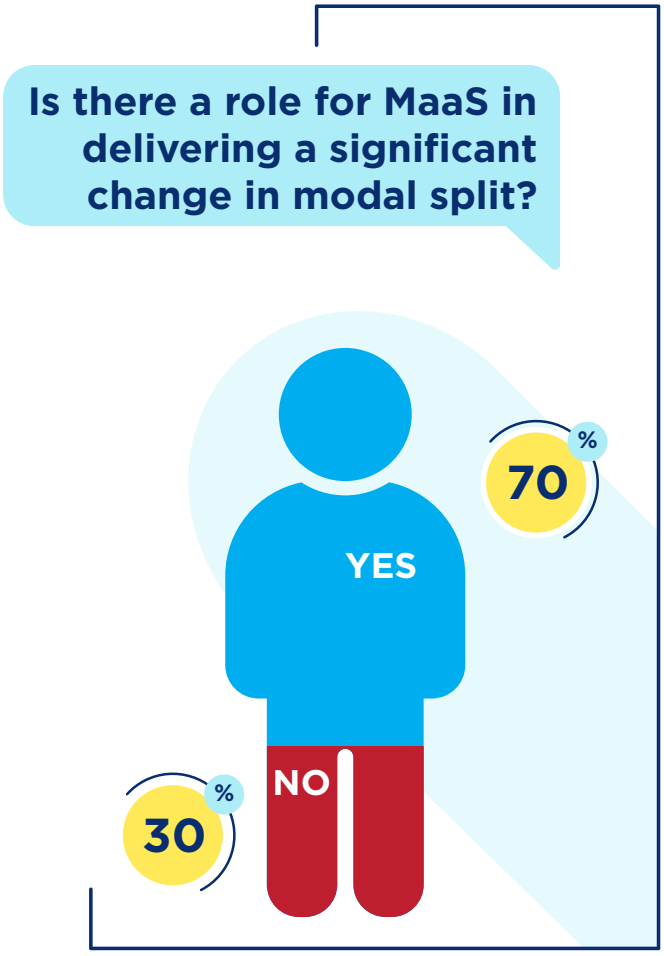
Often, we hear that MaaS can be setup, strive and survive only in an integrated business framework whereby a number of pillars/players come together to develop a working, sustainable and profitable transport system. This framework is sometimes called the MaaS ecosystem, as an undefined number of entities within the industry still exists, which can't be easily positioned and angled. It's also our preference to call it an ecosystem, as it favours a free number of degrees of transport providers that are still being worked out in an agile way as we cover more and more ground in defining the details of operating MaaS.

The majority of cities' heads of transport and strategy interviewed during the survey agreed almost unanimously that the on-demand technology-driven services, which continue to expand transport networks under MaaS, should fall under the responsibility of a mix-in between public authorities and private sector, in order to ensure that those services are integrated with one another. This is a very good result indicating that the bridge between private and public in the MaaS ecosystem is being built around the globe. Having said that, we still know in more theoretical, rather than practical sense, that MaaS (as the most representative on-demand transport concept) has the potential to reduce the number of private cars on city's roads for 90 or even 97% while it is also able to reduce emissions by a third (OECD ITF various Shared Mobility studies)[37].



Existing prerequisites for MaaS solutions in the interviewed cities

36 https://maas-alliance.eu/homepage/what-is-maas/
37 https://www.itf-oecd.org/itf-work-shared-mobility



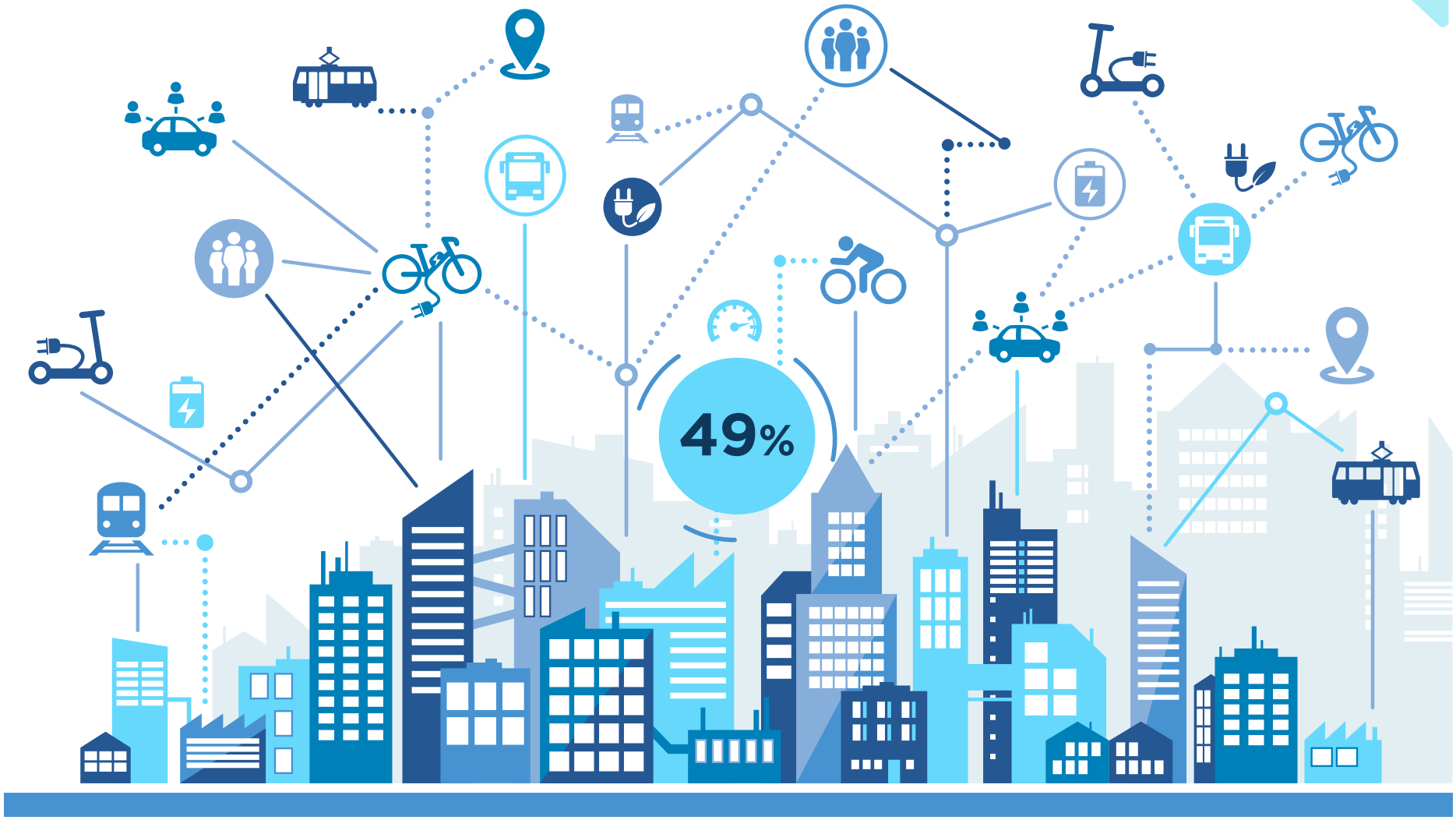
Existing prerequisites for MaaS solutions in the interviewed cities

Are the cities who are not acting faster missing a great opportunity to achieve these results, or perhaps they need support and empowerment to act? It is the latter, we believe, and further replies to ERTICO's questionnaire seem to support this conclusion. For example, a number of prerequisites for MaaS solutions exist in the interviewed cities (out of 150): 91 have 'integrated ticketing system', 89 necessary 'accessibility of all citizens to wide range of modes of transport', 77 'possibility of sharing real time travel information from different stakeholders' and 66 and 61 'technology that can enable MaaS rollout' and 'personal data security' respectively. Interestingly, a small percentage of 30% are still not convinced that there is '...a role for MaaS in delivering a significant change in modal split'. Therefore, we should start with the other 70% in the first instance, with a hope that the remaining will see the results and join the efforts sooner rather than later. This raises a question - how should we, the Smart Cities stakeholders, approach the challenge, and present the potential that MaaS offers to smart cities? We believe that part of the answer is already provided in our survey. Whenever cities want to explore the views of their citizens in adopting new solutions/technology, they conduct either an awareness campaign, a survey or a public demonstration. In our survey this was the case (again out of 150) respectively in 112 (campaign), 100 (survey) and 94 (demonstration) cities. Therefore, we, as transport and mobility community, should follow the same approach and encourage many more MaaS schemes and services to be deployed across Europe and the world. We do know that the potential is certainly there, for example, a recent study from Juniper Research concludes: "...the revenue generated by the use of MaaS (Mobility-as-a-Service) platforms, which integrate different transport services (including buses, taxis, rail and metro) into a single app, will exceed $52 billion by 2027, up from $405 million in 2020"[38]. There is some prize money to be considered in the next six to seven years from the MaaS revenue potential, but it seems the journey is still on its first leag. However, we can all agree that MaaS has significant value and it is still a territory that welcomes bold explorers.

What also encourages us in stating the above are answers to the other two questions we asked during the survey, about existing deployments of MaaS solutions in the cities, and about the studies and projects already undertaken on the topic. In their majority, the cities we interviewed in Europe (with cities in the North and West having a slight edge), stated that both studies and projects exist and the mobility professionals interviewed have a very good insight into both the challenges, but also the benefits that can be accrued by deploying MaaS in the cities. These cities are part of our newly established City Moonshot network and the ERTICO partnership has now at its disposal the valuable guidance and know-how in how to achieve the major step forward in the MaaS deployment. ERTICO is at the forefront of the European initiatives, has the deployment know-how through its innovation projects and works with a great and very active network of industry and public sector partners that covers the whole value chain. We represent the core team who developed the MaaS topic guidelines for Sustainable Urban Mobility Plans (SUMP)[39]. It is through the partnership and working together with the mobility sector players, in both the private and public sectors, that MaaS can be better defined and come to serve the needs of cities and their citizens. The ERTICO Partnership through its innovation and deployment projects, where the various sectors of mobility cooperate on attaining win-win targets, is taking the field of MaaS forward.

38 https://www.juniperresearch.com/press/mobility-as-a-service-revenue-to-exceed-$52
39 https://www.eltis.org/sites/default/files/maas_sump_topic_guide_2021.pdf

Cities with already available (or planned) MaaS projects and studies



Cities with already available (or planned) MaaS projects and studies

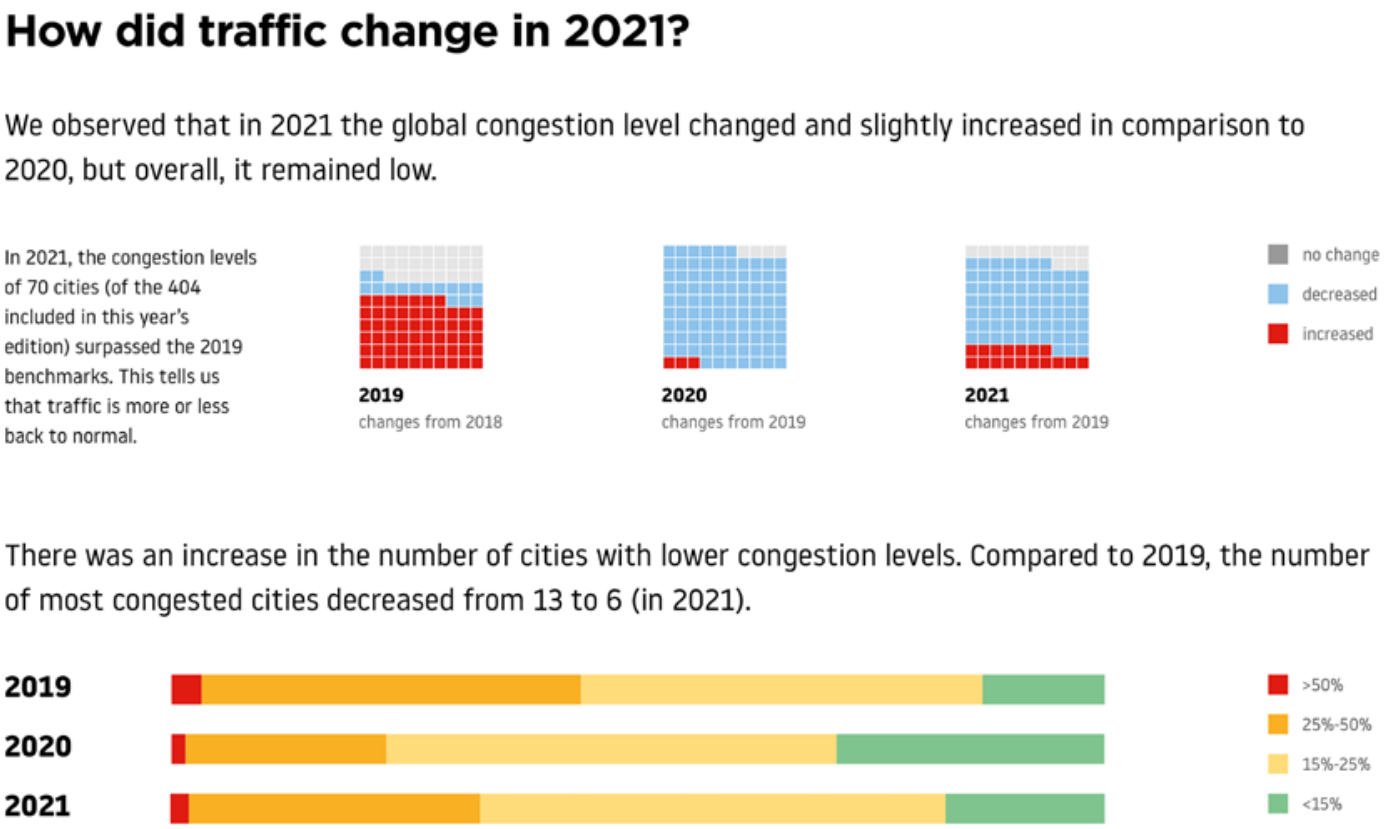
7. COVID-19 IMPACT ON TRANSPORT AND MOBILITY

The impact of COVID-19 on urban mobility has been felt worldwide. The conducted interviews confirm that, with the fact that 78% (117/150) of interviewed cities stated that they had implemented COVID-related transport measures.

The most popular transport and mobility adaptations were: addition of bicycle lanes in 47 cities, increased pedestrian space in 34 cities and public transport restrictions (reduced frequency and/or capacity) were implemented in 29 cities.

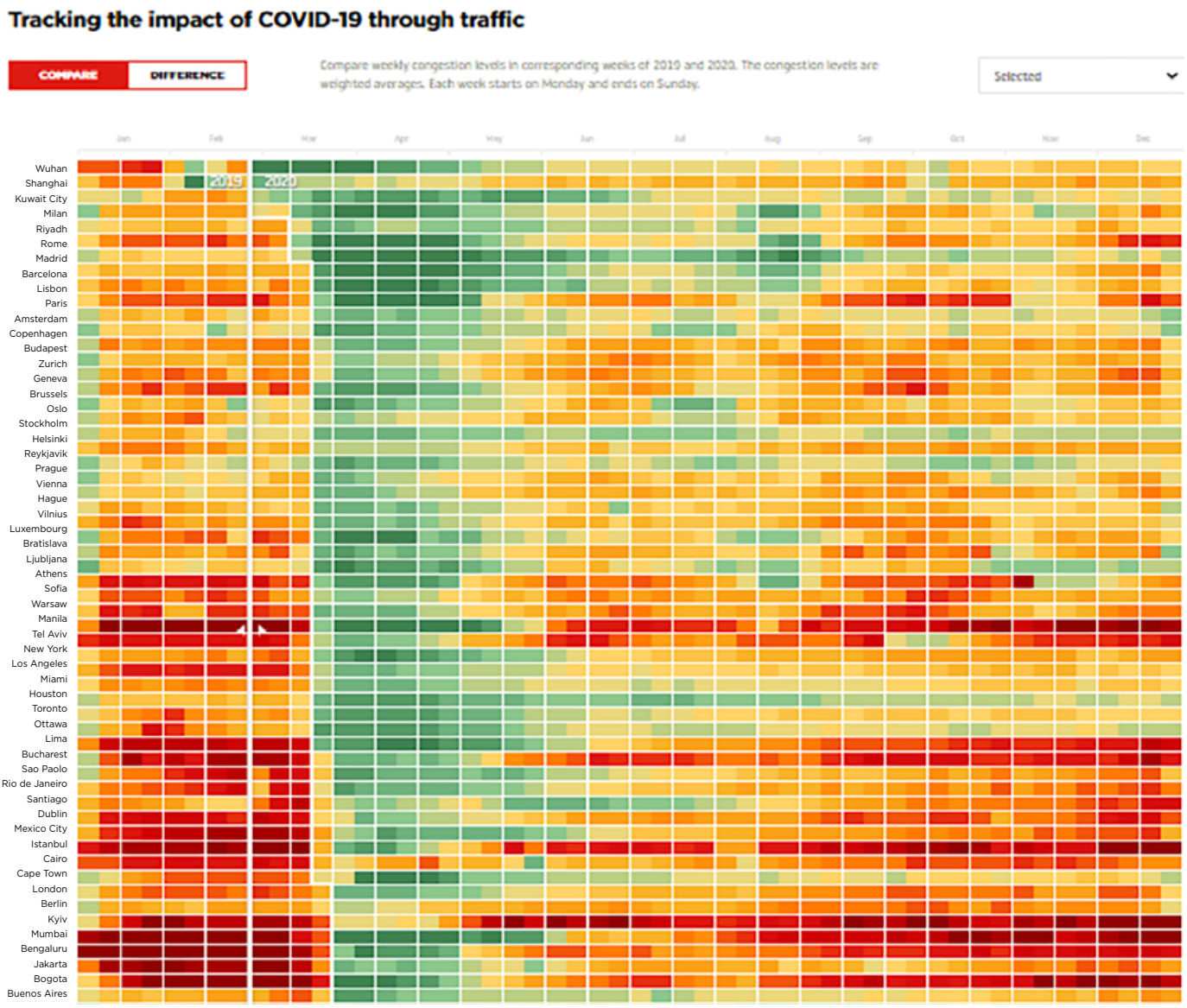
When asked about the duration of these measures beyond COVID, it was clear that public transport capacity limitations would be removed as soon as the health situation allows for it (and in most cases, at the time of writing, this has been done). Additional bicycle lanes are expected to be maintained in a majority of cases (89%). For some cities this decision has already been made while others were still in the process of discussing it.

COVID-19 impact was studied by TomTom, an ERTICO partner. Their data adds another level of information to our findings, where lockdowns lead to unprecedented reductions in traffic congestion.



Urban congestion over the year [40]

40 https://www.tomtom.com/en_gb/traffic-index/



Impact of COVID-19 on traffic [41]

This image from TomTom Traffic Index displays weekly congestion levels in from 416 cities. As can be seen from March 2020, the significant levels of congestion (yellow and green) disappear from cities (turning to green) as an effect of lockdowns.

41 https://www.tomtom.com/en_gb/traffic-index/

8. CITY ENGAGEMENT

The last section of the survey, composed of nine questions, focuses on how cities engage with the public, how they are cooperating with external entities on transport/traffic management, and finally on their existing knowledge on and/or interest in different topics related to Intelligent Transport Systems.

To guarantee clarity, the results of the analysis conducted for this section have been gathered in three sub-sections. The first sub-section focuses on citizens' engagement and on cities' willingness to cooperate with external entities on transport/mobility/traffic management. The second section hones in on previous knowledge cities have on ITS and C-ITS. Finally, the third section zooms in on cities' interest on a number of topics related to transport and mobility.

City engagement and willingness to cooperate.

To get a better understanding of how and how often cities engage with citizens to incorporate their views in their mobility planning, the ERTICO City Moonshot asked the city representatives: "How do you gain understanding of the transport needs of your citizens as part of planning? How often do you collect this data?"

How do you gain understanding of the transport needs of your citizens as part of planning? How often do you collect this data?

How often	Public surveys	Complaints handling	Public consultation	Mass media campaigns	Other
Weekly	3	39	6	6	19
Monthly	9	13	16	22	
Quarterly	13	2	29	26	
Annually	46	1	22	27	
More frequent	3	67	11	7	
Less frequent	47	4	32	27	
I do not know	14	10	12	12	
Total	**135**	**136**	**128**	**127**	**19***

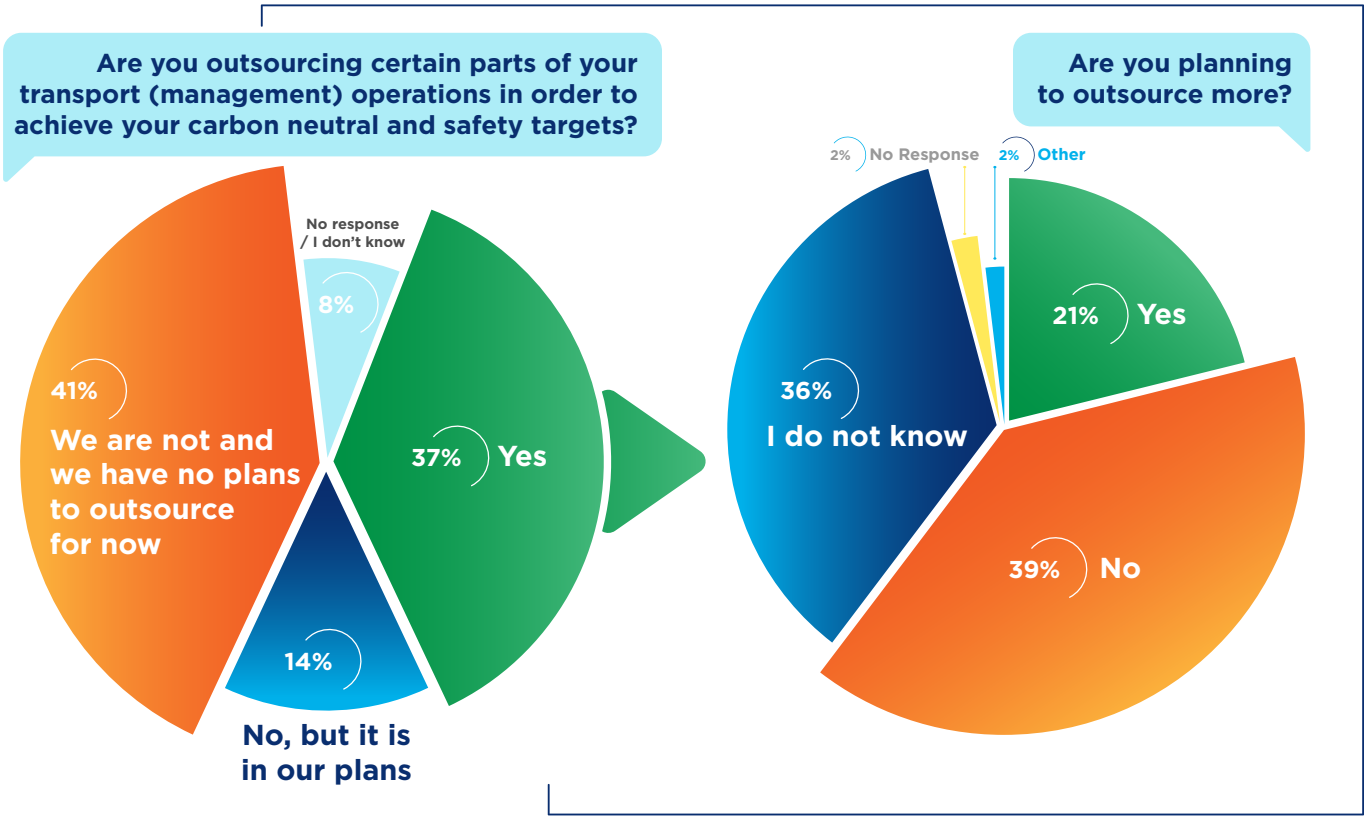
Understanding the transport needs of your citizens and collecting this data

Most of the cities conduct public surveys (135 cities) and handle complaints (136) as a way to understand their citizen's needs. In addition, the results show that most cities also collect data from public consultations and often carry out mass media campaigns, 128 and 127 respectively.

In addition, 19* cities listed other activities as part of their effort to understand the transport needs of their citizens. The most common answer revolves around the organisation of assemblies and workshops with citizens actively participating. The frequency with which these activities are carried out varies from city to city.

To measure the willingness of the cities to cooperate with external entities on transport/traffic management, the following questions were asked: "Are you outsourcing certain parts of your transport (management) operations in order to achieve your carbon neutral and safety targets?"; "Are you planning to outsource more?"; and "Would you be interested in outsourcing your traffic management operations if it enables cost-savings and staying at the forefront of technological developments?"

As highlighted in the graph below, when it comes to outsourcing, 41% of cities answered that they are not outsourcing parts of their transport management operations. Conversely, 45% of the cities are already outsourcing or plan to do so (37% and 14% respectively).



Outsourcing certain parts of transport operations in order to achieve carbon neutral and safety targets and potential further outsourcing

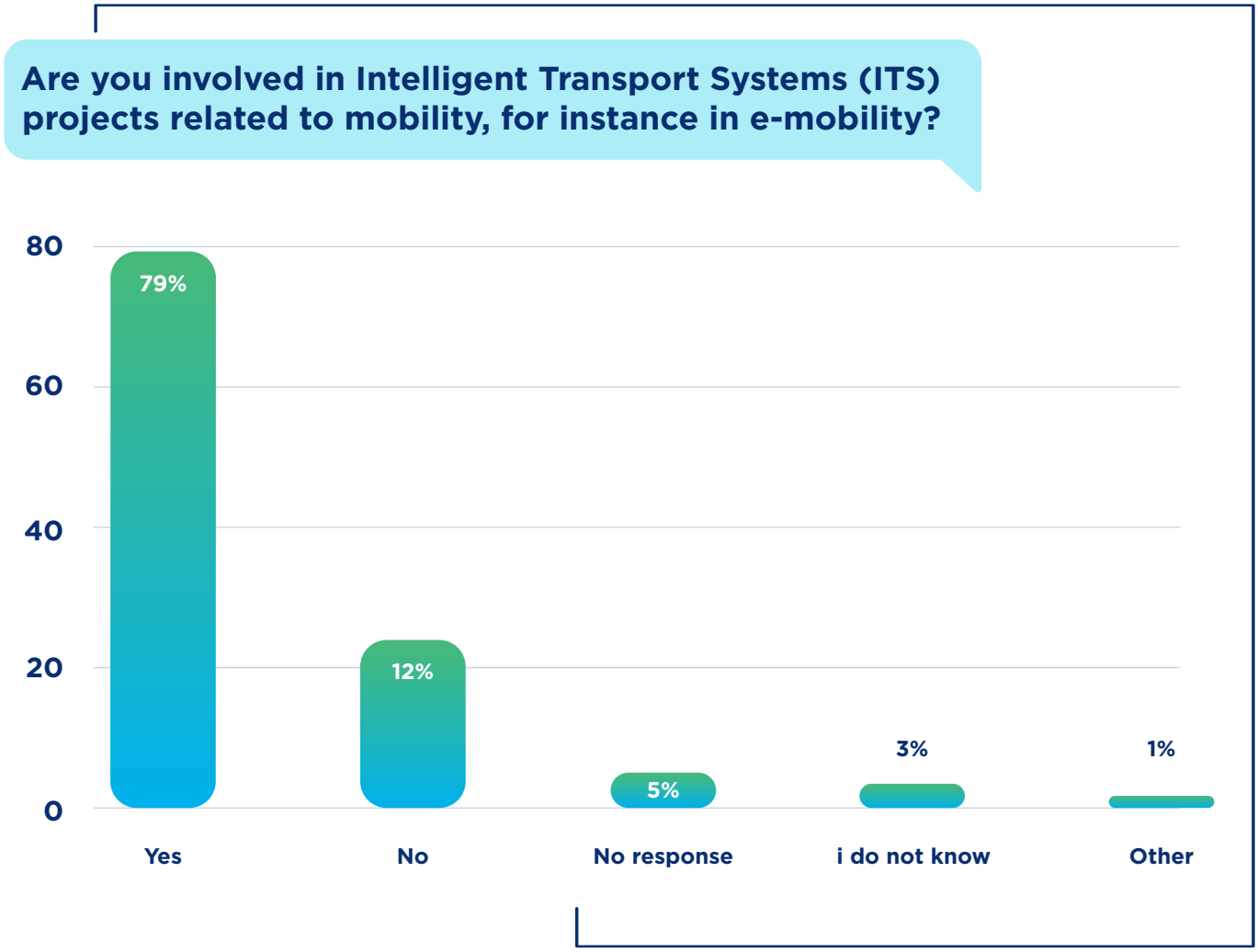
The team also found during the City Moonshot interviews that many cities outsourced only certain services; for example, they outsourced the running of public transport bus routes, but did not outsource activities such as transport management operations (including traffic management).

When asked about their plans to outsource more, 39% of the cities that are currently outsourcing responded that they do not wish to outsource more, while 21% of them stated that they plan to outsource more.

In contrast to the first question, ("Are you outsourcing certain parts of your transport (management) operations in order to achieve your carbon neutral and safety targets?") where 37% of the cities were outsourcing parts of their transport operations, 36% of the cities would be interested in outsourcing traffic management operations if it enables cost-saving and staying at the forefront of technological developments (response to the question: "Would you be interested in outsourcing your traffic management operations if it enables cost-savings and staying at the forefront of technological developments?").

Knowledge of Intelligent Transport Systems (ITS) and Cooperative-ITS

Excluding, 'others' and 'don't know' answers, the majority (almost 80%) of the cities interviewed were involved in Intelligent Transport System major projects; only 12% of the interviewed cities were not involved in ITS projects. In addition, most of the cities that were not involved in ITS projects are on the smaller size, as the vast majority (almost 80% in the 12% that are not involved in ITS projects) are either small or medium sized (from less than 50,000 to 250,000 inhabitants).



Involvement in Intelligent Transport System (ITS) projects related to mobility

The vast majority of interviewed cities (104 cities out of 150) know what Cooperative Intelligent Transport Systems are. As C-ITS is a terminology frequently used in Europe, we have also explained that this field is often referred to as "connected vehicles" in North America.

Interest of cities in mobility and transport topics.

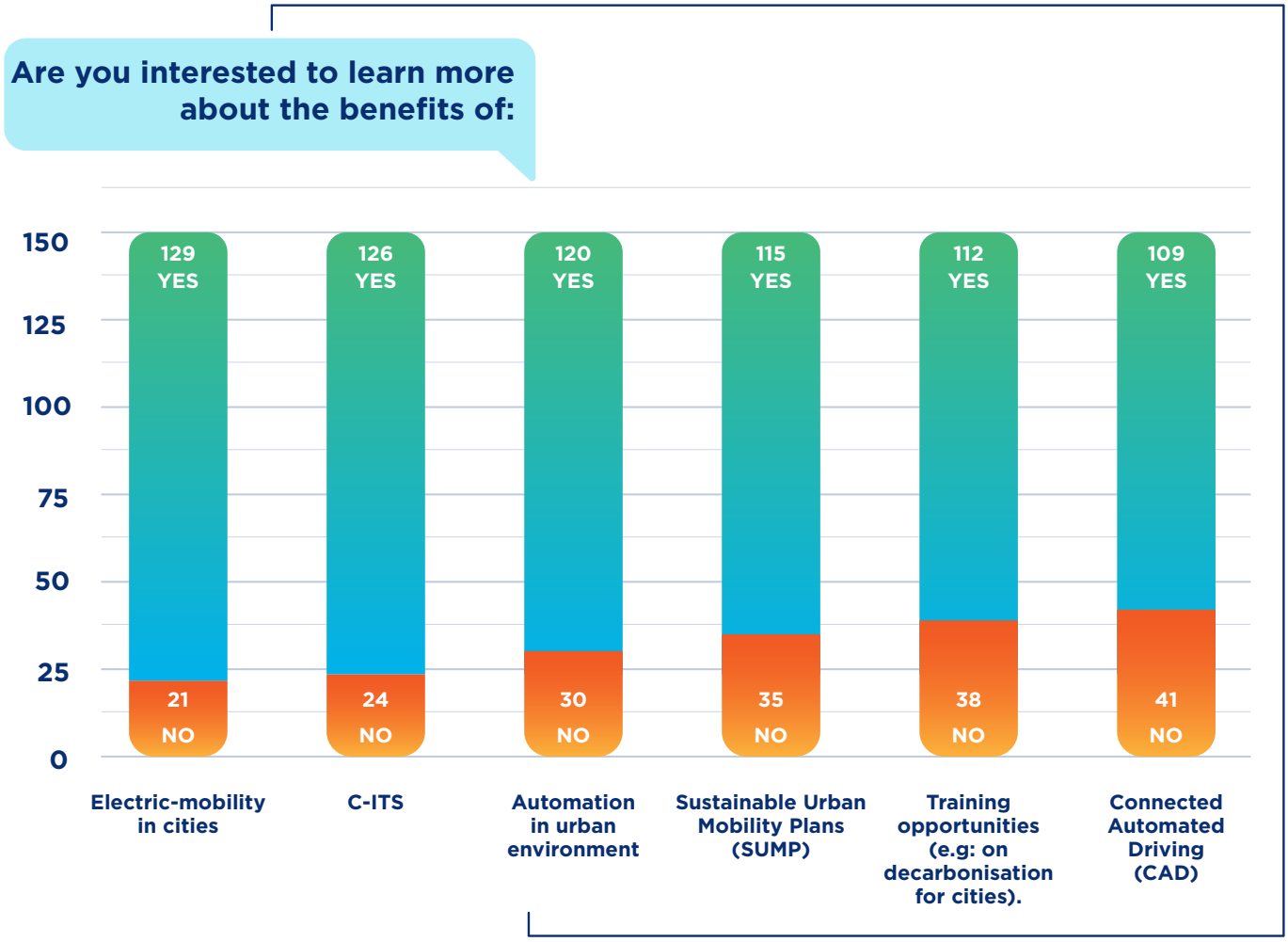
For the last question investigating the mobility topics in which city representatives were most interested, respondents were offered a list with several options between which they could choose:

C-ITS, electric mobility in cities, automation in urban environment, training opportunities, SUMPs and Connected and Automated Driving (CAD).

The results, as highlighted in the chart below, show that respondents from most cities wish to learn more about electric mobility in cities (129 cities interested). The results are not surprising, since the analysis performed on previous questions has shown that a great number of cities (110) has installed charging infrastructure for EVs, and 105 cities have been investing in increasing the number of EV charging stations.

The second most popular topic amongst the interviewees was C-ITS: 126 representatives of the cities expressed their interest in knowing more about C-ITS. Considering that in a previous question ("Do you know what is C-ITS (Cooperative Intelligent Transport Systems)/Connected vehicles?") respondents from 104 cities confirmed they knew what C-ITS was (only 40 cities did not have previous knowledge on the topic), the great interest in knowing more showcase the pivotal importance of C-ITS for urban mobility. Amongst interviewees which did not express interest in learning more about C-ITS are some of the leading cities in this field, such as Helmond and Copenhagen. As they are leaders on this topic, they often provide trainings to other cities on C-ITS. One example is ERTICO Academy training on C-ITS delivered by (among others) the City of Copenhagen.

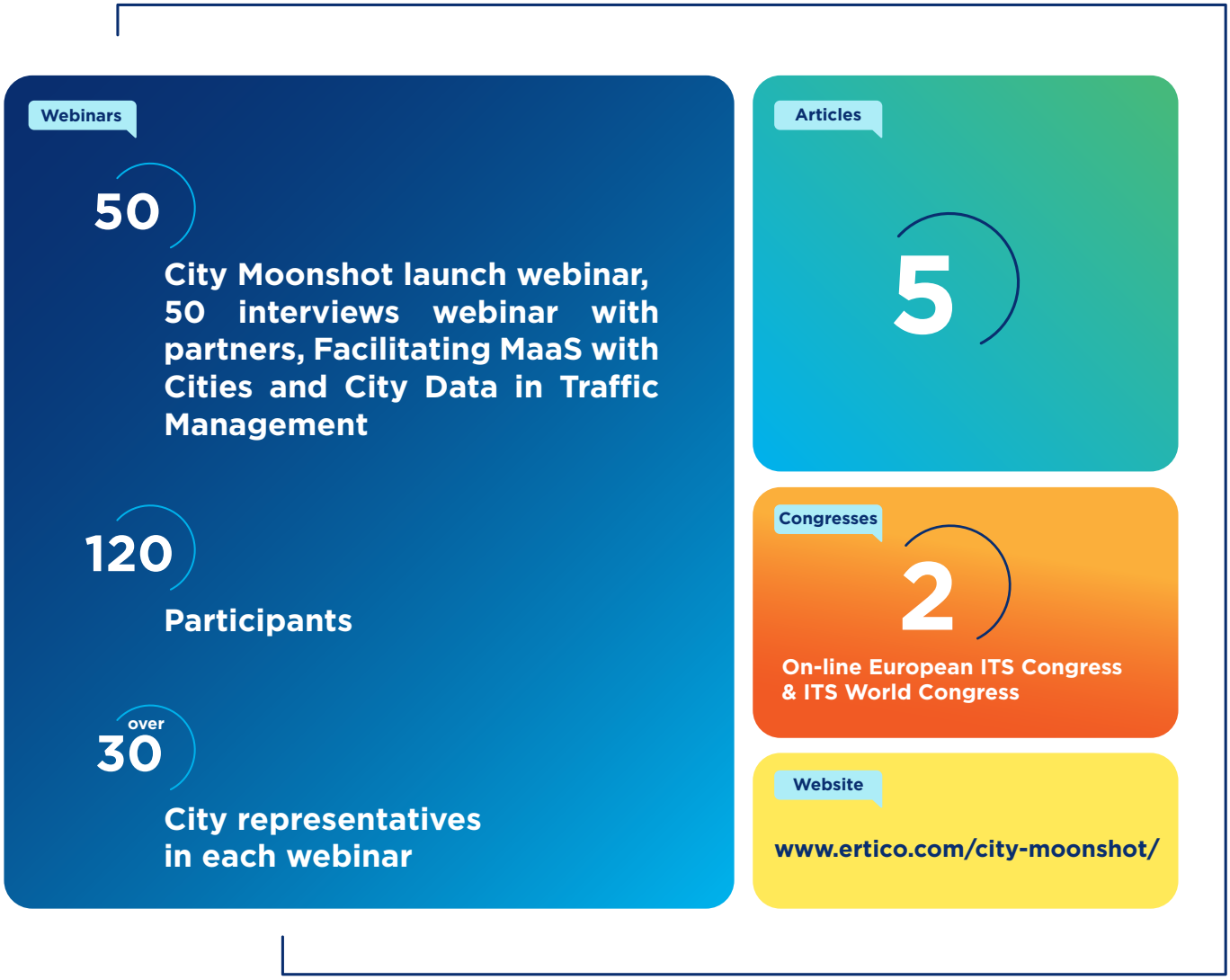
Even though e-mobility and C-ITS were the most popular topics, most of the interviewees also expressed interested in the other four topics (automation in urban environment, training opportunities, SUMPs and CAD), as reflected in the chart below.



Interest in learning more about ITS projects

9. CITY MOONSHOT AND THE DIALOGUE WITH THE WIDER ITS COMMUNITY

Along the realisation of the first 150 interviews, different activities to support the City Moonshot initiative were carried out. Among others, articles and on-line webinars are especially relevant.



Activities to support the City Moonshot initiative

Webinars

One of the features that supports the initiative are the ERTICO webinars on interesting findings of the City Moonshot. There have been three public webinars (and one for the ERTICO partners) on the City Moonshot initiative: one to introduce the initiative to the public; a second one focused on Mobility as a Service (jointly with the MaaS Alliance); and the third one focused on traffic management and preliminary results of the survey on this topic (jointly with ERTICO innovation platform TM 2.0), celebrating 100 interviews.

The webinars offered an opportunity to interviewed cities to discuss and learn about some of the topics on line. The webinars were well attended, with participants having the chance to ask questions on the entire process and methodology of the endeavour.

Articles

Multiple articles have been published about the City Moonshot initiative featuring different topics. The most recent one about the two sessions the City Moonshot initiative held during the 2021 ITS World Congress in Hamburg, where the results from the first 150 interviews were presented.

10. NEXT STEPS

The City Moonshot will continue in 2022 and onwards. 300 cities are a committed target, and interviews with 100 cities in Europe and 50 outside the continent are the set target of the initiative. The focus in achieving this objective in Europe will be centred on the *100 Climate-Neutral and Smart Cities by 2030*[42] initiative by the European Commission (EC). The Implementation Plan[43] issued by the EC will be the guiding light for ERTICO throughout the next phase of the survey. Having said that, the City Moonshot initiative may adjust the questionnaire (current questions are presented in Annex 1), towards addressing the topics and objectives as stated in the EC documents referred to above, supporting the EC initiative.

If we imagine the City Moonshot as a graph with multiple functions aiming at fulfilling particular objectives, interviewed cities may provide only a part of the holistic answer we are searching for. In the next step, the initiative will branch out to several questionnaires aimed at the various stakeholder groups, for example, logistics or public transport specific operatives, to deliver the full graph with a number of functions that are responsible for the successful, sustainable and safe operation of urban agglomerations, and their surroundings, of the future. The second phase questionnaire will expand on certain topics (e.g. Mobility-as-a-Service) and include new questions on electro-mobility and Urban Air Mobility. Further phases in the coming years will follow, with an ambition to convert this initiative into regular annual activity by ERTICO and its partnership.

Throughout the document, a number of ideas and actions are presented, based on the results of the interviews. The plan is to channel the findings from the City Moonshot into actions and project deployments. The opportunities by the EC and other funding bodies in Europe and globally (e.g. UN, World Bank, EBRD) through various active programmes will be the vehicle to fulfil the set objectives for the next Phase (II), taking the interviewed cities and regions as the places where first innovative actions will be robustly tested, affirmed and the resulting findings disseminated worldwide.

Global cooperation is a major input for the activity such as this. The next steps with regards to this segment are quite clear – at least 50 cities and regions outside geographic Europe will be consulted, interviewed and invited to join the actions planned through the projects in which the ERTICO partnership is participating. The best solutions for the cities and regions aiming to be climate-neutral, safe, efficient and people-friendly so not reside exclusively in Europe. The knowledge and experience exchange is a must, and the aim of the next steps of the initiative is to foster existing and establish new relationships amongst transport and mobility professionals globally.

42 https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/missions-horizon-europe/climate-neutral-and-smart-cities_en
43 https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/cities_mission_implementation_plan.pdf

ANNEX 1 | QUESTIONNAIRE

INTRODUCTION

1. **What are the main objectives for your city when it comes to transport and mobility?**

   a) Improving air quality
   b) Improving the public transport system
   c) Decarbonizing city mobility
   d) Increasing inclusiveness in the city transport
   e) Increasing road safety
   g) Other, please specify: [Text Box]

2. **What are the main challenges for your city when it comes to transport and mobility?**
   (You can select more than one).

   a) Growing carbon emissions
   b) Pollution and noise
   c) Lack of existing policy/regulations
   d) Traffic congestion
   e) Resistance to change from citizens
   f) Limited transport options
   g) Lack of budget and/or resources
   h) Other, please specify [Text box]

3. **Are these objectives and challenges recorded in an official document?**

   a) Sustainable Urban Mobility Plans (SUMP)
   b) Development strategy
   c) Urban plan
   d) No, they are not
   e) Other, please specify [Text box]

4. **Are you familiar with the SUMP (Sustainable Urban Mobility Plan) guidelines from the European Commission?**

   a) Yes
   b) No
   c) Other [Text box]

SUSTAINABILITY (Air quality & Climate change)

5. **How can cities ensure the delivery of carbon neutral targets?**
   (Please specify in other).

   a) Addressing the Green Deal with concrete actions
   b) Working together with citizens
   c) Making it their agenda priority
   d) Introducing green incentives
   e) Other, please specify [Text box]

6. **Have you already or are you planning to declare a climate emergency in your city?**
   (If no, please specify in other why not).

   a) Yes, we have declared
   b) Not yet, but we are planning to
   c) We have not and we do not intend to
   d) Other [Text box]

7. **Do you take any transport related actions to address the current climate crisis?**

   a) Yes
   b) No

   If yes: 11. What transport related actions have you taken or are currently taking to address climate emergency?

   a) Developed a transport action plan (if yes, may we request a copy?)
   b) Further investment in public transport
   c) The addiction of specific bicycle lanes
   d) Enabled (and regulated) micro-mobility provider operations
   e) Established a charging infrastructure for e-vehicles
   f) Introduced Urban Vehicle Access Regulation (UVAR)
   g) Other [Text box]

8. **Do you have legal obligations to take action related to climate crisis?**

   a) Yes
   b) No
   c) I do not know

9. **Do you measure your air quality?**

   a) Yes
   b) No

10. **Do you present parameters of air quality?**

    a) Hourly
    b) Daily
    c) Weekly
    d) Monthly
    e) Less often
    f) Other [Text box]

11. **What do you do with the results of the measurements?**

    a) Adjust parking level fees according to air quality

b) Change / adjust transport policy
c) Change / adjust transport operations
d) Share data with the users / interested stakeholders
e) Others [Text box]

12. How do you cope with bad days of air quality?

a) Increase parking fees
b) Close airports
c) Restrict traffic operations
d) Impose restrictions on private motorised vehicles usage
e) Other [Text box]

13. Has your city estimated the greenhouse gas (GHG) emissions from transport?
(If yes, in Other please specify how much is it per year in ton CO_2).

a) Yes
b) No
c) Other [Text box]

14. How is your city encouraging behavioural change to help achieve air quality improvements?
(You can select more than one).

a) The introduction of low emission-zones
b) Road and/or congestion charging
c) Incentivising walking and cycling
d) Incentivising Public Transport usage
e) Public transport improvement measures
f) Providing and promoting Park & Ride systems
g) More charging infrastructure for e-vehicles
h) Reduction of parking spaces
i) Other [Text box]

15. How would you incentivise the above?

[Text box]

16. Do you have any completed studies or projects in your city on this topic?
(If yes, may we request a copy?).

a) Yes
b) No
c) I do not know
d) Other [Text box]

17. Have you implemented any traffic measures during the COVID19 lock down?

a) Yes
b) No
c) I do not know

18. What are these measures?

[Text box]

19. How long are you planning to have them in place?

[Text box]

DATA SHARING

20. Do you believe that sharing your transport data (and receiving other transport data from other stakeholders) can help you reach your objectives & overcome some of the aforementioned challenges?
(If yes, in other please give us more details).

a) Yes
b) No
c) Other, please specify [Text box]

21. Do you have a city policy on data sharing?
(If yes, please share it with us).

a) Yes
b) No
c) Other [Text box]

22. What type of transport (traffic) data is typically collected in your city?

a) Traffic management
b) Number of vehicles traveling on certain r roads
c) Average speed on roads
d) Number of passengers on public transport
e) Number of bicycle rides
f) Micro-mobility data
g) Parking spaces occupancy
h) Other [Text box]

23. Are you sharing data with private sector (e.g. for public projects or other)?

a) Yes
b) No
c) Other [Text box]

24. Would your city be interested in cooperating with private entities to jointly elaborate and build new, innovative solutions based on your City data?
(Please share with us why)

a) Yes
b) No
c) Other [Text box]

25. Who are you willing to share your data with?

a) Transport providers in your city
b) Private sector e.g., private mobility providers
c) Other cities
d) Scientific institutions

e) Mobile telecommunication companies
f) Ministries/governments
g) None
h) Other, please specify [Text box]

26. From the above stakeholders who you will NOT share data with, could you explain why?

[Text box]

27. What type of data would you be willing to or do you already share with other stakeholders (such as micro-mobility operators, car-sharing companies, bike-sharing providers, logistics companies, etc.)?

a) Traffic data
b) Parking spaces
c) Number of passengers in public transport
d Air quality data
e) Number of cyclists
f) City logistics
g) Intersection data (signal plans, video from a) cameras, data from detectors)
h) Number of pedestrians
i) Other, [Text box]

28. Would you do it or do you currently do it for free or not?

a) For free
b) For a cost
c) I do not know
d) Other [Text box]

29. What kind of data would you be interested in receiving from mobility services providers?

[Text box]

30. Are you willing to pay for it?

a) Yes
b) No
c) I do not know
d) Other [Text box]

31. What are your commercial, legal and funding concerns related to data sharing?

[Text box]

32. How do you assure the quality of data?

a) Accuracy
b) Precision
c) Missing data
d) I do not know
e) Other [Text box]

33. Do you currently use any of the following standards for data sharing?

a) MDS - Mobility Data Specification
b) DATEX II - Exchange of traffic information between traffic management centres, traffic service providers, traffic operators and media partners
c) TMDD - Traffic Management Data Dictionary
d) GTFS - General Transit Feed Specification Defines a common format for public transportation schedules and associated geographic information
e) I do not know
f) Other [Text box]

34. *(For European Cities)*
What impact does General Data Protection Regulation (GDPR) have on your data collection system and on sharing data with other stakeholders?

[Text box]

34. *(For non-European cities)*
Do you have a regulation on data privacy?

a) Yes
b) No
c) I do not know
d) My city is European
e) Other [Text box]

MOBILITY AS A SERVICE

35. Do you have a city policy on Mobility as a Service (MaaS)?

a) Yes
b) Under development
c) No
d) I do not know
e) Other [Text box]

36. Do you have a time plan?

a) Yes, for the next 1-5 years
b) Yes, for the next 5-10 years
c) Yes, for the next 10+ years
d) No
e) Other [Text box]

37. Who is the driver behind MaaS in your city?

Public operator

City administration

Private provider

Other [Text box]

38. Are there any MaaS solutions implemented in your city?
(If yes, which solution?).

a) Yes

b) Under development
c) No
d) I do not know
e) Other [Text box]

39. What should be in your opinion the approach of MaaS?

a) City-led
b) Commercial services, private sector-led
c) A mix in-between

40. What in your view are the biggest benefits of MaaS for your city?

a) Reduction of carbon emissions
b) Improved modal split towards sustainable and cleaner modes of transport
c) Reduced congestion
d) More liveable public spaces
e) Greater overall transport efficiency (lower cost, travel time…)
f) Comfort and convenience
g) Other [Text box]

41. Is there a role for MaaS in delivering a significant change in modal split?

a) Yes
b) No
c) I am not sure
d) Other [Text box]

42. Do you have any of the following pre-conditions for MaaS already existing in your city?

a) Integrated ticketing system
b) Technology that can enable MaaS rollout
c) Demand
d) Open regulatory framework in Public Transport
e) Integration of traffic information from different stakeholders
f) Possibility of sharing real time travel information from different stakeholders
g) Accessibility of all citizens to wide range of modes of transport
h Personal data security
i) Other [Text box]

43. How do you include the needs of citizens when adapting this/a new technology?

a) Public demonstrations of solutions
b) Awareness campaign
c) Citizen survey
d) Other [Text box]

44. Do you have any completed studies or projects in your city on this topic?
(Please share it with us).

a) Yes
b) No
c) I do not know
d) Other [Text box]

CITY MOBILITY ENGAGEMENT

45. How do you gain understanding the transport needs of your citizens as part of planning? How often do you collect this data?

	Weekly	Monthly	Quarterly	Annually	More frequent	Less frequent	I do not know
a) Public surveys							
b) Complaint handling							
c) Public consultation							
d) Mass media campaigns							
e) Other							

46. Do you currently utilize key performance indicators around safety in order to plan the mobility landscape of your city?

c) Yes
b) No
c) Other [Text box]

47. Are you outsourcing certain parts of your transport (management) operations in order to achieve your carbon neutral and safety targets?

a) Yes, we are
b) No, but it is in our plans
a) We are not and we have no plans to outsource for now
c) Other [Text box]

47. Are you planning to outsource more?

a) Yes
b) No
c) I do not know
d) Other [Text box]

48. Would you be interested in outsourcing your traffic management operations if it enables cost-savings and staying at the forefront of technological developments? (please share with us why)

a) Yes
b) No
c) I do not Know
d) Other [Text box]

49. Are you involved in Intelligent Transport Systems (ITS) projects related to mobility, for instance in e-mobility?
(In other please specify which ones)

a) Yes
b) No
c) I do not know
d) Other [Text box]

50. What would you like to find out from other cities, related to transport and mobility?

[Text box]

51. Do you know what is C-ITS (Cooperative Intelligent Transport Systems)/Connected vehicles?

a) Yes
b) No

52. Are you interested to learn more about the benefits of:

a) C-ITS
b) E-mobility in cities
c) Automation in urban environment
d) Training opportunities (e.g.: on decarbonisation for cities)
e) Sustainable Urban Mobility Plans (SUMP)
f) Connected Automated Driving (CAD)
g) Cargo bikes
h) Other [Text box]

ANNEX 2 | GEOGRAPHIC LOCATION

At the beginning of the City Moonshot survey, the first question posed by the project team was – how we define what is a city, in terms of a relatively precise definition, which we intend to interview. There are various definitions of urban agglomeration, and the decision to interview units of public administration responsible for the transport and mobility management in an area with common infrastructure, policy responsibilities and infrastructure was based on UN Habitat's document "What is a city?"[44]. Therefore, a high-density cluster/urban centre with a minimum population of 50,000 was considered as a city and presented in the Annex 2 table. If the formal name, or the administrative setup differs from the above conditions, we publish in the note's column further information. If the urban agglomeration listed in the below table does not include a specific footnote, it can be considered as a city.

Europe			
City	Country	City	Country
Graz	Austria	Oslo	Norway
Minsk	Belarus	Stavanger	Norway
Antwerp	Belgium	Gdynia	Poland
Brussels	Belgium	Warsaw	Poland
Leuven	Belgium	Guimarães	Portugal
Banjaluka	Bosnia and Herzegovina	Faro	Portugal
Sarajevo	Bosnia and Herzegovina	Lisbon	Portugal
Heraklion[1]	Crete	Slobozia	Romania
Zagreb	Croatia	Moscow	Russia
Nicosia[1]	Cyprus	Belgrade	Serbia
Brno	Czech Republic	Kruševac	Serbia
Ostrava	Czech Republic	Novi Sad	Serbia
Prague	Czech Republic	Subotica	Serbia
Copenhagen	Denmark	Martin	Slovakia
Tallinn	Estonia	Novo Mesto	Slovenia
Helsinki	Finland	Barcelona	Spain
Tampere	Finland	Bilbao	Spain
Grenoble	France	L'Hospitalet de Llobregat	Spain
La Rochelle	France	Las Palmas	Spain
Paris	France	Lloret de Mar	Spain
Strasbourg	France	Logrono	Spain
Toulouse	France	Madrid	Spain
Versailles	France	Pamplona	Spain
Bremen	Germany	Borlänge	Sweden
Essen	Germany	Gothenburg	Sweden
Hamburg	Germany	Malmo	Sweden

44 https://unhabitat.org/sites/default/files/2020/06/city_definition_what_is_a_city.pdf

Europe			
City	Country	City	Country
Karlsruhe	Germany	Östersund	Sweden
Munich	Germany	Stockholm	Sweden
Athens[1]	Greece	Umea	Sweden
Lamia[1]	Greece	Basel	Switzerland
Larissa	Greece	Bern	Switzerland
Rafina & Pikermi[1]	Greece	Zurich	Switzerland
Thessaloniki	Greece	Ankara	Turkey
Trikala[1]	Greece	Bursa	Turkey
Budapest	Hungary	Gaziantep[1]	Turkey
Cagliari	Italy	Istanbul	Turkey
Florence	Italy	Izmir	Turkey
Milan	Italy	Kiev	Ukraine
Rome	Italy	Aberdeen	United Kingdom
Trieste	Italy	Belfast	United Kingdom
Turin	Italy	Cambridgeshire[4]	United Kingdom
Verona	Italy	Coventry	United Kingdom
Reykjavik	Iceland	Glasgow	United Kingdom
Dublin	Ireland	Hull	United Kingdom
Limerick	Ireland	Kent [4]	United Kingdom
Riga	Latvia	London	United Kingdom
Skopje	North Macedonia	Manchester	United Kingdom
Chisinau	Moldova[1]	Milton Keynes	United Kingdom
Podgorica	Montenegro	Northern Ireland[3]	United Kingdom
Amsterdam	Netherlands	Oxfordshire[4]	United Kingdom
Enschede	Netherlands	West Midlands[4]	United Kingdom
Helmond	Netherlands		
Rotterdam	Netherlands		
Utrecht[2]	Netherlands		
Utrecht	Netherlands		
Bergen	Norway		

[1] Municipality, [2] Province, [3] Region, [4] County

North and South America	
City	Country
Buenos Aires	Argentina
Sao Paulo	Brazil
Brampton	Canada
Toronto	Canada
Vancouver	Canada
Windsor	Canada
Winnipeg	Canada
Santiago	Chile
Trujillo	Peru
Montevideo	Uruguay
Pennsylvania[1]	United States
Eugene	United States (Oregon)
West Hollywood	United States (California)
Suffolk	United States (Virginia)
Boston	United States (Massachusetts)
Olympia	United States (Washington)
Chattanooga	United States (Tennessee)
Los Angeles	United States (California)
Alexandria	United States (Virginia)
Philadelphia	United States (Pennsylvania)
New Orleans	United States (Louisiana)
Minneapolis	United States (Minnesota)
Pittsburgh	United States (Pennsylvania)
New York	United States (New York State)
San Francisco	United States (California)

[1] Region/State

Asia	
City	Country
Qingdao	China
Nanjing	China
Shenzhen	China
Beijing	China
Jerusalem	Israel
Tel Aviv Yafo	Israel
Almaty	Kazakhstan
Doha	Qatar
Yekaterinburg	Russia
Yuzhno-Sakhalinsk	Russia
Sejong	South Korea
Ras Al Khaimah[1]	United Arab Emirates
Tashkent	Uzbekistan

[1] Region

Africa	
City	Country
Addis Ababa	Ethiopia
Cape Town	South Africa
Johannesburg	South Africa

Australia and Oceania	
City	Country
Brisbane	Australia
Auckland	New Zealand
Christchurch	New Zealand

TESTIMONIALS FROM CITIES

“I’m looking forward to assisting the ERTICO team in the implementation of the City Moonshot interviews. I’m very confident that it will help cities learn from best practices and challenge them to accelerate their de-carbonisation plans”,

Marshall Poulton, Head of Transport Strategy at Glasgow City Council.

“In Berlin, we continuously research, develop and apply innovative solutions for future mobility. We are very keen to share our experience and also learn from the expertise of other cities. ERTICO´s City Moonshot will increase the transfer of knowledge and we look forward to participating“,

Gernot Lobenberg, Director of Berlin Agency for Electromobility eMO.

’’We are very interested to see the results of the City Moonshot initiative as it will provide the City with a good benchmark in the application of new and emerging Mobility technology and global best practice. This, in turn, will help us to refine and adapt our approaches to our strategic mobility initiatives in line with current and emerging trends.’’

Leigh Stolworthy, Transport Forward Planning Manager, City of Cape Town .

“Sustainable urban mobility is at the heart of liveable and vibrant cities. Exchange is always valuable. Not only cities can learn from each other about their goals, measures taken, engagement, cooperation or regulatory framework. City Moonshot can also provide important insights for private companies.”

Tina Wagner, Head of Department for Transport Development; Free and Hanseatic, City of Hamburg.

“Being one of the first Latin American cities to participate in the City Moonshot Project was an incredible opportunity for us to exchange experiences with other cities around the world, regarding important themes for the mobility of the future that we aspire to. We look forward to the next opportunities!”

Eduardo Castellani Gomes dos Reis, Advisor to the Presidency of SPTrans, Sao Paolo.

ERTICO-ITS EUROPE
Avenue Louise 326 | B-1050 Brussels | Belgium
Tel: +32 (0)2 400 0700 | info@mail.ertico.com

ertico.com | @ertico

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