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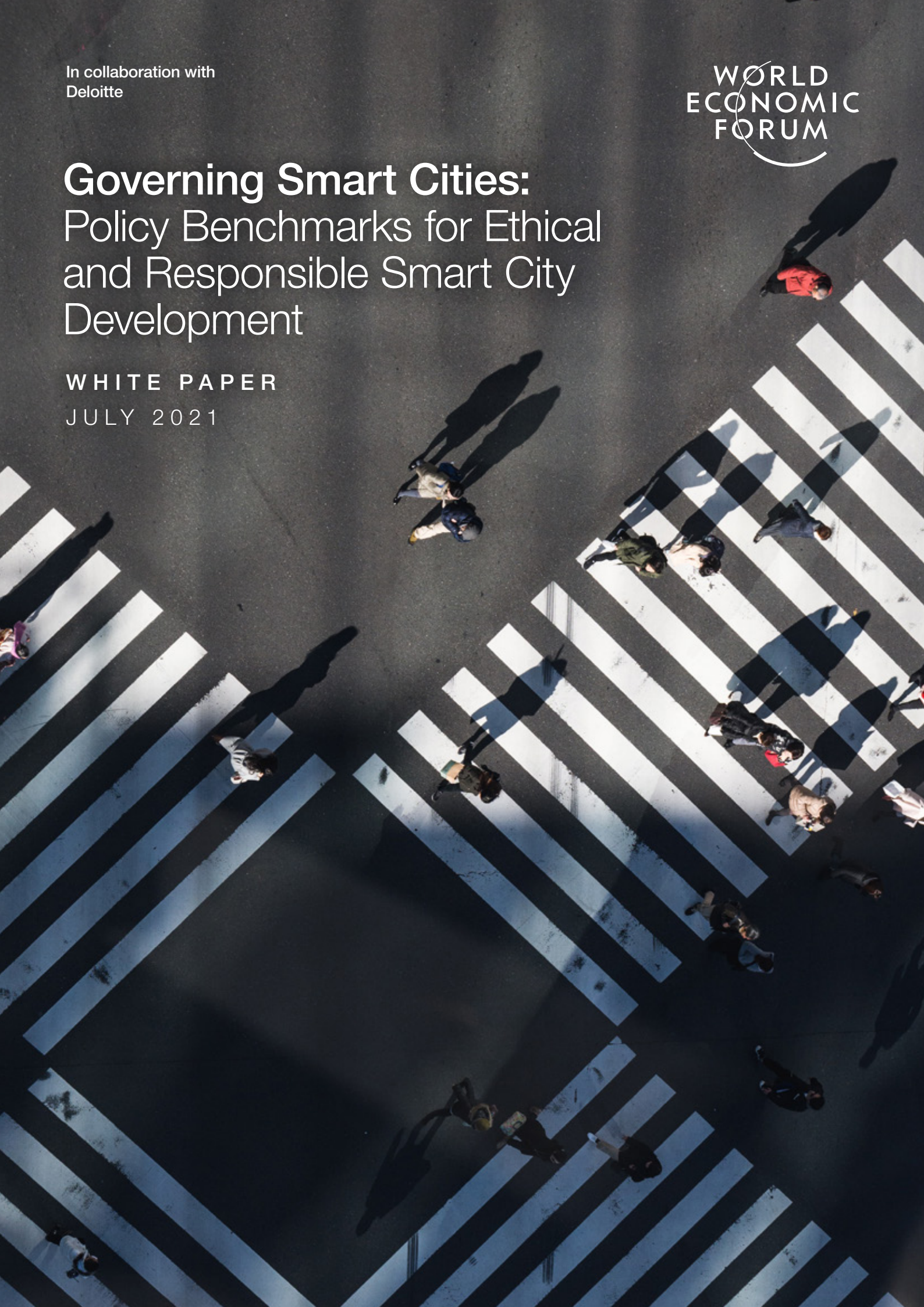
WORLD ECONOMIC FORUM

Governing Smart Cities:
Policy Benchmarks for Ethical and Responsible Smart City Development

WHITE PAPER

JULY 2021



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Foreword

Cities need better governance to build resilience and improve technology practices.

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The COVID-19 pandemic has underscored the importance of resilience in societies across the world. The crisis has seen cities, in developed and developing nations alike, reaching for data and tools to get real-time intelligence and make targeted interventions to save lives. Digital tools are a step towards realizing the "smart city" that technologists have been anticipating for years.

The crisis has also highlighted challenges for policy, governance and operations that have been around since the idea of smart cities first came about – in relation to how data is secured, how people's privacy is protected, how inclusion is ensured, and how different agencies and organizations can share data quickly. As we look at how to recover from the pandemic and invest in improving resilience to meet the next crisis, we need to ensure that governments address policy gaps that slow down our responsiveness.

This is the first report by the World Economic Forum on the state of technology governance in cities. The report tracks the efforts of the G20 Global Smart Cities Alliance, which seeks to advance the responsible and ethical use of smart city technologies. The Alliance and its partners represent more than 200,000 cities and local governments, leading companies, start-ups, research institutions and civil society communities. The World Economic Forum acts as its secretariat.

This report is possible only because of the close partnership between the World Economic Forum and Deloitte.

Executive summary

As cities adjust to the new post-pandemic paradigm, there is a need to focus on policies for the responsible and ethical use of technology.

This report, *Governing Smart Cities*, provides a benchmark for cities looking to establish policies for ethical and responsible governance of their smart city programmes. It explores current practices relating to five foundational policies: ICT accessibility, privacy impact assessment, cyber accountability, digital infrastructure and open data. The findings are based on surveys and interviews with policy experts and city government officials from the Alliance's 36 "Pioneer Cities". The data and insights presented in the report come from an assessment of detailed policy elements rather than the high-level indicators often used in maturity frameworks.

Using model policies developed by global experts as a framework, the analysis in this report reveals serious gaps across cities of all sizes, in all geographies and at all levels of economic development. Among our Pioneer Cities:

- The pandemic has rapidly accelerated digital transformation and the adoption of city services, which makes the accessibility of digital city services a vital component of an inclusive city. However, less than half of cities have policies in place to embed basic accessibility requirements into their procurement of ICT, and less than half of cities provided evidence that they implement these requirements in practice.

- 80% of cities acknowledge legal obligations for privacy and data protection, but less than 25% conduct privacy impact assessments when they deploy new technology.

- During the pandemic there appears to have been an increase in cyberattacks on local authorities and services.[1] Yet most cities do not have anyone designated as accountable for cybersecurity, nor a cybersecurity plan that is regularly reviewed by senior executives.

- The pandemic has been defined by homeworking and remote education. But many cities lack the digital infrastructure needed to support or sustain this shift. The importance of connectivity has been made clear.[2] Among the Pioneer Cities, less than half have a "Dig Once" policy in place to ensure that digital infrastructure is installed during street excavations and construction works. This would accelerate the roll-out of connectivity infrastructure and reduce disruption. Moreover, less than one-third of cities have the governance processes needed to drive connectivity roll-out through a Dig Once policy.

- Open data policy is perhaps the only area in which most cities in our sample have achieved a level of basic implementation. Even here, only 15% of the Pioneer Cities have integrated their open data portals with their wider city data infrastructure, which is a necessary step towards making a city "open by default".

These results show that cities today lack the basic building blocks to safeguard their interests and ensure the longevity of their smart city.

The report concludes with a call to action for stakeholders – including city leaders, policy-makers, civil society[3] and smart city technology vendors. City leaders need to take a longer-term view and identify governance gaps before they become material risks. Government officials and policy-makers can use benchmarks such as the model policies offered by the G20 Global Smart Cities Alliance to identify and address these gaps. Civil society organizations can offer these policy-makers multidimensional assistance including technical advice. Furthermore, smart city technology vendors should use this opportunity to demonstrate long-term commitment to cities by helping them to implement the policies they need.

All of these stakeholders have a role to play in speeding up the adoption of better policies in cities, to ensure they are fit for the challenges they face today. The G20 Global Smart Cities Alliance offers a platform for stakeholders to work together in developing, piloting and scaling better policies for smart cities.

1 Introduction

The G20 Global Smart Cities Alliance has developed policy benchmarks that specify the foundational policies that cities need for ethical smart city development.

1.1 Cities adjusting to the new paradigm

Governments, businesses and societies across the world have suffered severe disruption from the consequences of the COVID-19 pandemic since late 2019, and by April 2020 economic activity had collapsed almost everywhere. Cities and urban areas, the engines of economic growth, faced their biggest public health and economic challenge in modern times.

Vaccination programmes have now started, and these will play a big part in getting cities and countries back on their feet. However, the pandemic has left behind a trail of economic destruction, especially in cities and urban areas. Mayors are concerned about the impact of the pandemic on their local economies and finances. Respondents to a Deloitte-ESI survey[4] of 167 cities globally ranked the pandemic and damage to the economy as the two biggest external disruptions facing cities today.[5] In addition to the economic challenges, city leaders have been hard pressed to improve public health infrastructure and build resilience to counter further outbreaks.

In this context, smart city technologies have a role to play in enhancing the responsiveness and resilience of cities to current and future shocks while unlocking efficiencies and improvements in the quality of life. Cities such as Melbourne are collecting data on foot traffic to analyse their economic activity. Seoul and Singapore have used investments in their data infrastructure to deploy contact tracing services quickly. But, as the case of Singapore has shown, rapid deployment of technology can lead to a public backlash.[6] Yet cities may struggle to put sustainable policies in place when they are in the middle of a crisis and searching for solutions.

In the future, the drive for resilience and efficiencies could lead to more investment in new technology. As city leaders start looking to technologies such as chatbots and facial recognition to find efficiencies and provide new services, we need to ensure that policies are in place that embed ethical and responsible governance. This will ensure that cities can move quickly to deploy new solutions, without incurring risks regarding privacy, cybersecurity or sustainability.

However, some cities are better placed than others to develop and implement the policies required. In fact, around half of the world's urban population live in settlements with fewer than 500,000 inhabitants, where they do not have the same level of resources as global cities such as Seoul and Singapore.[7] Knowledge-sharing between cities is therefore crucial to rapid progress. This is the starting point for this report and for the G20 Global Smart Cities Alliance.[8]

1.2 The G20 Global Smart Cities Alliance and a new policy roadmap

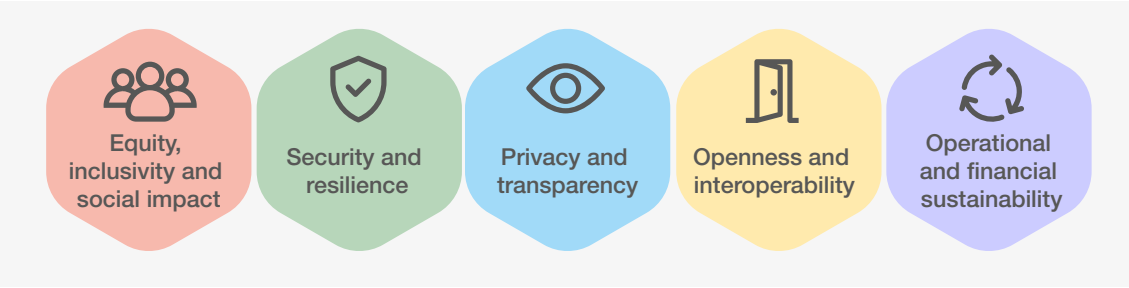
Following a call to action from the G20 ministers in 2019, the G20 Global Smart Cities Alliance was established to help cities identify and adopt foundational policies for smart city technologies.

To that end, the G20 Global Smart Cities Alliance is committed to creating a policy roadmap to which policy-makers and technology providers can refer as a baseline for sound technology governance. The roadmap is organized around five core principles (Figure 1).

These principles embody fundamental requirements that all smart cities should meet, regardless of their strategic objectives. For example, a city may invest in smart lighting to reduce its carbon footprint and meet the strategic objective of environmental sustainability. However, it must ensure that there is sufficient security and resilience in the smart lighting so that the streetlights stay on when they are needed.

> **This is a commitment from the largest economies in the world to work together and set the norms and values for smart cities.**
>
> **Børge Brende**, President of the World Economic Forum

FIGURE 1 | **The five core principles of the roadmap**



Source: World Economic Forum.

> **This roadmap is not about theoretical ideas and pipe dreams; it is built on practical, real-world policies from leading cities around the globe."**
>
> **Jeff Merritt**, Head, Internet of Things and Urban Transformation, World Economic Forum

Within each of these core principles, the Alliance is coordinating teams of experts to develop model policies based on well-established foundational procedures that have been tried and tested by leading cities. The first five of these "model policies" were announced at the Smart City Live 2020 event. The five model policies are shown in Figure 2: the full policies are available in multiple languages online.

FIGURE 2 | **The first five model policies from the roadmap**

Source: World Economic Forum

Alongside this first tranche of policies, the Alliance announced that 36 Pioneer Cities would:

1. Evaluate the usefulness of the policy roadmap to help the Forum guide its development
2. Move towards piloting the model policies where possible
3. Provide a baseline dataset for other cities based on an assessment of their own policies

The Pioneer Cities were selected to provide a diverse sample from across the G20 and beyond. They are drawn from six continents, 22 countries (Figure 3) and have populations ranging from fewer than 70,000 to more than 15 million.

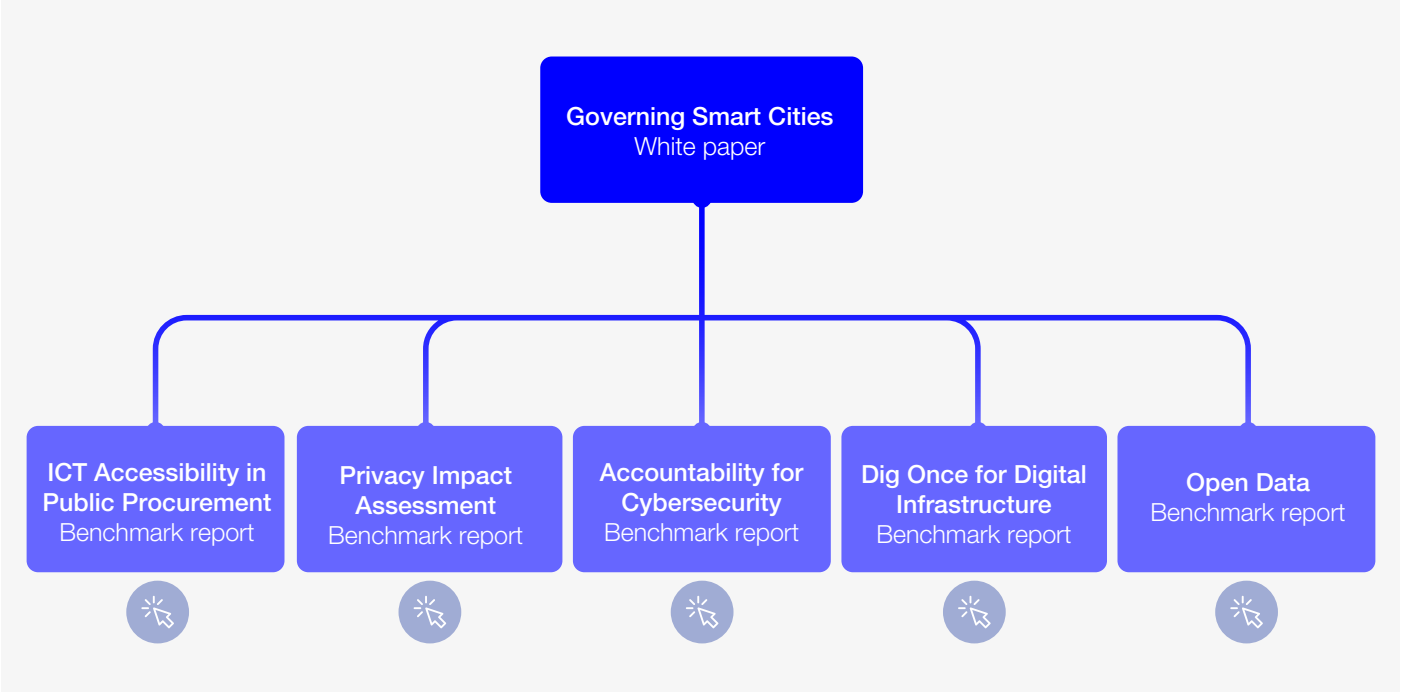
FIGURE 3 **The 36 Pioneer Cities**

Source: World Economic Forum

As a starting point for their engagement, the Pioneer Cities took part in a policy assessment process that evaluated their policies against the policy roadmap. The Pioneer City Policy Assessment was carried out in January–March 2021. Our data comes from a detailed survey and interviews with policy experts of the G20 Global Smart Cities Alliance and city government officials in the 36 Pioneer Cities.[9] The data was provided on the condition that individual city results would be kept confidential.

This report aggregates and analyses findings from that process, examining trends in smart city governance among the Pioneer Cities and offering recommendations for how city leaders should close governance gaps in their own cities. In five appendices, we report more detailed findings on how cities are performing against policy benchmarks laid out in the five model policies, as outlined in Figure 2. The structure of this suite of reports is shown in Figure 4.

FIGURE 4 **The Pioneer City Policy Assessment suite of benchmark reports**



Source: World Economic Forum

2

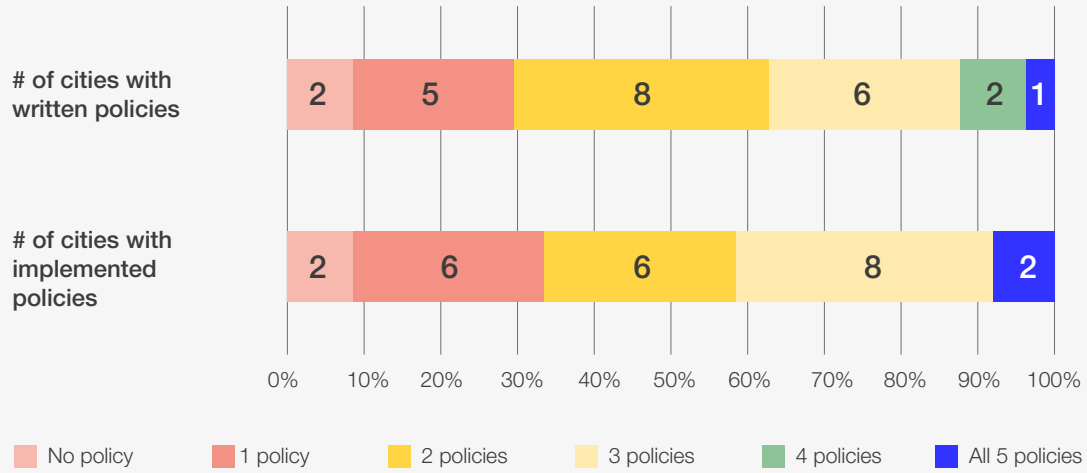
Emerging trends in smart city governance

Cities lack foundational policies for sound technology deployment, and they need support and strong leadership to fix this.

Taking stock of the data on the five policies and insights from the Pioneer Cities reveals where cities are putting policies in place, where there are gaps and why:

- **Most cities are not adopting and implementing the foundational policies they need.** Out of 36 Pioneer Cities, only two have relevant written guidelines in place for all five policies, and only one has successfully implemented all five. Since the Pioneer Cities include many that are considered advanced in terms of their smart city development, this suggests that the vast majority of cities have gaps they need to address in their policy foundations (Figure 5).
- **Policy gaps appear particularly in four out of the five policies assessed.** Only open data policy presents as having fairly widespread implementation (Figure 6)

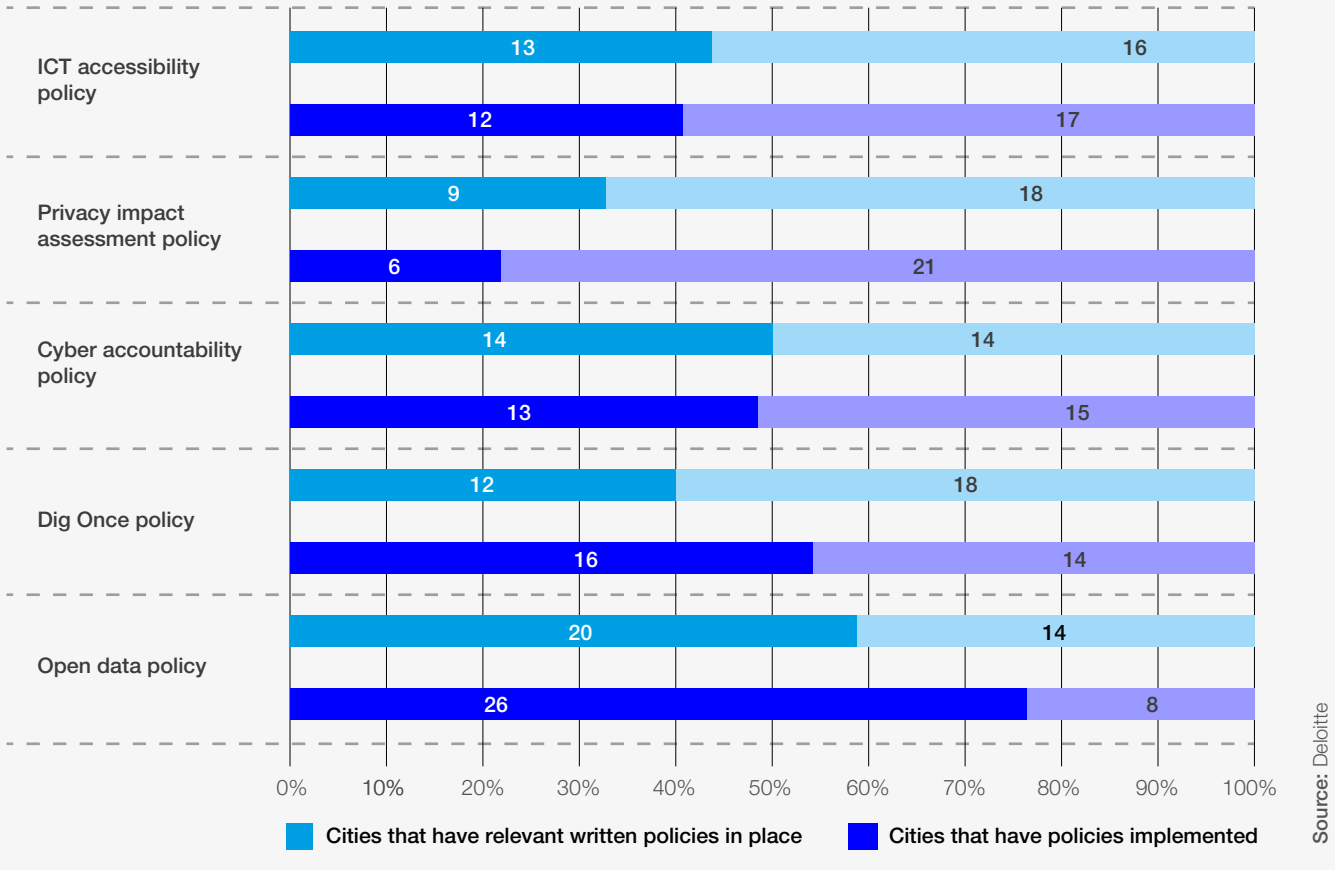
FIGURE 5 **Distribution of Pioneer Cities by the number of policies they have written and implemented**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

Note: Excluding cities that did not participate in the assessment in all five policy areas.

FIGURE 6 **Number of Pioneer Cities with written and implemented policies**



Source: Deloitte

Figure 6 shows a small cohort of cities within each policy area that have adopted corresponding policies. While this trend suggests an opportunity for shared learning from these cities, there is also significant work to be done to mainstream these policies. In all areas, with the exception of open data, most cities do not currently have comparable policies written or enacted. This suggests that cities lack the key policies needed to protect the privacy of citizens, inclusivity, cybersecurity and operational and financial sustainability.

- **Pioneer Cities cite lack of capacity, leadership and stakeholder coordination as the reasons for these gaps.**
  - "*The privacy unit has been understaffed for well over a year.*"
  - "*The biggest problem is that the budgets and investment policies of local administrations and infrastructure institutions are different and there is a lack of full coordination in between, even though there is an existing coordination centre.*"
  - "*Our cybersecurity division of IT needs more personnel, better funding and focus from leadership throughout the city.*"

- **In some cases, cities are implementing a model policy in practice, but without documenting the policy in written form – or it may be distributed across multiple written policies and protocols.**
  - "*The work is done, and good practice exists, but it is not documented in municipal regulations.*"
  - "*This is part of different policies running separately and it needs a centralized policy to be governed and executed by all.*"

  Different governance environments in each city can lead to variations in how policies are developed, with some city officials being satisfied that policy is implemented in practice without having a single written policy in place. However, cities need to check their progress against a framework that takes a comprehensive view. Otherwise, there is a risk that gaps will go unnoticed – a risk that is particularly acute with cybersecurity.

- **Cities often rely on national policies, but this can mask an implementation gap or lack the elements needed at local level.**
  - "*There is [a national policy] on [accessibility] that is binding ... however, the policy is at a very basic version with no details around the technical inclusions for any ICT or electronic procurements to be followed.*"
  - "*The [national law] that is used to manage the conditions for development do not reference a Dig Once policy ... Little coordination between agencies is evident. We are able to coordinate contributions to road resurfacing; however, the coordination of service installation among utilities is non-existent.*"

  Local authorities will defer to higher levels of authority in many of the areas examined, but this can leave implementation gaps when national policy lags behind effective methodologies, or when it is not translated into implementable protocols for cities. This problem is particularly serious for privacy protection, where 23 of 27 participating Pioneer Cities recognize legal obligations to protect citizens' privacy,[10] but only 6 of 27 cities carry out privacy impact assessments for all new technology deployments.[11]

- **Pioneer Cities view the G20 Global Smart Cities Alliance and its policy roadmap as a route to action but are asking for more support.**

  City officials examining the policy roadmap testified to its usefulness both at a strategic level and in developing concrete policies. Some 31 cities agreed to advance at least one model policy from the policy roadmap as part of this process.
  - "*The Alliance policy roadmap helps us to generate the first version of a policy based on the knowledge of international experts. There is a big time saving in initial discussions, as well as helping a lot in directing the debate among our specialists.*"
  - *"Under the guidance of the G20 policy roadmap for the city, we got the basic idea of how to analyse, identify and adapt model policies for the city. The Forum provides an in-depth knowledge on the various parameters any city should incorporate in their policy for building smarter cities. The expert group from various countries have demonstrated the use cases for such policies in different cities and how it has improved the life of the citizens."*

  At the same time, officials asked for more support – largely to provide technical assistance, but also to help secure political buy-in.

  - *"We need to participate in working groups to know better other experiences and lessons learned from this process, as well as spaces for training and expert support for the adoption and implementation of policy models."*
  - *"Some policies would require the approval of the city council. In that sense, the presence of the World Economic Forum and other city officials could be beneficial to convince councilmen and women."*

Taken together, these trends suggest a serious lack of governance measures for vital aspects of smart city governance, and for which action is needed from local and national levels of government. Capacity constraints and knowledge gaps in government require greater action from the G20 Global Smart Cities Alliance, supported by the World Economic Forum's partners.

3 Conclusion

City stakeholders need to take action to address governance gaps to ensure Fourth Industrial Revolution technologies are used responsibly.

Our assessment of the 36 Pioneer Cities provides an insight into the inner workings of cities in each of the five model policy areas: equity, inclusivity and social impact; security and resilience; privacy and transparency; openness and interoperability; and operational and financial sustainability. While some cities have made considerable progress across all model policy areas, they are few and far between.

The report has identified gaps between implementation and policy methodologies in most cities. There is an urgent need for cities to meet policy benchmarks for technology and smart city development. Only by addressing these gaps can we be confident that citizens' long-term interests are protected as new technologies are deployed. This report therefore makes the following recommendations to key players in the city ecosystem:

- **City leaders** should engage with the significant gaps in their smart city governance, which come with serious risks to their citizens' privacy, security and ICT accessibility, and to their city's sustainability and efficiency. Leaders are encouraged to instigate a review of their policies to identify these gaps and address them. The G20 Global Smart Cities Alliance provides a starting point for this process through its policy roadmap and Pioneer City Programme.

- **City officials** should be conscious of the governance gaps exposed by smart city deployments, which could affect their domains unexpectedly. Officials can examine the model policies provided by the G20 Global Smart Cities Alliance and use the policy roadmap as a call to action for their stakeholders to engage in a policy agenda. Officials can work with the Alliance to help shape the direction of the roadmap.

- **National and regional policy-makers** should engage with local government and the smart city agenda to ensure that guidance and regulations issued at a national level are in line with global best practice, as developed by the Alliance, technical standards organizations and others. At the same time, the capacity constraints found at local level might necessitate more support from higher levels of government to resource or directly implement the required policies.

- **Civil society organizations** have a significant role to play in providing more capacity and skills to local government. The Pioneer Cities frequently cited a lack of technical skills that civic technology groups can offer (e.g. to develop a city's open data platform). At the same time, civil society organizations can help to provide transparency and accountability on the state of governance (e.g. monitoring the conduct of privacy impact assessments).

- **Technology vendors and private companies** should work with public authorities to help bring their governance up to the most effective global standards. This support could lead to risks of regulatory capture and unfair competition, which is why the World Economic Forum works through the G20 Global Smart Cities Alliance to provide a neutral mechanism for this support.

The G20 Global Smart Cities Alliance has a mandate to help cities close the governance gaps that this report has uncovered. At the time of publication, the Alliance continues to work with the 36 Pioneer Cities on proposals to develop and enact policies that address the gaps shown by their policy assessments. However, this report suggests that action is needed on a much wider level and in greater depth.

Partners of the World Economic Forum are invited to support cities in their implementation, both globally and through regional networks that the Alliance is creating.[12] City leaders looking to tap into this support are invited to contact the Forum through our website and apply to be part of the next cohort of Pioneer Cities.

This report and policy roadmap should be used as a starting point in the journey towards developing responsible and ethical use of technologies. The actions that cities take today can help build smart cities of the future that are equity-centric, data-driven, digital-ready and resilient.

4 Appendices

Benchmark reports

Appendix 1: ICT accessibility in public procurement

Introduction

Accessibility refers to how products, systems, services and facilities can be accessible to a population with the widest range of characteristics and capabilities. Information and communications technology (ICT) should be accessible to everyone, including individuals with physical/mental disabilities, elderly people and immigrants with limited proficiency in the local language. The model policy for ICT accessibility provides an enabling framework to support the public procurement/development of accessible ICTs.

Some 29 Pioneer Cities provided details about their ICT accessibility policies. Figure 7 shows the extent to which a policy for ICT accountability has been adopted in these Pioneer Cities.

Key findings

- Accessibility in public services requires the adoption of ICT accessibility standards. **Less than 20% of Pioneer Cities regularly use ICT accessibility standards in procurement** (5/29 cities).[13]
- Procurement needs to be supported by verification of conformance by vendors. **Few Pioneer Cities are verifying conformance criteria** (6/29 cities).[14]
- City officials need training to embed accessibility into ICT procurement. However, **most Pioneer Cities are not training city officials** (9/29 cities).[15]

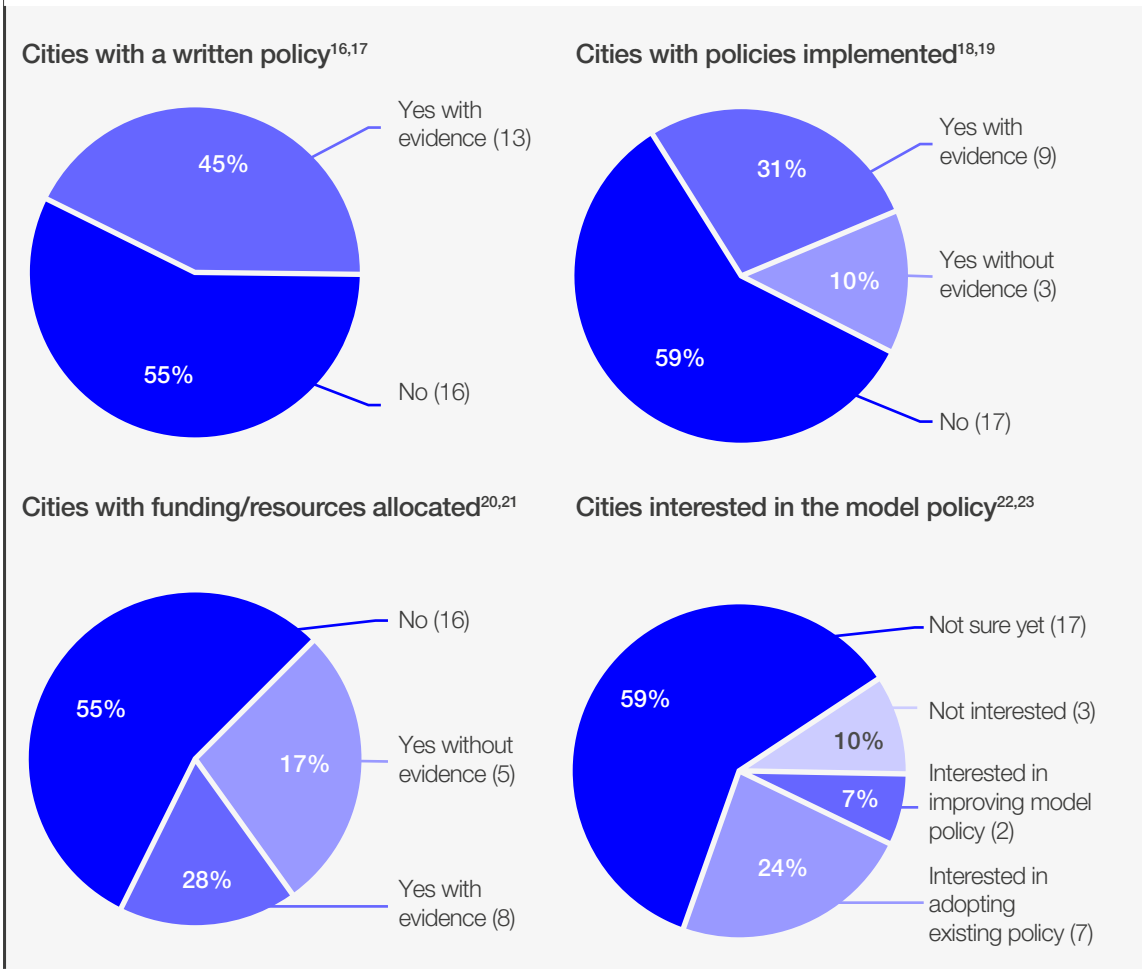
The current state of play

Even though accessibility standards are well established in the Pioneer Cities, very few cities appear to use them in the procurement of ICT. As a result, there is a risk of large sections of the population being excluded. However, having a written policy in place appears to prompt action towards implementation. Cities should therefore consider:

- Adopting the model policy for ICT accessibility in procurement policies
- Involving the ICT procurement function in developing a procurement policy for ICT accessibility

More guidance on these points can be found in the model policy.

FIGURE 7 **Adoption and implementation of policies for ICT accessibility in public procurement**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

Appendix 2: Privacy impact assessment

Introduction

A privacy impact assessment policy enables a city to establish a consistent method for identifying, evaluating and addressing privacy risks. By prescribing the processes that should be followed and the issues that must be considered when handling personal data, cities can address privacy risks in a manner consistent with public expectations. This model policy supports ethical decision-making and cities' efforts to minimize privacy risks.

Some 27 Pioneer Cities provided details of their privacy impact assessment (PIA) policies. Figure 8 shows the extent to which a policy for PIA has been adopted in these Pioneer Cities.

Key findings

- **Less than one-quarter of Pioneer Cities conduct privacy impact assessments regularly** (6/27 cities) (Figure 8).
- Cities need to identify specific organizational values for privacy against which they assess smart city technologies and services (for example, Seattle's Privacy Principles)[24] because wide variations exist around the world in cultural and legal approaches to privacy and data protection. **More than half of Pioneer Cities have clearly defined organizational values concerning privacy** (17/27 cities).[25]
- Strong leadership by a senior officer is often needed to ensure that PIAs are conducted across functional boundaries, and identified risks are mitigated. This role may be filled by a chief privacy officer or data protection officer responsible for ensuring that PIAs are carried out and privacy risks addressed where appropriate. **About half of Pioneer Cities have designated senior officials with these responsibilities** (12/27 cities).[26]
- Anyone who handles personal data should have appropriate training in privacy requirements. **About two-thirds of the Pioneer Cities have privacy training and awareness programmes for staff** (17/27 cities).[27] In many countries, cities have specific legal obligations in relation to privacy and data protection, including the conduct of PIAs, such as the EU's General Data Protection Regulation (GDPR).[28]
- **A large majority of the Pioneer Cities have a relevant legal compliance obligation for privacy and data protection** (23/27 cities).[29] PIAs can act as a process for ensuring compliance with these regulations.
- Experience with smart city projects to date has demonstrated that public trust in how privacy is protected is a critical requirement for success. Engaging external stakeholders or groups during the PIA process, such as an advisory board or working group to provide input to the process, can help build this trust. **About half of the cities use such an external body to consider privacy impacts (either as their sole focus or as part of a wider remit)** (12/27 cities).[30]

> "The municipality ... ensures that privacy is safeguarded, including through measures in the field of information security, data minimization, transparency and user control. The chief privacy officer advises on the careful handling of personal data and the data protection officer ensures compliance with the privacy policy. [31]
>
> **Apeldoorn**, the Netherlands

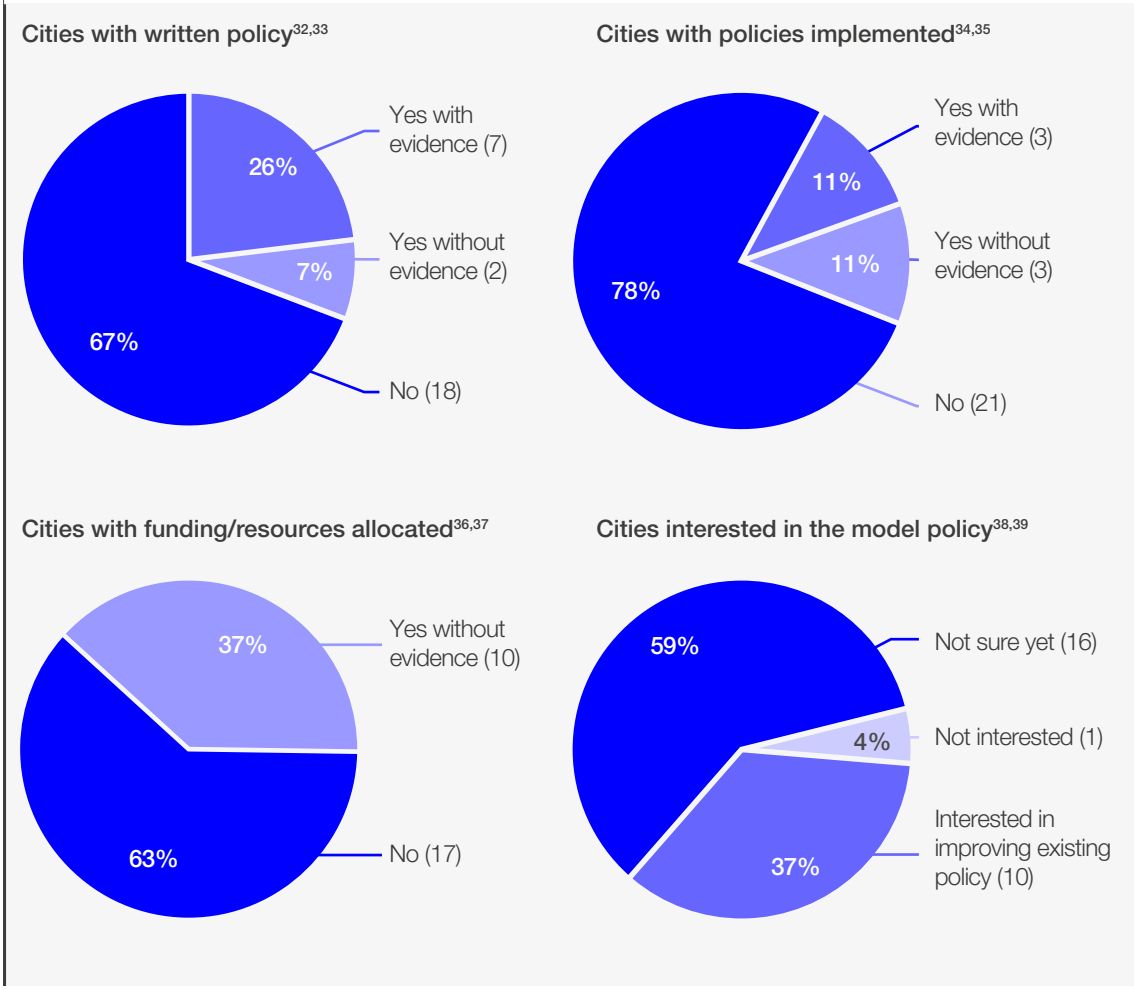
The current state of play

Cities recognize the importance of privacy and data protection. However, the number of cities with legal obligations in relation to privacy and data protection is greater than the number of cities with a formal PIA policy or other safeguards in place. Even more concerning is the fact that the vast majority of cities do not have any policies or practices for conducting privacy impact assessments to mitigate privacy risks. Cities should consider the following steps to address this issue:

- Start checking the privacy impact of new technology procurements through a privacy impact assessment, especially if your city has legal obligations in terms of privacy and data protection
- If your city does not have a PIA policy in place today, find out who should be given the task of implementing it. Finding a senior official who can act as champion is a good start
- Privacy and data protection are frequently the public's biggest concerns in relation to smart cities. Define how your city wants to plan for community engagement and transparency to build trust and overcome their concerns

More guidance on these points can be found in the model policy.

FIGURE 8 **Adoption and implementation of policies for privacy impact assessment**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

Appendix 3: Accountability for cybersecurity

Introduction

As municipal authorities and services become more connected through procurement of smart city solutions, exposure to cybersecurity risks increases. Cybersecurity should be a high priority for any city, even in the absence of a smart city agenda, as cybersecurity threats exist everywhere. Designating responsibility and accountability for cybersecurity is a step towards protecting a city and its public services against cyberthreats. According to the model policy, one senior officer or a group of key senior individuals within a city should have the ultimate responsibility for cybersecurity and any breaches of security. This person or group should evaluate, direct and monitor the design and deployment of effective information security measures for smart services, and be answerable for the response to and recovery from any cyber incident. There should also be full buy-in from the executive city leadership.

Some 28 Pioneer Cities provided details of their cyber accountability policies. Figure 9 shows the extent to which a policy for cybersecurity accountability has been adopted in these Pioneer Cities.

Key findings

- Accountability to senior leaders is a key requirement in the model policy. A senior official should be given the responsibility for cybersecurity and a cybersecurity plan should be reviewed regularly by senior management. **Less than half of Pioneer Cities have met these basic requirements for senior accountability** (13/28 cities) (Figure 9).

- Cities should have a governance framework that is reviewed regularly. **Senior management carry out regular reviews of the cybersecurity governance framework or plan in about half of the Pioneer Cities** (15/28 cities).[40]

- To understand the potential cybersecurity risks, a senior responsible officer needs to have an up-to-date inventory of the city's information and communications technology (ICT) infrastructure and assets, including devices, users, networks, data and applications. This also should include operational technology as well as information technology assets. **More than half of Pioneer Cities, and most in Europe, maintain an up-to-date inventory** (18/28 cities).[41] Most Pioneer Cities in Europe state that their data inventories are up to date. This could be due largely to the implementation of General Data Protection Regulation (GDPR) regulations in the European Union.[42]

- The officer responsible for an up-to-date inventory needs to be informed about new technology deployments that will add to this inventory. This is to ensure that minimum standards are adhered to for new ICT deployments. **In less than half of Pioneer Cities, the IT function is not always informed about new technology deployments** (11/28 cities).[43] This means that the IT function may be out of the loop and unaware of new technology assets in less than half of these cities.

> **Dubai has set up an office for cybersecurity in each of 133 government entities and semi-entities. The cybersecurity governance framework is reviewed annually by the director-general's office and assessed by Dubai Electronic Security Center (DESC), which functions as an audit practice.[44]**
>
> **Dubai**, UAE

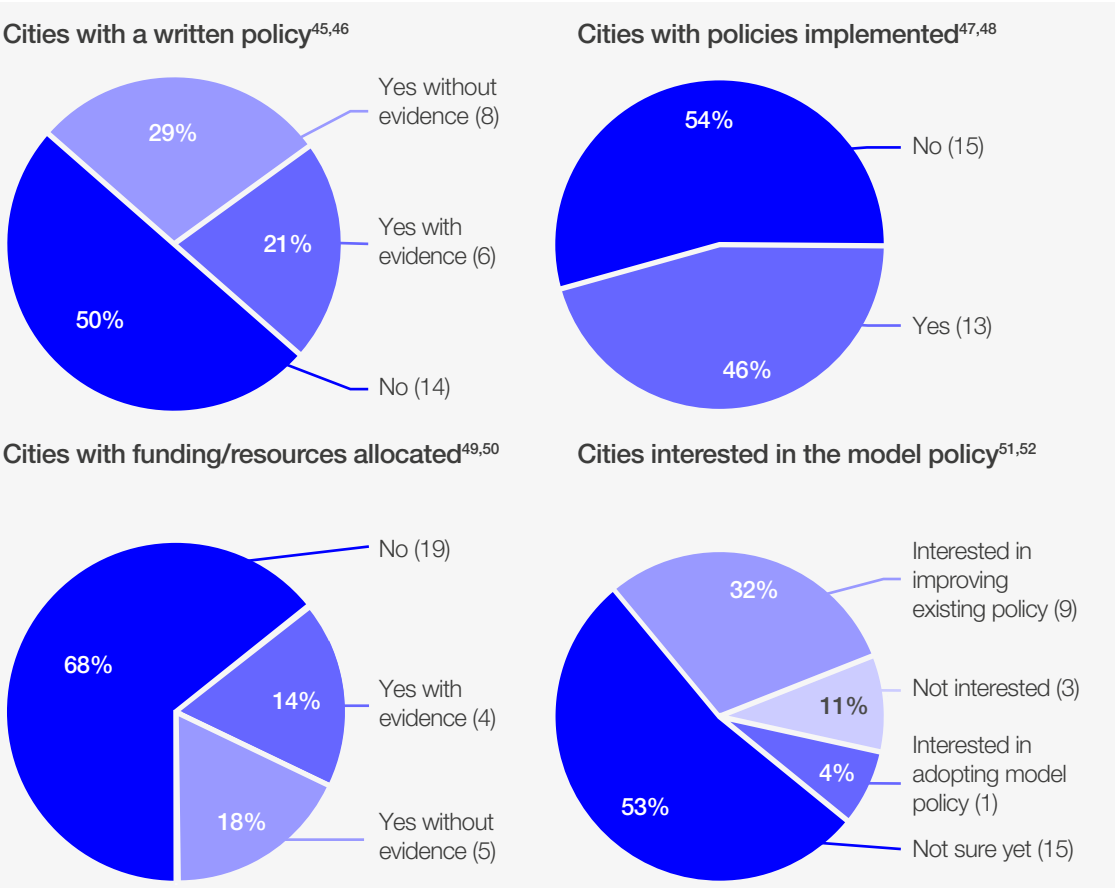
The current state of play

Compared to other model policies in our assessment, the Pioneer Cities have made good progress with this model policy. This may reflect the seriousness of the cyberthreats cities face. Even so, cities should consider areas for improvement, particularly if they do not yet apply the model policy recommendations:

- Establish a structure for senior leaders to be informed about cybersecurity in their smart city deployments and other systems and be accountable for them
- Develop a better way to understand cybersecurity risks to which the city is exposed across all departments

More guidance on these points can be found in the model policy.

FIGURE 9 **Adoption and implementation of policies for cybersecurity accountability**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

Appendix 4: Dig Once for digital infrastructure

Introduction

Digital infrastructure – wired and wireless connectivity – is the physical foundation for any smart city. However, rolling out this infrastructure can be complex and costly. The largest single cost is typically the civil works required to lay fibre and install equipment. According to the US Federal Highway Administration (FHWA), "90% of the cost of deploying broadband is when the work requires significant excavation of the roadway."[53] These works also result in significant disruption to citizens, businesses and cities.

A "Dig Once" policy aims to simplify and accelerate the roll-out of digital infrastructure, through driving strategic collaboration between cities, connectivity providers, utility companies and other urban stakeholders. At its simplest, a Dig Once policy aims for:

1. New builds and developments to be connected from the outset: by ensuring the installation of conduits (and connectivity) during the construction phase to avoid further works

2. Existing builds and other assets to have future-proofed connectivity: through coordinating highway, street and other works of utility companies, connectivity providers and other stakeholders to reduce the need for multiple excavations – and to ensure the installation of conduits

3. The delivery of multipurpose connectivity: by ensuring the installation, provision and sustainability of the crucial conduits that will drive next-generation connectivity (including 5G, the internet of things [IoT] and new Wi-Fi technologies)

A Dig Once policy reduces inconvenience and disruption to citizens, accelerates the roll-outs of connectivity providers and reduces the administrative and wider burden on cities and local authorities. It highlights the central role of the city in ensuring the delivery of connectivity and making sure no one is left behind, or excluded, from the potential that it can enable (including in tackling the broader digital divide).

Some 30 Pioneer Cities provided details about their Dig Once policies. Figure 10 shows the extent to which a policy for Dig Once has been adopted in these Pioneer Cities.

Key findings

– **Less than half of Pioneer Cities have a Dig Once policy in written form** (12/30 cities), **but more than half implement Dig Once in practice** (16/30 cities). Compared to other model policies, cities are performing better in this model policy area (Figure 10).

– A list of notifiable activities ensures that authorities are informed when construction, street work and other activities are planned – providing an opportunity to facilitate collaboration and minimize disruption (a requirement for achieving Dig Once). **Half of Pioneer Cities maintain a list of notifiable activities** (15/30 cities). This implies the other half may not be able to effectively coordinate works.[54]

– The model policy for Dig Once highlights that cities need governance processes to coordinate and drive connectivity roll-outs. The governance structure, which must be agreed upon locally, can range from a steering group to a more formal arrangement. **Only one-third of Pioneer Cities have a governance process to drive connectivity roll-outs** (8/30 cities).[55]

– **Complex political structures can make governance and coordination a challenge**. Many Pioneer Cities with multilayer governance, such as a national government and city government, struggle to achieve coordination between multiple stakeholders. For instance, in Istanbul, different aspects of the city infrastructure are managed by different authorities – while connectivity policies (and legislation) are often decided at a national level.[56]

– More advanced cities make use of geographic information system (GIS) records to keep track of connectivity assets. A city should maintain an accurate record of all connectivity assets in a GIS-based platform and keep records of how conduits are being used. Similarly, the private sector must be encouraged to share data with city governments to record all relevant connectivity assets. **Encouragingly,**

> Funding from the federal government would not have been enough to install fibre in smart poles in 2017 without alignment between the infrastructure provider and the utility provider to reduce cost. [We] do not have a written policy, but we practise it. Lack of a written policy led to some missed opportunities because we did not get funding in time.[60]
>
> **Newcastle,** Australia

nearly one-third of Pioneer Cities track connectivity assets through GIS records (11/30 cities).[57]

- Although Dig Once as a concept is well known, cities have struggled to articulate and implement it in practice. **About half of the Pioneer Cities are familiar with the concept of Dig Once** (14/30 cities),[58] and **fewer cities have an actual Dig Once policy in place** (12/30 cities).[59] This may be due in part to uncertainty as to where connectivity policy sits within a city administration, the challenges of engaging with a fast-moving area (driven by the private sector) and a complex range of technical aspects related to passive enabling infrastructure (conduits, pits etc.). The absence of a written policy can limit the ability of cities to obtain the full benefits of Dig Once.
- **A Dig Once policy, coupled with partnership models for financing, can help cities to make national and other funding go further.**

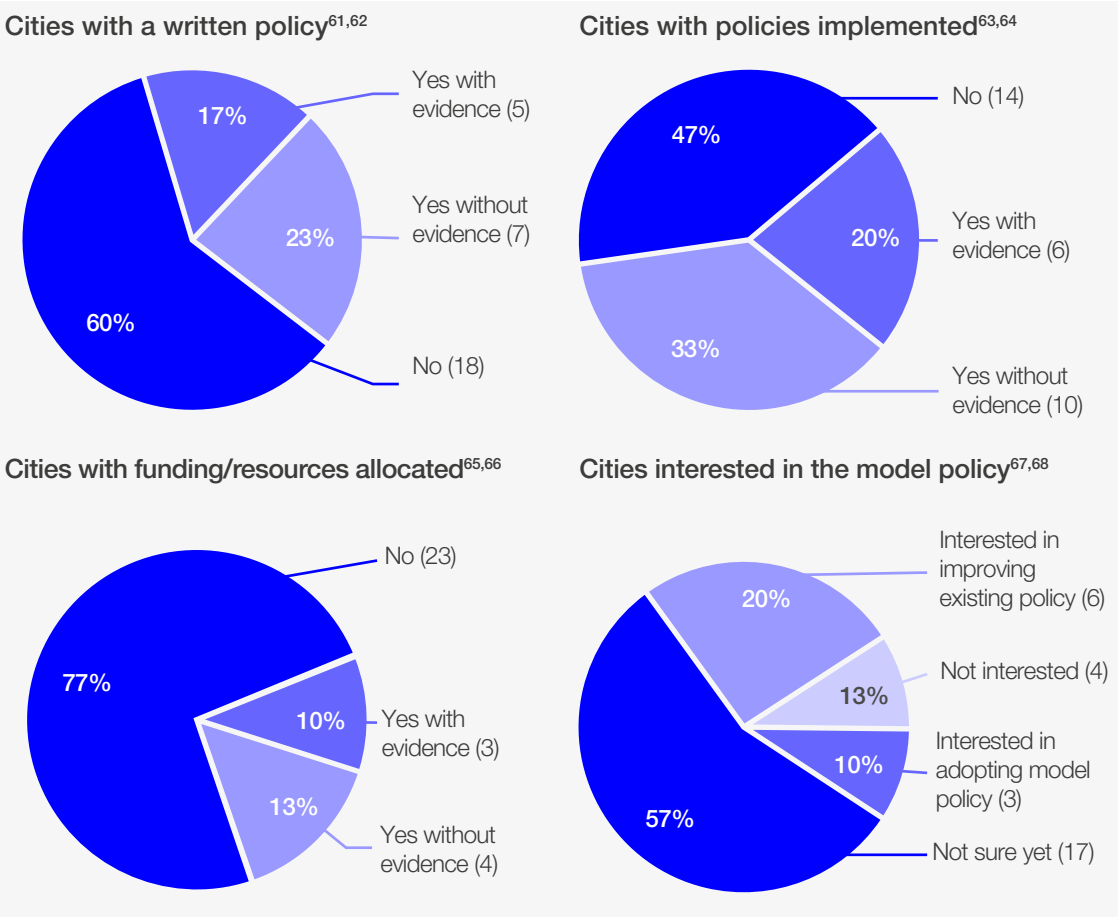
The current state of play

Dig Once is a concept with which cities are instinctively familiar. Even so, many cities struggle to adopt it despite the benefits it offers for digital infrastructure roll-out. Cities should consider the following steps to address this issue:

- Action starts with information: half of the Pioneer Cities do not have a list of notifiable activities or a GIS record of connectivity assets, making coordination between stakeholders difficult. The model policy for Dig Once sets out steps to rectify this information gap.
- Governance processes and engagement with key stakeholders are needed for sustainable implementation: these can be formal or informal, but cities must identify ways to drive inclusive connectivity roll-outs.
- Cities should develop "build once and build for the future" specifications for passive enabling infrastructure (conduits, pits etc.) that can be easily deployed.
- Cities should encourage more engagement and dialogue with the private sector and aim to shape true collaboration for the benefit of citizens.

More guidance on these points can be found in the model policy.

FIGURE 10 **Adoption and implementation of policies for digital infrastructure**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

Appendix 5: Open data

Introduction

Since its first appearance more than a decade ago, open data has grown in importance, impact and adoption. For city administrations, open data can deliver a range of benefits. These include:

- Providing smart city technologies and advanced urban services for much of their core functionality
- Making sure public servants and the private and voluntary sectors have access to data to pursue innovation opportunities in technology and analytics
- Increasing transparency and promoting more government accountability
- Creating an open, common and reliable evidence base to support policy development, decision-making and democracy
- Establishing open, contestable markets for technology in city services

Intended to be applicable to cities at all stages of development, and to respond to the challenges and opportunities presented by increasing data volumes and rapidly advancing data-intensive technologies, this policy builds on early practice across governance, standards and internal and wider ecosystem organization.

Some 34 Pioneer Cities provided details of their open data policies. Figure 11 shows the extent to which a policy for open data has been adopted in these Pioneer Cities.

Key findings

- **In contrast to other policy areas, the majority of Pioneer Cities are already implementing an open data programme** (26/34 cities) **and most have a written policy** (20/34 cities) (Figure 11).
- **Most Pioneer Cities have a central data team** (27/34 cities).[69] In most of these cases, a central team has organization-wide responsibility for data and open data management.
- The value and costs associated with open data platforms often depend on the degree to which they are integrated with the underlying data infrastructure of the city and its partners. When integration is lacking, data becomes more costly to publish and harder to tie into services that require reliable, regular (or real-time) data. **Direct integration between open data portals and data infrastructure is rare in Pioneer Cities** (5/34 cities).[70]
- **Collaboration through open data platforms is hindered due to a low level of trust in data platforms and an inability to demonstrate business or social value.** (See Melbourne example below.) Organizations need to be convinced to join a city data platform and share their data. Many Pioneer Cities face two main barriers to persuading organizations to join the city data platform:
  1. Low trust in the government's ability to address data misuse and data breach issues[71]
  2. Challenges in persuading organizations at an early stage of the benefits of an open data platform
  3. Lack of common governance arrangements for data sharing and publishing
  4. A complicated or unclear relationship with privacy laws and other city policies (e.g. data security)
- Once the initial excitement about a data platform dies down, cities need regular assessments to drive progress in unlocking data, maintaining high-quality data and demonstrating its value. The model policy specifies that as part of their open data plan cities should undertake periodic assessments of data availability, quality, interoperability and discoverability on at least a prioritized part of their data inventory (e.g. mobility). **Only about one-third of Pioneer Cities conduct such periodic assessments of their open data practices** (12/34 cities).[72]
- Open data is the most popular area of the five areas among Pioneer Cities, with 34 cities participating in the assessment. According to the survey, the top three biggest potential gains from adopting and implementing an open data policy area are:[73]

1. Encouraging the development of innovative technology solutions and data analytics by a broader group of stakeholders

2. Strengthening public understanding and trust of city operations and other information concerning their communities

3. Generating economic opportunity for individuals and companies

> **The City of Melbourne's open data team use(s) an integration software package called Feature Manipulation Engine. This allows for most data sources to be virtually integrated into the open data programme.**[74]
>
> Melbourne, Australia

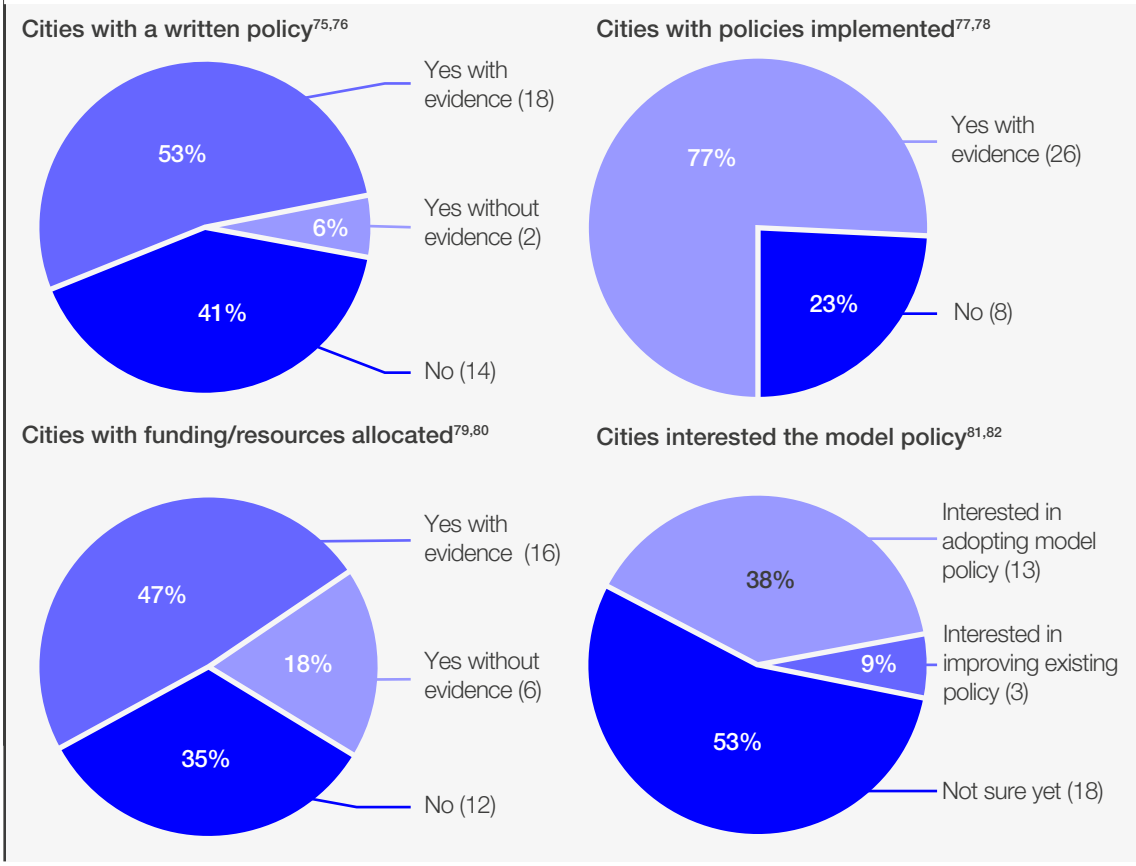
The current state of play

Our Pioneer Cities apply many of the features of an open data policy, from centralized data teams to dedicated funding and open data portals. However, many of the thorny issues surrounding open data remain, preventing cities from reaping the full benefits of the policy. Specifically, cities should consider:

- Stronger integration of open data policy and data infrastructure to achieve cross-cutting data flows, which would be beneficial to the functionality of city services
- Developing flexible but clear data governance arrangements that provide clarity on the role of data custodians, data processors, data subjects and usage rights, but that also encourage data publishing

More guidance on these points can be found in the model policy.

FIGURE 11 **Adoption and implementation of policies for open data**



Source: Deloitte analysis of Pioneer City Policy Assessment data, March 2021

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- eThekwini, South Africa
- Faridabad, India
- Gaziantep, Turkey
- Hamamatsu, Japan
- Hyderabad, India
- Indore, India
- Istanbul, Turkey
- Kaga, Japan
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- Maebashi, Japan
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- Medellin, Colombia
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17. IA2.3: "Please share a link to the most relevant document. Name of policy, relevant laws and regulations."
18. IA3.1: "Do your procurements and tenders for ICT typically require that accessibility standards are maintained?"
19. IA3.2: "Please demonstrate this by sharing this requirement in your most recent ICT procurement. Name of project/ investment."
20. IA4.2: "Are there resources or funding available in your city government to improve accessibility for ICT?"
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31. PIA4.1: “What measures has your city taken to ensure that the technology deployments are assessed for their impact on privacy? Please outline both measures taken and their results.”
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33. PIA2.3: “Please share a link to the most relevant document – link.”
34. PIA3.1: “Do new technology deployments by your government or city services typically have a privacy impact assessment?”
35. PIA3.2: “Please demonstrate this by sharing the latest privacy impact assessment undertaken – link.”
36. PIA4.2: “Are there resources or funding available in your city government to ensure privacy impact is assessed for new technologies?”
37. PIA4.3: “Please describe these resources – funding/budget per year.”
38. PIA7.4: “Having reviewed the model policy, will your city work towards adopting the model policy or some version of it in the future?”
39. CPPF2.1: “Please select all model policies that your city will be working on in future stages of the Pioneer Programme (including attending workshops and developing policy proposals).”
40. CA5.1: “Does your city’s senior leadership review a cybersecurity governance framework or plan on a regular basis (e.g. once per year)?”
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47. CA3.1: “Please provide the job title of the senior officer with direct accountability for the following cyber-related duties.”
48. CA5.1: “Does your city’s senior leadership review a cybersecurity governance framework or plan on a regular basis (e.g. once per year)?”
49. CA4.2: “Are there resources or funding available in your city government to ensure privacy impact is assessed for new technologies?”
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55. DO5.3: “Does your city have a governance process to drive roll-out of digital connectivity and engagement with connectivity stakeholders?” (e.g. steering groups or trusts created to manage common assets)
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63. DO3.1: “Regardless of written policy, does your city ensure alignment between public and private sector constructors, utility companies and connectivity providers to install conduits and connectivity during the construction phase?”
64. DO3.2: “Please demonstrate by sharing the methodology from a recent typical case – link.”
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76. OD2.3: ”Please share a link to the most relevant document – link.”
77. OD3.1: “Does your city already have an open data platform available for use by data publishers and data consumers?”
78. OD3.2: “Please provide details and a link to this platform – link.”
79. OD4.2: “Are there resources or funding available for the operation and maintenance of the open data platform?”
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81. OD7.3: “Having reviewed the model policy, will your city work towards adopting the model policy or some version of it in the future?”
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