Global assessment of Responsible AI in cities

Research and recommendations to leverage AI for people-centred smart cities

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List of Acronyms

AI	Artificial Intelligence
BCOR	Benefits, Challenges, Opportunities, and Risks
EGM	Expert Group Meeting
UN	United Nations
UN-HABITAT	United Nations Human Settlements Programme
UNITAC	United Nations Innovation Technology Accelerator for Cities
SDG	Sustainable Development Goals

Executive Summary

In an era defined by unprecedented urbanization and technological evolution, cities worldwide facing complex urban challenges perceive Artificial Intelligence (AI) as a key consideration. Recognizing the urgency of designing, implementing, and governing AI for cities responsibly, this report presents a global assessment of AI in cities. It provides an overview of the current AI landscape and informs about the benefits, challenges, and opportunities that AI presents for urban environments from the global survey and case studies repository. Also, the report identifies the capacity gaps and needs and proposes recommendations for a more responsible application of AI in cities.

The rapid and widespread adoption of AI across the world requires a consolidated governance of AI, based on international cooperation at a global level, and derived from the experiences of people living in cities, at the local level. The Global Assessment draws attention to the significant increase in the adoption of AI technologies by cities worldwide, highlighting the critical role of governance structure, practices, and culture.

Case studies showcased diverse AI implementations in urban environments, ranging from simple chatbots for public service delivery (24%) to complex integrations for city governance (35%) and future planning (26%). AI has shown promising benefits, including saving time (57%), better city management (53%), service effectiveness (49%), and more security in the cities (45%) in addressing various urban challenges, including mobility, energy consumption, water and waste management, urban planning, safety, healthcare, and education.

Further, the assessment reveals persistent challenges such as cost of implementation (58%), personal data protection (53%), lack of laws and regulations (45%), and the lack of knowledge and skills (45%) to achieving Responsible AI in cities. Cities are concerned about risks related to bias, discrimination, privacy violations, misinformation, and human rights implications raised along with AI adoption. Case studies such as the Automated Social Protection Services in Trelleborg (**Box.4**) highlighted risks of structural inequalities and unfair treatment in society resulting from the city's lack of adequate AI governance and strategy.

The assessment also highlights the need for multi-level stakeholder engagement with stronger participatory processes. Cities ranking key stakeholder when setting up AI policies ranked legal actors and regulators first (80%), ICT personnel and experts second (78%), policy and decision makers third (63%), and citizens and academia lastly (60%). Regulatory frameworks need to be flexible enough to allow adaptation and experimentation but only 38% of cities that have implemented AI solutions track their performance. Public participation can help to increase feedback given on AI systems and their performances.

For global efforts toward AI governance to be truly inclusive, it is crucial to include Latin America, Africa and Asia, the so-called Global South, in governance discussions. Results show, for example, that half of the cities that responded to the survey from Asia and Latin America do not have specific governance initiatives. Without equal participation and perspectives of different regions in global AI governance discussions, the people from these locations will be underrepresented, exacerbating regional divides.

Embracing a holistic vision of Responsible AI extends beyond technological considerations. The process demands an approach that aligns with international human rights principles and Sustainable Development Goals (SDGs).

The report reveals significant capacity gaps and needs which are categorized into three levels:

- Organisational capacities, including fostering a creative culture, prioritizing AI education, and establishing approaches to support Responsible AI implementation.
- Governance and regulatory capacities, including the need for governance measures at the city level and regulatory frameworks for Responsible AI.
- Technological capacities, particularly in the cities from the Global South, including expertise gaps in developing effective AI models, interoperability issues, and cybersecurity weaknesses in local government settings.

This assessment seeks to empower city leaders and stakeholders with actionable insights, fostering the development of AI ecosystems that contribute to the resilience, inclusivity, and sustainability of urban communities.

For this to be achieved, a set of recommendations has been developed to guide city leaders and key stakeholders in navigating the complexities of AI adoption, ensuring responsible, inclusive, and sustainable integration:

1. AI for local government and public services

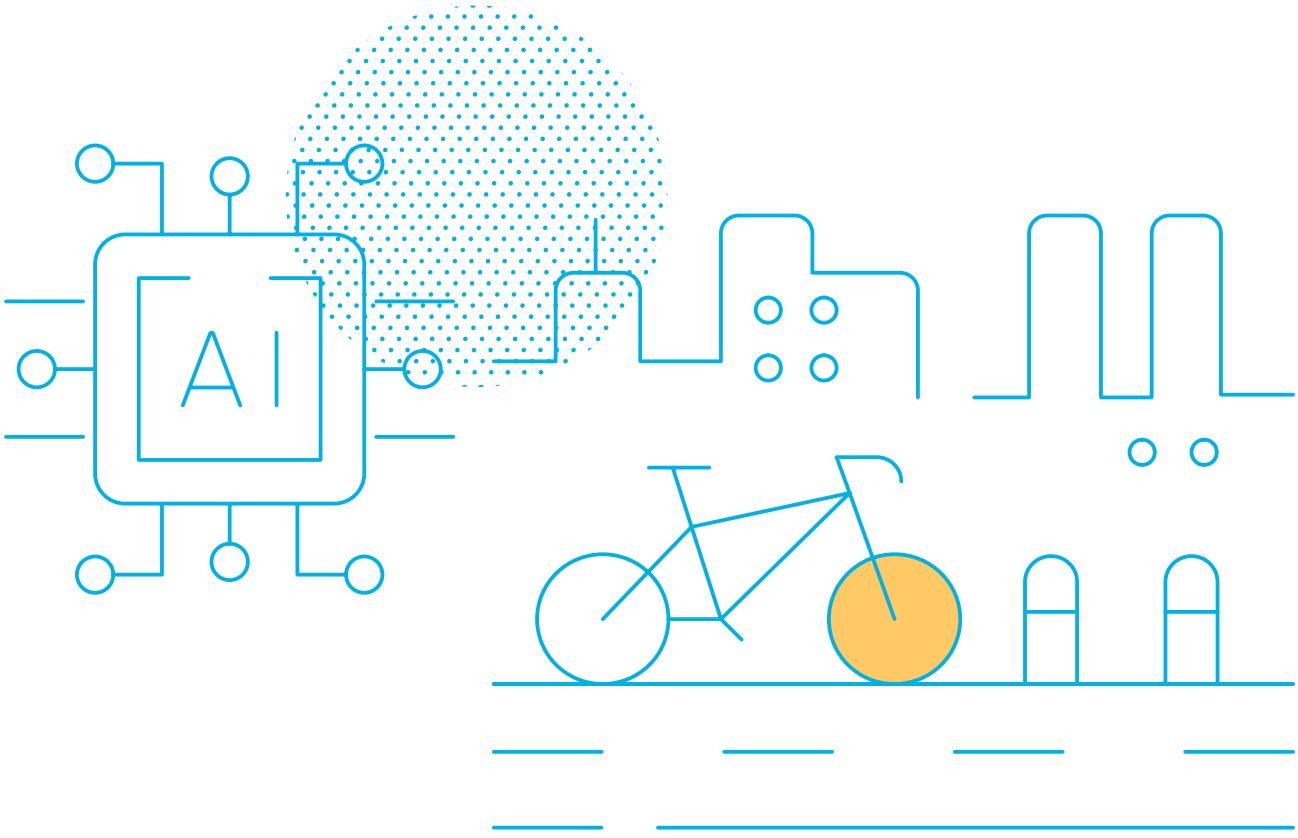
1.1. Establish foundations for Responsible AI
1.2. Define a Governance model of Responsible AI
1.3. Structure the Governance of Responsible AI in Cities.
1.4. Building the Ecosystem of Responsible AI

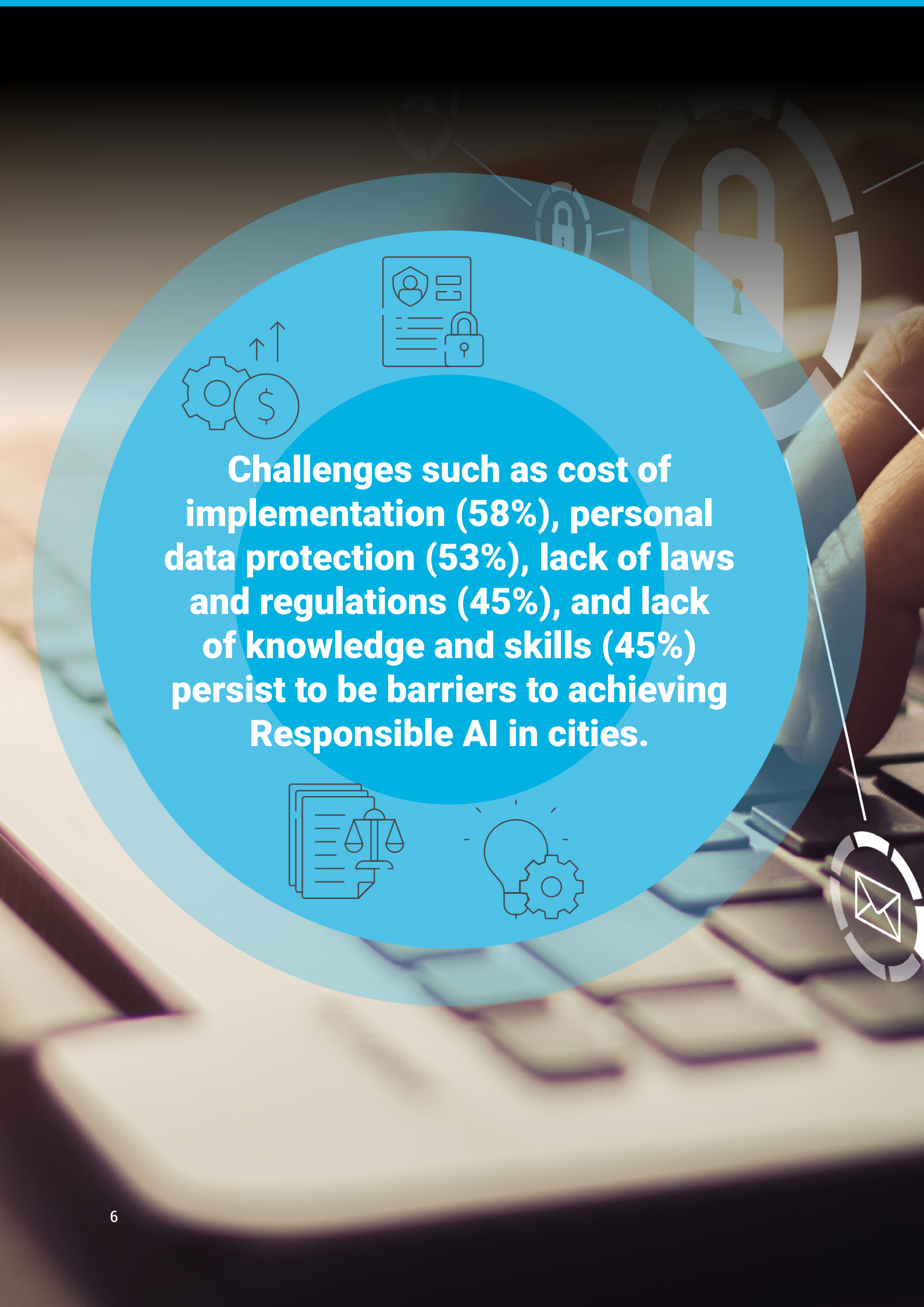
2. Responsible AI in cities

2.1. Defining the principle of Responsible AI.
2.2. Prioritizing long-term sustainability
2.3. Promoting Inclusion and resilience

3. Capabilities of Responsible AI in cities

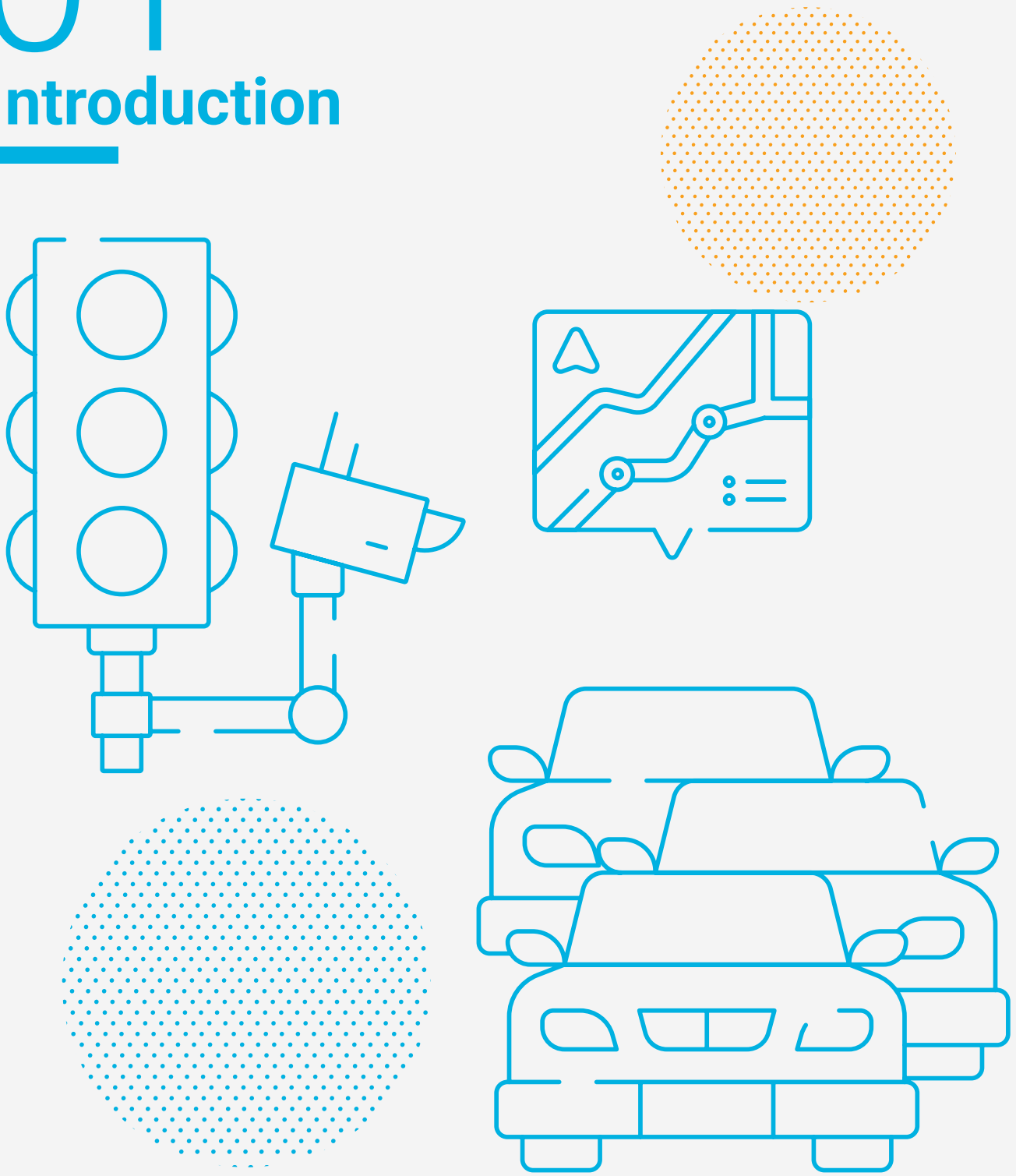
3.1. Framing Responsible AI
3.2. Design Responsible AI
3.3. Implementing Responsible AI
3.4. Maintaining/Evaluating/Monitoring AI





Challenges such as cost of implementation (58%), personal data protection (53%), lack of laws and regulations (45%), and lack of knowledge and skills (45%) persist to be barriers to achieving Responsible AI in cities.

01
Introduction



Navigating urban challenges by adopting the appropriate technologies has become a tendency in the face of unprecedented urbanisation. Worldwide, cities are experiencing a massive flux of people seeking security, enhanced opportunities, better employment, and benefits from public services. This population surge has fueled rapid urbanization, presenting cities with complex challenges related to land management, urban planning, and the delivery of efficient public services.

In parallel, the progress in smart cities and the advancement of digital technologies, including AI and increased data produced, offer promising solutions to address these challenges and the increased expectations of the citizens/residents for better service, accessibility, security, transparency, and privacy (Voda and Radu, 2018). Use of AI in cities shows interesting potential addressing challenges such as traffic congestion, mobility, energy consumption, water scarcity, drought emergencies, pollution, noise, or waste management.

Recognizing this potential, governments and public services worldwide are increasingly turning to AI, especially at the local level, to manage city operations and data, and engage with their constituencies. Thus, AI emerged as a pivotal technology for promoting sustainable development and addressing diverse societal and environmental challenges.

Despite its significant potential, the application of AI in cities raises concerns about possible bias and discrimination, surveillance and privacy violations, and other human rights implications, leading to structural inequalities and unfair treatment in society. While many countries have established national-level initiatives to guide and regulate AI adoption, translating these initiatives into operational frameworks at the local level remains a significant challenge. The capabilities required for Responsible AI deployment require comprehensive exploration, including heightened awareness among civil servants and citizens.

Cities and local stakeholders provide crucial evidence for AI applications and policymaking as they regularly make day-to-day decisions about AI and how it affects people's lives (UN-Habitat, 2022). These experiences can significantly contribute to regional and global efforts to regulate and govern AI systems. Understanding the landscape of AI strategies, and the needs and capabilities of government officials is crucial to tailor technical support and steer to use AI in cities in a responsible manner, to address priority challenges and positively impact their communities.

This is why UN-Habitat has collaborated with the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV), with the support of the Institute for Development Research Centre (IDRC), to assess Responsible AI and best practices, needs and gaps experienced by cities from around the world. The Global Assessment of Responsible AI also draws inspiration from the activities of the AI for people-centred smart cities workstream, launched in 2022 and co-chaired by ITU, UNESCO, UNDP and UN-Habitat, as part of the UN Inter-Agency Working Group on AI[1] .

Recognizing that Artificial Intelligence increasingly affects all of society and requires strong governance, the United Nations through the leadership of the Secretary General has established a High-level Advisory Body on AI to analyse and advance recommendations for the international governance of AI [2]. These efforts build upon existing and new frameworks such as UNESCO's Recommendations on the Ethics of AI (UNESCO, 2021), the recently adopted landmark resolution [3] on the promotion of "safe, secure and trustworthy" artificial intelligence (AI) systems, by the UN General Assembly, that can contribute for the achievement of the Sustainable Development Goals, while respecting, protecting and promoting human rights. The zero draft of the Global Digital Compact[4], published in April 2024, among others commitments, will establish an International Scientific Panel

1 The Inter-Agency Working Group on AI (IAWG-AI) was launched in October 2020, and is co-led by UNESCO and ITU, under the auspices of the High-level Committee on Programmes (HLCP).
2 The Interim report: Governing AI for Humanity was published in December 2023 by the Secretary General's Advisory Body on AI.
3 https://documents.un.org/doc/undoc/ltd/n24/065/92/pdf/n2406592.pdf?token=sVKBK7S46T5gaOxpTd&fe=true
4 https://www.un.org/techenvoy/sites/www.un.org.techenvoy/files/Global_Digital_Compact_Zero_Draft.pdf

on AI to conduct independent multi-disciplinary scientific risk and evidence-based opportunity assessments.

At the local level, in the New Urban Agenda (NUA) Member States commit to adopt a smart city-approach that harness technology to ensure the digital future is both progressive and inclusive, making use of digitalization, clean energy and innovation. UN-Habitat's flagship programme, People-Centred Smart Cities promotes the deployment of technological innovations, including AI, to realise sustainability, inclusivity, prosperity and human rights and to make urban digital transformation work for the benefit of all leaving no one behind (UN-Habitat, 2020a).

Given the private sector role and resources in developing AI solutions, the governance of AI must as well leverage existing agreed resolutions, such as the one approved by the UN Human Rights Council's 'Protect, Respect, Remedy' which highlights Member States duty to protect citizens against human rights abuses by third parties, including business enterprises, who should act with due diligence and address adverse impacts to human rights[5].

This sets the stage for understanding Responsible AI, which is explored as a framework for the use of artificial intelligence for inclusive and sustainable cities, considering human rights and ethics. Responsible AI in cities is defined as the design and use of AI for economic, environmental, and social good, aiming to promote resilient, inclusive, and sustainable urban environment. This report adopts the definition of Responsible AI proposed by the United Nations Human Settlement Programme (UN-Habitat) emphasizing the lifecycle approach that promotes a set of foundational values and principles, including the internationally agreed-upon human rights, SDGs and ethical principles such as fairness, privacy, and accountability.

Responsible AI and AI-enabled solutions in cities require appropriate governance, management, deployment, and monitoring to ensure inclusive, resilient, and sustainable communities in compliance with ethics, laws, and regulations. Achieving Responsible AI in cities requires a holistic view encompassing a multidisciplinary perspective, a multi-stakeholder approach, and the integration of existing technologies. Cities should grasp the diversity of AI ecosystems and better understand the ethics, privacy, regulations, and regulatory implications. Moreover, attention is needed to the pre-conditions requirements for successfully adopting AI to contribute to solving societal challenges while positively impacting the community.

Such a holistic view of AI in cities and the concept of Responsible AI in cities are often not clearly understood. Mechanisms and enforcement for implementing existing national/regional AI initiatives and strategies can ambiguous at the city level. Also, there is an imbalance between a philosophical and engineering approach to AI in cities that calls for understanding the multidisciplinary nature of applying AI responsibly. Moreover, cities are unaware of the diversity of stakeholders and their contribution to Responsible AI, which may lead to the engagement of irrelevant stakeholders and, thus, failure to design and use AI solutions that respect and promote human rights and ethics.

The existing limitations in planning and using AI responsibly increase risks of bias, discrimination, and inequality in societies. Thus, further exploration of how AI solutions are planned, designed, and used in cities to promote inclusive, resilient, and sustainable communities is necessary. Such realization requires specific capabilities and competencies that are hardly explored in cities.

In order to support local governments and municipalities to understand better these constraints and capacity gaps, a framework describing the main dimensions required to analyse Responsible AI is proposed, and consists of: 1) Context of Responsible AI in cities, 2) Benefits, Challenges, Opportunities, and Risks (BCOR) of Responsible AI in cities, and 3) Governance & Partnerships and AI Capabilities.

5 Guiding Principles on Businnes and human rights (OHCHR, 2016).

Key findings from the survey for every dimension of the framework include:

1 Context of Responsible AI in cities

- Growing interest in AI adoption, with 75% of surveyed cities have proactively planned to implement AI for enhancing municipal services.
- While this approach may create early benefits to cities, it may lead to design of inappropriate solutions for unprepared cities in terms of management, technology, and processes.
- Findings reinforce the need for AI strategies to support the responsible use of AI in cities.
- After the Internet of Things (30%), the next most frequently used applications of AI in surveyed cities include predictive analytics, simulations, pattern matching (22%), as well as chatbots and virtual assistants (21%).
- Around 20% of the chief technology managers and directors and more than 55% of civil servants in surveyed cities are starting to engage in AI projects without the requisite knowledge and expertise.
- This underscores the immediate need to combine digital literacy, as a foundational skill, with basic AI literacy and applied AI skills.
- Governments and municipalities must prioritize investments in training and capacity-building to empower their workforce with relevant AI knowledge to harness the full potential of AI responsibly.

2 Benefits, Challenges, Opportunities, and Risks (BCOR) of Responsible AI in cities

- Cities planning to use AI expect benefits mostly in mobility (42%), water and waste management (41%), public safety (40%), and urban planning (40%).
- According to the survey responses, the three most highly valued benefits of AI adoption: savings through process automation (58%), service effectiveness (49%), and enhanced decision-making capabilities (47%).
- However, to fully harness the benefits and the opportunities of AI, cities must address critical capacity gaps and needs, as well as mitigate potential risks arising from the use of AI, for example, related to privacy, ethics, bias and discrimination, misinformation and deepfakes.
- Top challenges are as follows: - Cost of implementation: A significant concern, reported by 58% of respondents. - Personal data protection: Worries about safeguarding personal data, expressed by 53% of respondents. - Laws and regulation challenges: Legal and regulatory obstacles were cited by 52% of respondents. - Lack of Knowledge about AI capabilities: A knowledge gap regarding the extent of AI's potential is a concern for 45% of respondents.
- The respondents of the survey also identified risks according to UN-Habitat framework for AI, divided in the phases of Design, Implementation, Deployment, Maintenance.

3 Governance and Partnership

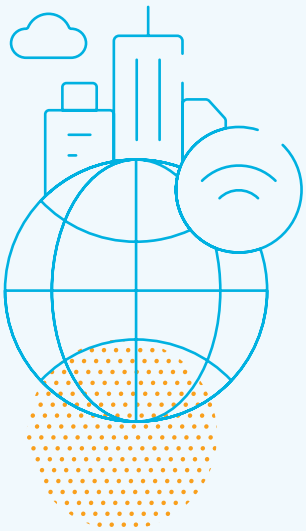
- A comprehensive AI strategy must encompass various parameters that support the responsible planning, design, and use of this technology.
- Digital inclusion ranks as one of the most critical dimensions included in AI strategies, with 62% of respondents prioritizing it. The incorporation of a data strategy into AI strategies is mentioned by 58% of the respondents.
- The survey reveals that only 15% of cities with implemented or piloted AI solutions possess a well-defined AI governance framework
- Interestingly, 72% of those with implemented solutions and 35% with pilot solutions rely on existing ICT governance bodies to manage AI. This approach may prove insufficient, as AI introduces distinct challenges and risks that extend beyond conventional ICT systems
- Notably, 61%. of cities planning AI initiatives are yet to implement specific governance measures.
- AI governance frequently follows the national authorities, who define comprehensive policies, strategies, and legal frameworks to govern AI, when they are available. However, a noticeable gap exists when considering city-level guidelines and initiatives, considering the impact of context and local diversity.

4 AI Capabilities in cities

- Strong political and managerial leadership, coupled with a culture of creativity and innovation, are recognized as available or partially available by 42% of the respondents
- 35% of respondents noted the availability or partial availability of advanced analytics and data management capabilities
- Cybersecurity awareness competencies and skills are partially available for 47% of the respondents
- Digital literacy among employees, both in utilizing and supporting AI systems, is considered lacking by 34% of respondents.
- Additionally, 31% of respondents express a knowledge gap in understanding relevant AI data and regulations.
- Only 30% of the respondents affirmed that their cities possess a dedicated and sufficient budget for building AI skills and competencies
- A mere 17% of surveyed cities have successfully integrated their systems and established data-sharing standards
- A concerning 52% of cities express uncertainty about the reliability of data obtained from their available sources, casting doubt on the trustworthiness of the information being used
- Only 32% of cities have defined or adopted existing standards for data usage

AI for the SDGs

Survey respondents underscored the multifaceted impact of cities aligning with various Sustainable Development Goals (SDGs).



A majority of surveyed cities across the globe, especially in regions such as Africa (68%) and Latin America and the Caribbean (58%), are actively harnessing AI's potential to bolster their business ecosystems.

82% of respondents from African cities emphasizing education as a particularly vital dimension for AI application

Existing AI applications in surveyed cities are actively engaged in mitigating environmental concerns. Of primary focus of cities worldwide is the management of transport-related pollution and traffic for more than 68% of the respondents from African cities followed closely by American cities with 56% and Asia with 50%

Based on the framework and findings from the Assessment, recommendations for city leaders and key stakeholders are proposed in three main domains:

1 AI for local government and public services

1.1. Establish foundations for Responsible AI
1.2. Define a governance model of Responsible AI
1.3. Structure the governance of Responsible AI in Cities.
1.4. Building the ecosystem of Responsible AI

2 Responsible AI in cities

2.1. Defining the principle of Responsible AI.
2.2. Prioritizing long-term sustainability
2.3. Promoting inclusion and resilience

3 Capabilities of Responsible AI in cities

3.1. Framing Responsible AI
3.2. Design Responsible AI
3.3. Implementing Responsible AI
3.4. Maintaining/Evaluating/Monitoring AI

This report aims to provide a comprehensive assessment of Responsible AI in cities. It identifies benefits and opportunities as well as challenges and risks, offering insights into how cities can adopt AI responsibly to address societal challenges and positively impact their communities. For that, a multi-dimensional approach was employed, combining a global survey, comprehensive desk review, and case studies to gather diverse perspectives on AI in urban settings. The method adopted aims to capture the nuances of Responsible AI adoption, analyzing real-world examples and aligning findings with broader literature.

How to read this report

The report is structured into six main sections, which build upon section 1, the introduction.

Section 2 outlines the methodologies used for data collection and analysis. It provides insights into the approach employed in conducting the global survey, comprehensive desk review, and case studies.

Section 3 introduces the essential dimensions that define responsible AI in urban contexts. It delves into the findings from the global survey, examining the context of AI in cities (3.1), the benefits, opportunities, challenges, and risks (3.2), the dynamics of governance and partnership (3.3), AI capabilities (3.4). Throughout this section, the report underscores the significance of these findings in the broader literature, complemented by real-world examples illustrating the practical application of AI concepts.

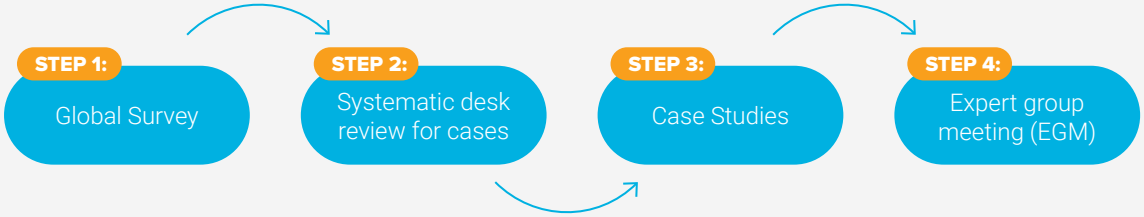
Section 4 discusses the role of AI in fostering resilient, inclusive, and sustainable cities, addressing the dimensions of economic, environmental, social and institutional sustainability in relation to AI. It explores the contributions of AI to the achievement of the Sustainable Development Goals.

Section 5 concludes highlighting the key policy recommendations arising from the data extracted through the global survey and the lessons learned from the case studies. These recommendations are aimed at guiding policymakers and local governments in enhancing their capacities for responsible AI implementation, governance, and execution

02
Methodology and Data Collection

To conduct the study, a comprehensive four-step approach encompassing a global survey, systematic desk review, case studies, and an Expert Group Meeting (EGM) - as in was **Figure 1** was employed. This section elaborates on these steps, highlighting data collection methods and their rationale.

Figure 1: A four-step approach for the Global Assessment of Responsible AI



Step 1: Global survey design

The survey aimed to deepen the understanding of AI landscape in cities by identifying challenges, opportunities, needs, and gaps while examining existing initiatives related to Responsible AI planning, design, use, and governance. An extensive literature review on AI in public service and government was conducted to identify aspects of planning, designing, and using Responsible AI. We determined the key dimensions for assessing AI in cities and formulated a questionnaire through an iterative approach. The survey featured six sections shown in **Table 1**. We translated it into four languages: English, French, Portuguese, and Spanish to ensure global outreach.

Table 1. Global survey dimensions

Sections	Description
1.General and context information about AI for cities	Exploration of the demographic characteristics of respondents and information about Government's AI project in cities and contributed to the analysis by grouping findings based on characteristics.
2.Opportunities and benefits of AI in cities	Examination of the opportunities and benefits of AI in cities. The results contributed to validating the theoretical opportunities and benefits identified in the literature about using AI at the city level and identifying new ones.
3. Risk and challenges of AI in cities	Findings contributed to understanding the situation, risks, and challenges to identify the needs and competencies that might hinder cities from adopting AI and propose solutions to accelerate Responsible AI in cities.
4. Governance and partnership of Responsible AI in cities	Exploration of the available practices governing the planning, designing, using, and managing of Responsible AI in cities.
5.Capacity gaps for Responsible AI in cities	Investigation of the capacity and competence available to support AI in cities. These include capabilities, skills, funds, infrastructure, and data. The results supported the development of guidelines and policy recommendations on the needs and requirements of cities while planning on adopting or using AI responsibly.
6.AI for resilient, inclusive, and sustainable cities	Determination of how Responsible AI solutions are in cities to create inclusive, resilient, and sustainable cities.

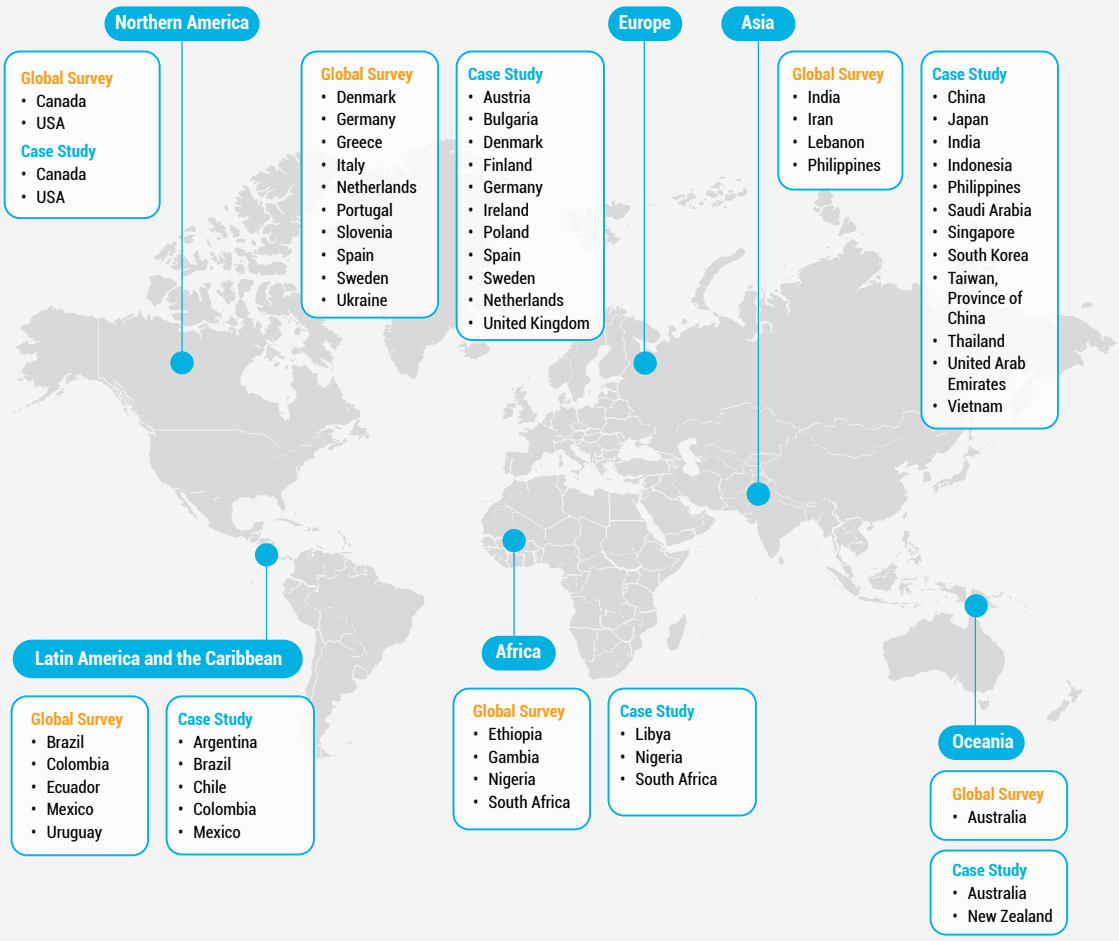
The survey was distributed through various networks and channels, reaching city managers, experts, researchers, and other stakeholders involved in AI planning, design, and governance. We received approximately 118 responses from 122 municipalities across Africa, Asia, Europe, Latin America, and North America (**Figure 1**). In some cases, multiple cities within a country provided responses.

Step 2. Desk review

In parallel with the global survey, an extensive desk review was realized. Various documents were analyzed to define an analytic framework for the situation analysis of AI for cities and identify case studies for exploring AI practices in cities.

We targeted 189 member states and classified them based on regions to determine a global representation of cities from different region worldwide regions for the case study selection. Based on the case studies repository, we used "purposeful sampling," suggesting that case studies should be selected from potential cases with information-rich and provide deep knowledge and understanding about the AI project in cities. In total 70 case study populated the repository (**Figure 2**).

Figure 2. Visual representation of global survey responses (N=118) and collected case studies (N=70)



Step 3. Case studies

Case study protocols were prepared to design data collection and analysis. The information collected for each case includes Project name, Location (city, country), Sector, Description of the AI Project, Problems/Urban challenges, AI solution/use-cases proposed/Implemented, Governance of AI, data, and use of data, Status of the AI project, Sustainability/SDG, Opportunities of using AI (Drivers), Challenges faced in the implementation of AI (Barriers), Successful/Unsuccessful project (what expectations were met and those that were not met/partially met?). We also identified lessons learned and potential recommendations from the cases.

Five cases were selected for follow-up interviews to show the diversity of AI for city types and from different regions of the world (city of Taiwan, city of Copenhagen, city of Belo Horizonte, and city of Manila).

Step 4. Expert group meeting (EGM)

An Expert Group Meeting (EGM) was prepared and organized to validate a thorough assessment of the opportunities and constraints for local government to responsibly implement, use, and govern Artificial Intelligence (AI) technologies in cities. It aimed to gather feedback and additional insights. The EGM consists of three main themes and a set of guiding questions to be applied in their validation of the report (**Table 2)**.

Table 2. Main themes and questions of the EGM

Sections	Guiding Questions
AI for Government and public services	What are the challenges of Government and public service in planning, designing, using, and governing AI.
Responsible AI and sustainable development	Are the current criteria used (Sustainable development and SDG contribution or compliance) enough to define Responsible AI for cities? Or are there any other dimensions that should be considered in the definition of Responsible AI? How can 'gender' and 'inclusion' be better incorporated in the definition of Responsible AI for cities?
AI needs and capabilities	How do you identify the needs and the available capabilities for AI in local governments, in developing AI systems, funding AI projects, and governing Ai solutions and data related to AI? What are the skills and competence required to support Responsible AI initiatives in cities? What is needed to develop Responsible AI strategies in cities?

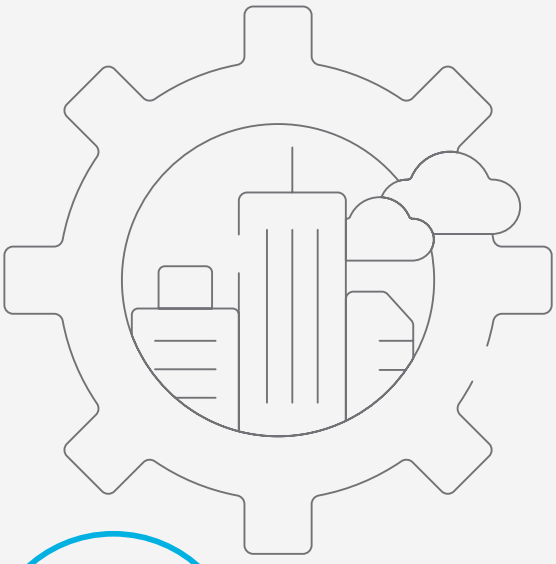
Over 100 participants from diverse organizations engaged in constructive dialogues focused on these three domains. There was representation from influential organizations like UNESCO, UNDP, UNOHCHR, UN Volunteers, International Trade Center, MILA Quebec, Internet Freedom Foundation, Open North Canada, Mozilla Foundation, Eurocities, Global Urban Observatory of AI, African Observatory on Responsible AI, Black in AI, and Smartivist Philippines. Also, government representatives at city level from various countries like USA, Canada, Austria, Germany, Iceland, Netherlands, Switzerland, Portugal, Spain, Brazil, Colombia, Nigeria, South Africa, and India, actively participated in the EGM.

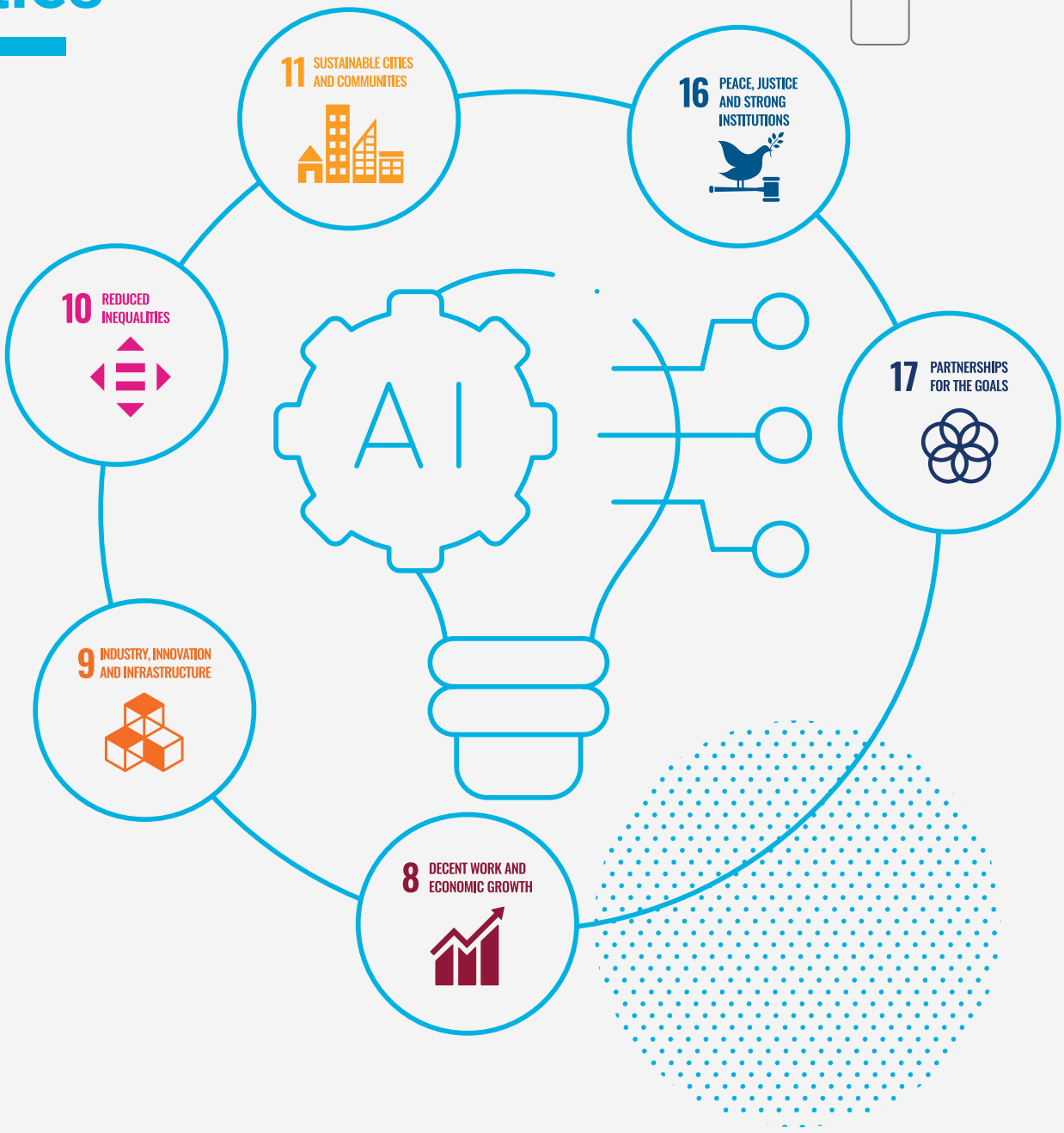
The academic community was also represented with experts from institutions such as Seoul Institute of Technology in South Korea, Research ICT Africa and Kibabii University in Kenya, PIT Policy Lab in Mexico, University of Montreal in Canada, and Institute for Ethics in Artificial Intelligence - Technische Universität München in Germany.

The participants discussed the challenges facing each theme and deliberated on whether additional dimensions should be integrated into the definition of Responsible AI for cities, with a particular emphasis on gender and inclusion. This multi-faceted dialogue ensured a comprehensive and in-depth exploration of AI in cities, touching upon practical challenges, ethical considerations, and the empowerment of local governments in their AI endeavors. These discussions led to the proposal of relevant elements and interpretations that enriched the analysis of the data collected, further enhancing the depth and quality of the findings.

03

Framework for Responsible AI in Cities

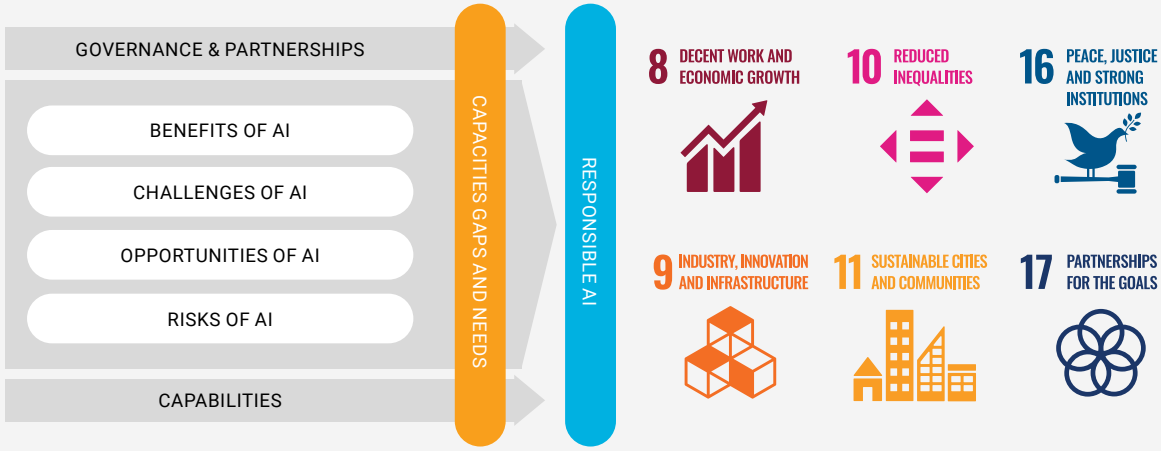




An analytical framework was defined to organize data collection and findings obtained from the global survey and case studies of AI in cities. The framework also highlights relevant insights for achieving Responsible AI in cities. It is composed of five dimensions. The three first dimensions are 1) Context, 2) the BCOR (Benefits, Challenges, Opportunities and Risks) and 3) Governance & Partnerships and Capabilities (prerequisites). These three dimensions served as a critical compass for identifying two other dimensions: Capacity Gaps and Needs required to plan, design and use Responsible AI in cities.

Figure 3 illustrates these dimensions.

Figure 3: Analytical framework for Responsible AI in cities



The effectiveness of these dimensions in advancing Responsible AI within cities is intrinsically linked to the unique contextual features of each city. Thus, understanding the contextual nuances and addressing them accordingly, cities may facilitate in the adoption of Responsible AI.

3.1. Context of Responsible AI in cities

The concept of Responsible AI in cities is intrinsically tied to the unique context in which it is implemented. The structures, practices, and workflows governing municipal operations warrant meticulous consideration in achieving Responsible AI in cities. These contextual factors define the functioning of cities and dictate how AI is introduced. Also, the status of AI progression, goals, priorities and visions vary substantially from one city to another. These factors play a pivotal role in either facilitating or hindering the process. Thus, making the path to AI adoption differs in cities, reflecting the idiosyncrasies of each urban center's administrative, cultural, and operational landscape.

Looking into the context of the surveyed cities, a substantial number of cities are actively planning to introduce AI as shown in **Figure 4**. This surge in interest underscores the growing commitment among cities to embrace AI as an indispensable tool for advancement and improvement. Additionally, 75% cities have proactively planned to implement AI for enhancing municipal services, while around 80% have either in the pilot phase or deployed AI tools or techniques which reflects the growing interest in AI adoption among cities (**Figure 4**).

Figure 4. Interest toward AI technology by level of adoption of AI and by continent

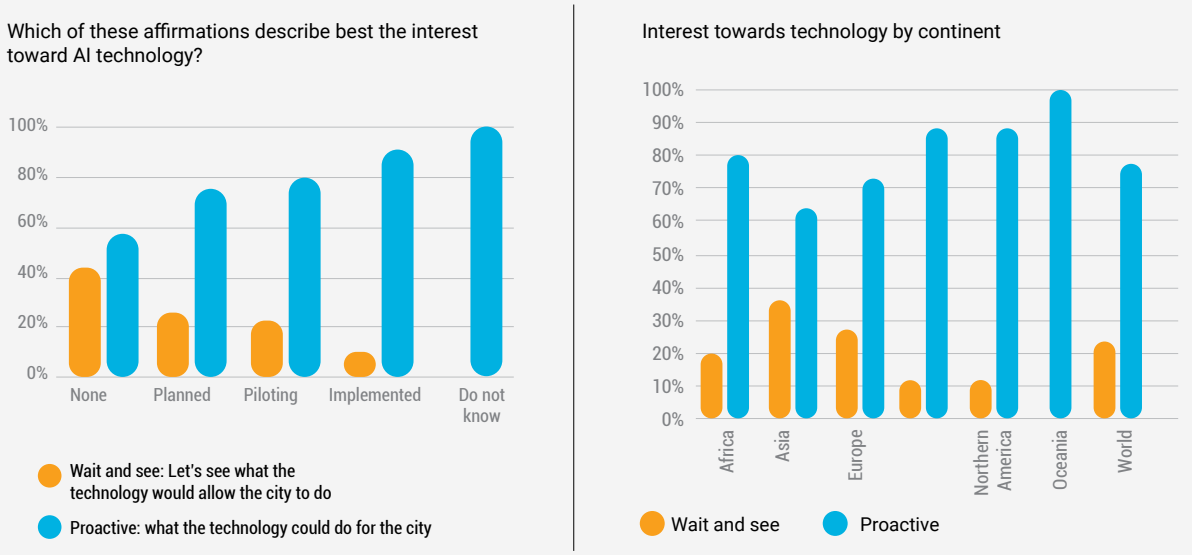
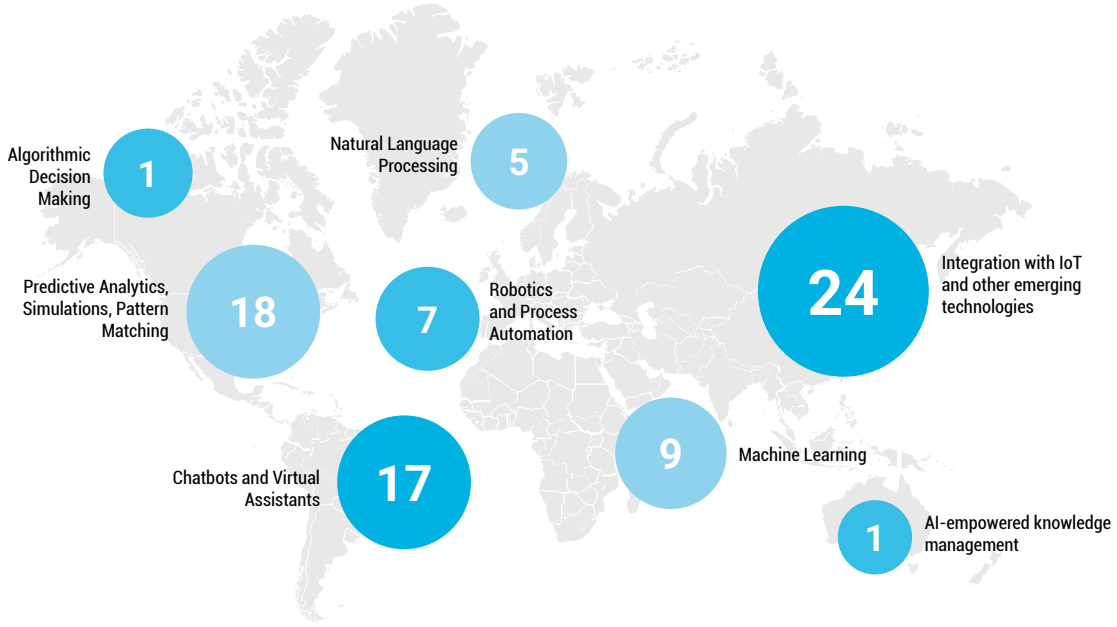


Figure 4 further shows most of the surveyed cities prefer proactive approach of adopting AI with the aim to unlock the potential of the technology in their city. While this approach may create early benefits to cities, it may lead to design of inappropriate solutions for unprepared cities in terms of management, technology, and processes.

The analysis has revealed a significant and proactive interest among the surveyed cities in adopting AI, (**Figure 4**). The analysis of case studies further underscores this increasing interest and need, revealing that even though similar projects might be successful, the intricacies of each city's context lead to diverse outcomes, progression, and applications of AI technology. There exists no one-size-fits-all solution in this domain; contextual perspectives, overarching visions, regulatory frameworks, governance models, the depth of knowledge and skills available, as well as the type of AI technology integrated into projects, are central determinants of AI outcomes within cities.

Figure 5. Distribution of AI in cities case studies based on AI typologies

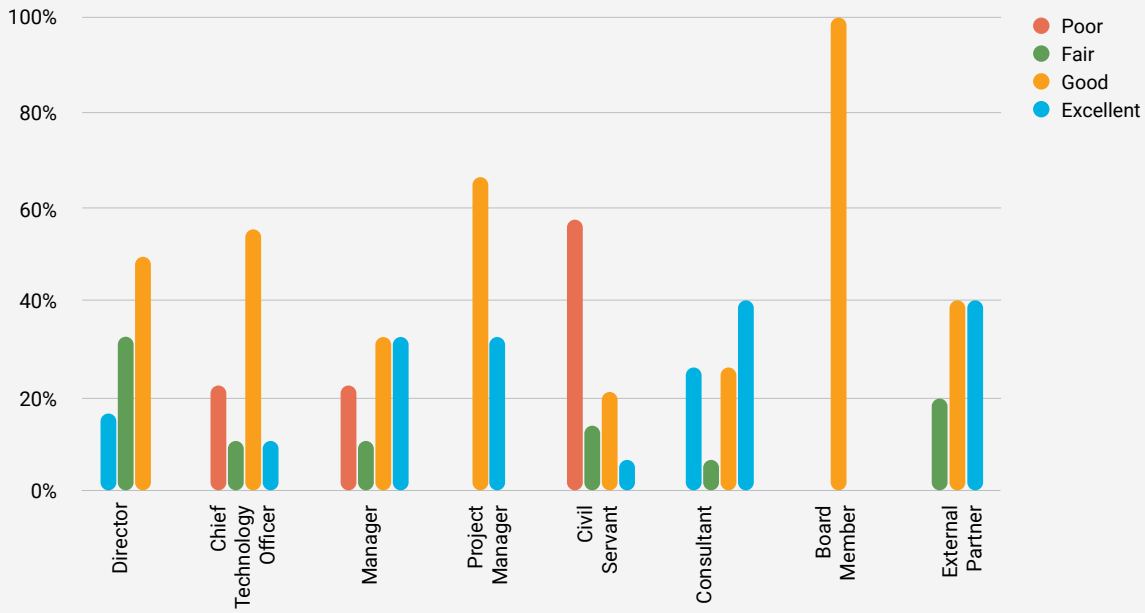


Among the various types of AI applications in cities, the most common ones are integrated with emerging technologies like the Internet of Things (30%). The next most frequently used applications include predictive analytics, simulations, pattern matching (22%), as well as chatbots and virtual assistants (21%). **Figure 5** provides a visual representation of the distribution of these AI types among the collected use cases in cities

Knowledge on AI

Surveyed cities further portrayed the limited understanding and knowledge of AI, as illustrated in Figure 6. The level of AI expertise tends to vary significantly based on the professional roles of individuals involved in the city. For instance, municipalities' directors and managers who responded to the survey are less knowledgeable about AI regardless of their contribution to the decision-making related to the adoption process. It is essential for them to possess profound knowledge to effectively lead their cities and understand the implications of AI toward inclusive, resilient, and sustainable cities.

Figure 6: Knowledge of AI in cities based on the professional level of respondents.



On the other hand, the findings also reveals that around 20% of the chief technology managers and directors and more than 55% of civil servants are starting to engage in AI projects without the requisite knowledge and expertise. This underscores the immediate need to combine digital literacy, as a foundational skill, with basic AI literacy and applied AI skills. While the majority of respondents are generally aware of AI technology, **Figure 6** highlights that project managers tend to possess a better grasp of AI concepts, whereas civil servants, despite their significant contributions to the initiatives in cities, show lower familiarity with AI principles and technologies. Extensive AI expertise is more prevalent among external consultants or partners, indicating a reliance on outsourcing AI capabilities. This practice may provide short-term solutions that may weaken the in-house resources and expertise among public sector professionals. Outsourcing of AI solutions was further discussed in the EGM, where participants urged cities to thoroughly ponder the decision to acquire a solution versus developing one based on the context. It is crucial to identify AI use cases appropriate to the city needs and the associated data requirements.

Limited AI knowledge in cities was also advocated in the EGM, where participants expressed a pressing need for practical, real-world use cases and applications of AI technology in the realm of public service, particularly within the local context. Furthermore, a growing demand for comprehensive knowledge about AI implications in the urban context was uncovered. This necessitates a multifaceted understanding of AI's nuances for implementing it responsibly.

The understanding of the AI landscape accentuates the significant gap in AI knowledge and skills in municipalities. Consequently, governments and municipalities must prioritize investments in training and capacity-building to empower their workforce with relevant AI knowledge to harness the full potential of AI responsibly.

Capacity gaps and needs:

1. Need of knowledge and understanding of AI technology at the executive level

2. Need to combine digital literacy, as a foundational skill, with basic AI literacy and applied AI skills.

3. Discrepancy between AI interest in the city and the set-up of planning, designing and, implementing AI in the City ensuring the actual needs and priority of the city

4. Lack of expertise in the city to deal with AI planning, designing and implementing

5. Need emerges for practical, real-world use cases and applications of AI technology

CASE STUDY

Trancity, pioneering urban mobility through tailored AI solutions

Trancity stands out to exemplifying the significance of customizing AI solutions for specific "city context." This intelligent management network service operates at the intersection of public transportation and urban mobility, with a primary focus on enhancing the commuting experience for passengers (OECD-OPSI, 2020). Currently operational in multiple Latin American countries and expanding into Europe, Trancity's remarkable success lies in its ability to adapt Trancity's success stems from its ability to fine-tune its AI platform to align with the unique characteristics, challenges, and needs of each location. The adaptive nature of Trancity's technology ensures that it remains highly relevant and effective in addressing the precise challenges and issues faced by the community it serves.

By acknowledging and catering to the particular demands and conditions of each city, Trancity achieves a level of synergy that goes far beyond the capabilities of standardized. This case serves as a powerful testament to the transformative potential of AI when harnessed with a deep-rooted understanding of the city context in which it operates.

3.2 Benefits, Challenges, Opportunities, and Risks (BCOR) of Responsible AI in cities

Building upon the insights gained from the Global Assessment of Responsible AI for Cities and the analysis of case studies, the BCOR (Benefits, Challenges, Opportunities, and Risks) provides a comprehensive overview of the impacts—both positive and negative—of AI in this domain. The objective is to unveil the multifaceted landscape of AI's influence on government and public service delivery while shedding light on the related challenges and risks.

Benefits and opportunities of AI in cites

The implementation of AI in cities presents a numerous positive impacts, making it an essential tool for addressing various organizational, urban, and societal challenges associated with public service delivery in cities. It offers substantial benefits and opportunities, ranging from enhancing efficiency and productivity in service delivery to automating processes, aiding in decision-making, streamlining routines, and tackling complex tasks.

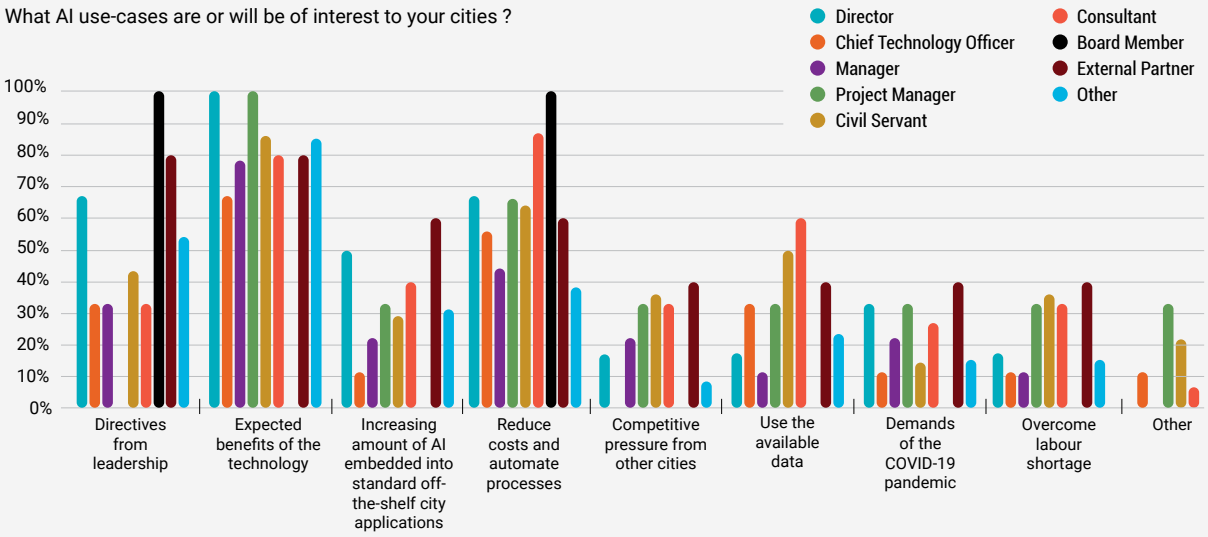
Many opportunities for AI are reported to transform government and public service at the local level. In the same line, goals, visions, and missions of various nations and regions highlight the potential of data technologies, particularly AI, to improve service delivery and promote sustainable, inclusive, and resilient communities. These opportunities motivate cities to adopt the technology (proactive approach in **Figure 4**). Thus, municipalities worldwide are spearheading the deployment of AI-enabled services, proactively investing in AI to confront existing challenges and unlock new opportunities.

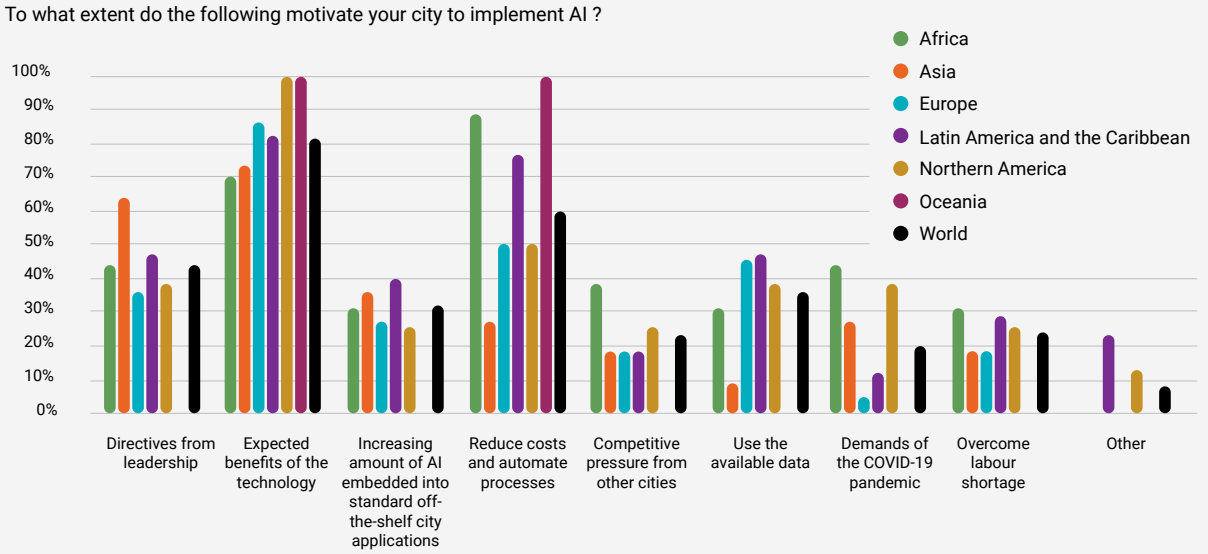
The Global survey findings reveal various factors influencing individuals at various levels of municipal management to adopt AI as seen in **Figure 7**. Most of the cities who responded to the survey opt for AI because of its potential and expected benefit in city governance. Different professionals from the survey expect AI to reduce operation costs and automate processes in their municipalities. Also, civil servants (50%) and consultants (60%) are motivated to use AI to make use of available data collected. Cities serve as vast repositories of data, continuously generated by a range of AI-driven tools, including sensors, traffic management systems, smart meters, IoT devices, and mobile phones. When this volume of data is combined with municipal information, AI emerges as a powerful catalyst for socio-economic opportunities while addressing pressing urban challenges (Jha, 2021).

The AI potentialities are observed also in the case studies where most cities deploy the technology to automate processes for evidence-based decision-making in their municipalities. For instance, the Dublin City Council employed Citibeats technology to analyze unstructured data, including social media opinions (**Box 1**). This allowed the government to understand citizens' attitudes toward community issues better, facilitating data-driven decision-making.

Furthermore, all the board members, external partners (80%) and city directors (68%) from the survey decide to adopt AI as part of the directives from the leadership. While this approach can accelerate the adoption in a specific time, the demand may change with the change in leadership. This cements the significance of leaders both at the national and city levels to have AI knowledge and its implications for cities to support its implementation continuously.

Figure 7: **Motivations for adopting AI in cities.**



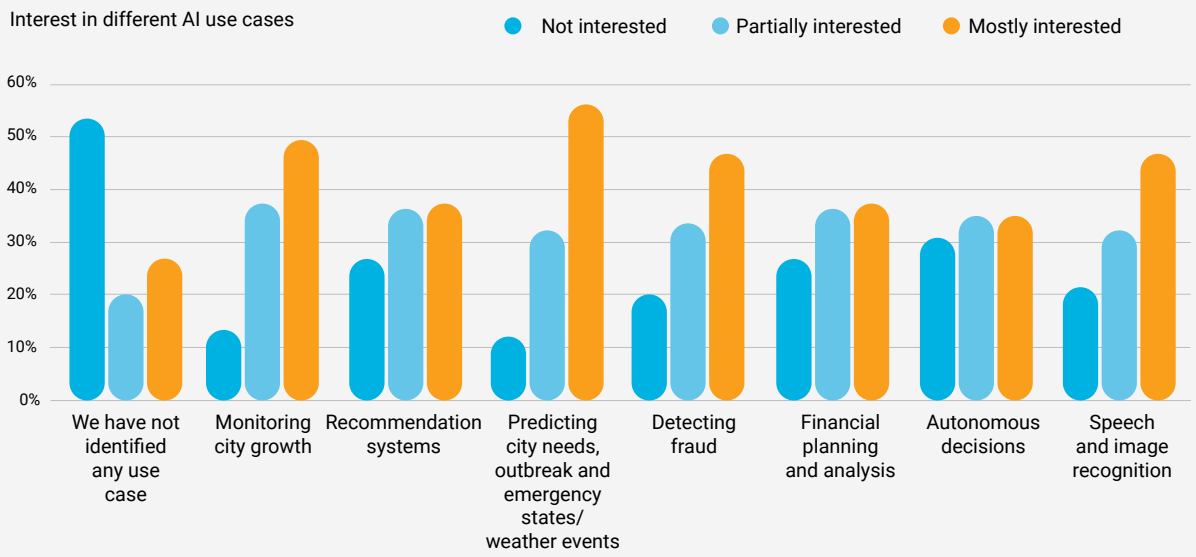


Potential use-cases for AI application in cities

Looking into the different AI use cases depicted in Figure 8, 56% of cities prioritize the prediction of city needs and outbreak and emergency states. Other areas of focus include monitoring city growth (49%), fraud detection (46%), and speech and image recognition (46%).

These trends in technology interests are indicative of potential development and acquisition directions, underlining the imperative of acquiring the necessary capabilities. Autonomous decision-making, prediction, and resilience are increasingly critical facets, underscoring the need for robust governance, regulation, and effective planning instruments to tackle urban emergencies.

Figure 8. Potential AI use-cases for cities interests



Box 1.

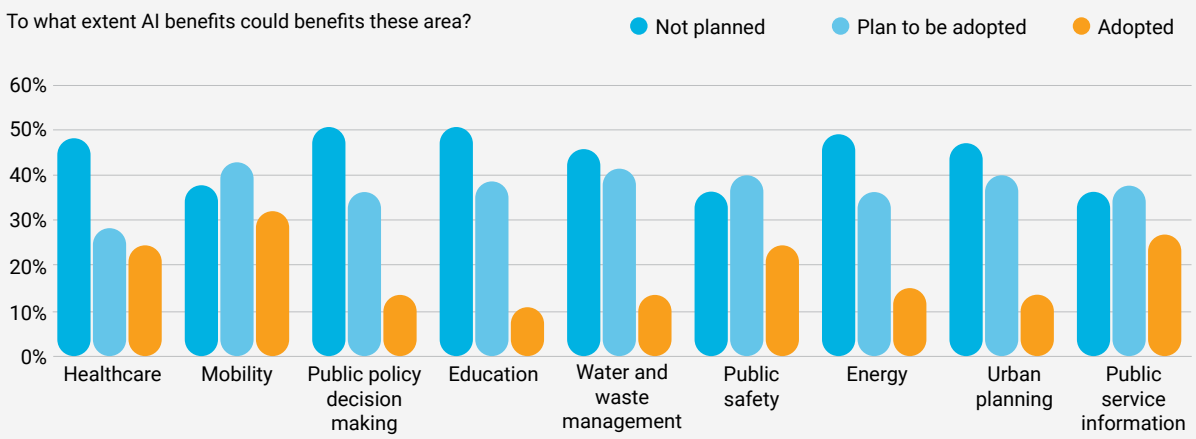
Opportunities of AI in Dublin Beat in Dublin, Ireland

Dublin City Council has entered a fruitful collaboration with Citibeats, a platform harnessing the power of natural language processing and machine learning to wrangle unstructured data, including anonymous, aggregate social media expressions (Smart Dublin, 2020). The result is real-time portrayal of how citizens experience life within the city region. This wealth of data is not only visually presented through intuitive dashboards but also serves as a vital resource for enhancing the city's quality of life.

One of the standout outputs of this partnership is the 'Dublin Beat' report, a monthly snapshot of trends and sentiments voiced by Dubliners through social media. This comprehensive analysis highlights key issues, ranging from environmental concerns to cultural events and city developments. The sentiment analysis empowers the Dublin government to understand citizen attitudes towards community matters. The real-time insights garnered enable data-driven, timely decision-making, providing guidance to shape the city's ongoing evolution. This case stands on how AI can swiftly transform unstructured data into actionable knowledge, fostering more responsive, citizen-centric governance in urban environments.

AI opportunities are beneficial to local governments in transforming public sectors operating in the city. For example, the literature advocates AI in transforming the mobility sector by controlling road traffic, improving public safety by detecting and preventing crimes, and enhancing public service information by providing personalized information 24/7 days to citizens. These sectorial benefits are also observed in real world examples as illustrated in Figure 9 Cities have experienced benefits from AI in the mobility sector (32%), public service information (28%), public safety (24%), and healthcare (24%).

Figure 9. Areas benefiting of AI implementation in cities.



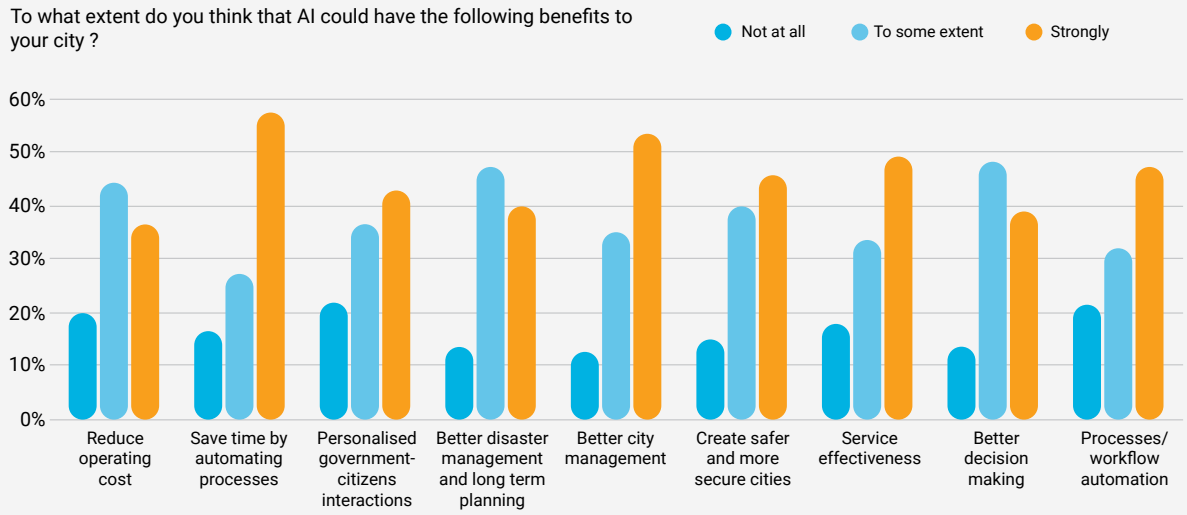
Cities planning to use AI expect benefits mostly in mobility (42%), water and waste management (41%), public safety (40%), and urban planning (40%). Similarly, case studies showcased mobility as one of the popular sectors in which cities benefit from AI. For example, the City Brain project in Hangzhou, China, in collaboration with tech company Alibaba, harnessed AI, big data, cloud computing, and emerging technologies to enhance urban management and alleviate traffic congestion (Marvin et al., 2022). This initiative led to a remarkable 15% improvement in Hangzhou's transportation system and a 50% boost in route optimization for emergency vehicles, such as ambulances, thus saving lives (**Box 2**).

AI is also expected to bring benefits to public policy decision making (51%), education (51%) mostly to cities without AI implementation plans. The ability of AI to bring benefits to various public services contributes to promoting sustainable development goals in cities.

The multifaceted applications of AI in public sectors provide specific benefits such as optimization of operational costs and resources, enhancement in efficiency, and fostering proactive citizen engagement. The global survey further revealed the three most highly valued benefits of AI adoption: savings through process automation (58%), service effectiveness (49%), and enhanced decision-making capabilities (47%). These findings align with existing literature, which indicates that municipalities embarking on AI implementations aim to enhance service effectiveness, tailor services to residents, and create safer and more secure cities.

Cities planning to use AI expect benefits mostly in mobility (42%), water and waste management (41%), public safety (40%), and urban planning (40%).

Figure 10. Benefits of AI implementation in cities.



Box 2.

Benefits of AI as demonstrated in the City Brain in Hangzhou, China

The Hangzhou City Brain system, initiated by Alibaba, showcases AI-driven innovation in smart city platforms, specifically targeting traffic congestion (Marvin et al., 2022). Designed to tackle Hangzhou's notorious traffic issues, the platform utilized AI, big data, cloud computing, and other advanced technologies to revolutionize urban management.

The Hangzhou transportation system witnessed a 15% improvement, significantly alleviating traffic congestion throughout the city. Furthermore, the system's route optimization capabilities extended beyond the ordinary, enhancing the efficiency of emergency services, such as ambulances by 50%.

City Brain seamlessly integrated data from various government agencies and sectors in Hangzhou, establishing a consolidated information ecosystem. This integration fostered a holistic understanding of the city's dynamics, enabling more informed and data-driven decision-making. The success of the Hangzhou City Brain system attests to AI's transformative potential in addressing real-world urban challenges, ultimately elevating the quality of life for city residents. This case illustrates how AI technologies can reshape transportation systems and urban management, offering valuable insights into the global benefits of AI for cities.

These insights are further corroborated by the case studies collected in the repository. They depict how AI contributes to enhancing residents' quality of life (as witnessed in Dublin and Barcelona; Smart Dublin, 2020; Barcelona City Council, 2020), optimizing urban mobility and transportation (exemplified by Seoul and Delhi; Smart City Korea, 2021; Chand, 2022), reducing energy consumption (notably in Copenhagen; Copenhagen Solutions Lab, 2021), and bolstering public safety (evident in London and Manchester; London Metropolitan Police, 2022; Ironside, 2022). AI systems analyze traffic patterns, leading to the development of intelligent traffic management systems, which result in smoother and safer traffic flow, particularly during emergencies (as observed in Hangzhou and Pittsburgh; Marvin et al., 2022; City of Pittsburgh, 2018).

The gathered data demonstrates that AI can transform cities management. However, to fully harness the benefits and the opportunities of AI, cities must address critical capacity gaps and needs, as well as mitigate potential risks arising from the use of AI. By addressing these capacity gaps,needs and risks, cities can unlock the full potential of AI for smarter, more responsive urban environments that benefit all residents.

Capacity needs

1. **Promoting AI awareness and literacy:** Establish campaigns and initiatives to enhance AI awareness and knowledge among citizens. Public engagement is key to fostering a technologically literate population and ensuring that AI applications are embraced and understood by all.

2. **Guidance for realizing AI benefits:** Cities require clear use-cases and mechanisms to harness the full potential of AI benefits and opportunities. Developing guidelines and best practices can help cities navigate the diverse landscape of AI technologies effectively.

3. **Citizen involvement in AI initiatives:** Engaging citizens in AI projects is essential. Establish mechanisms and platforms for citizens to actively participate in the planning and execution of AI initiatives

CASE STUDY

The AI-based mobile application, DataCrowd, implemented in Edo State, Nigeria, highlights the capacity gaps and needs identified in the benefits and opportunity section (World Bank, 2020). This innovative project focuses on promoting citizen participation by collecting feedback on the State Employment and Expenditure for Results (SEEFOR) initiative.The use of DataCrowd underscores the need for:

Implementing AI technologies like DataCrowd emphasizes the necessity for greater citizen engagement in municipal projects. Citizens' participation in providing feedback is a crucial aspect of achieving successful project outcomes.

Establishing effective feedback mechanisms is essential to gather insights from the community and monitor various aspects of a project. These mechanisms help ensure transparency, accountability, and project success.

By addressing these needs and improving capacity in these areas, cities can better leverage AI-based tools like DataCrowd to involve citizens in the decision-making process and enhance the quality and effectiveness of municipal initiatives.

AI challenges and risks in cities

Despite the potential benefits and opportunities previously discussed, cities are confronted with persistent challenges and risks in adopting AI technology.

Residents are required to share sensitive and personal data or being under constant surveillance due to the prevalence of cameras on city streets to collect data for AI solutions. This is a challenge as some of the designed solutions interfere with personal privacy. Challenges related to data also include interoperability issues (Seoul; Smart City Korea, 2021) or difficulties in integrating data from multiple sources (Espoo, Wuhou, Hong Kong SAR; O'Brien, 2020; Chen, Ran, & Gao, 2019; Hong Kong Legislative Council, 2022). Analytics for Traffic Management (Kolkata; Analytics India Magazine, 2020) also highlighted the interoperability challenges in integrating data across technologies.

The use of AI by public authorities in cities also raised questions regarding the lawfulness and effectiveness of such system in a certain context. For example, AI systems deployed in Amsterdam to detect fraud on housing rental platforms have provoked debate over whether such systems have been used legally and effectively, meaning, that they fulfil their intended purpose. Another example is the deployment of automated parking control systems on cars in Amsterdam, which have been subject to a high number of objections: Out of 551,150 fines allocated by automated scanning, 70,513 were objected to in 2019, and 66% of these objections were granted as justified by the municipality (Broem, 2021). In any given situation, a contextual assessment will be necessary to manage potential tensions, taking into account the principle of proportionality and in compliance with human rights and fundamental freedoms (UNESCO Recommendation on the Ethics of AI, 2021).

Additionally, introduction of AI into urban environments, especially when combined with technologies like IoT, Blockchain, and others, adds layers of complexity to security measures. This may lead to difficulties in ensuring robust protection. Poor infrastructure, such as unreliable internet connections and device availability, poses considerable challenges in regions like Asia, Africa, Latin America, and the Caribbean (e.g. internet connection, devices).

On the other hand, the absence of standardized AI implementation processes and a clear regulatory framework poses significant challenges to consistent and Responsible AI integration. Some cities have identified that the lack of collaboration among key stakeholders is also causing some inconsistencies in maintaining the quality of infrastructure. Securing funding is a redundant challenge raised by the cities even from high-income countries (Queensland; OECD-OPSI, 2018).

The Global Assessment not only aligns with the challenges identified during the desk review and case study analyses but also sheds light on the prevalence of these challenges (as depicted in **Figure 11**). Notably, the following key insights are revealed:

- **The lack of adequate resources** and **funding** to facilitate the adoption of AI. This obstacle affects cities regardless of whether they have formulated AI implementation plans or not. Notably, this issue is particularly acute in Latin American and Caribbean cities, where it affects a substantial 65% of respondents, and in African cities, where it affects 57% of respondents. Also, cities in the "planning" phase of AI implementation frequently cite a lack of resources as a significant barrier. This finding underscores the critical need for resource allocation and mobilization at the planning stage, as many cities encounter obstacles in translating their AI plans into actual implementation due to resource shortages.
- **Lack of awareness** emerges as another dominant challenge, primarily affecting European cities, with 45% of respondents noting it as a key hurdle. This challenge is also evident in Latin American cities, impacting 35% of respondents.

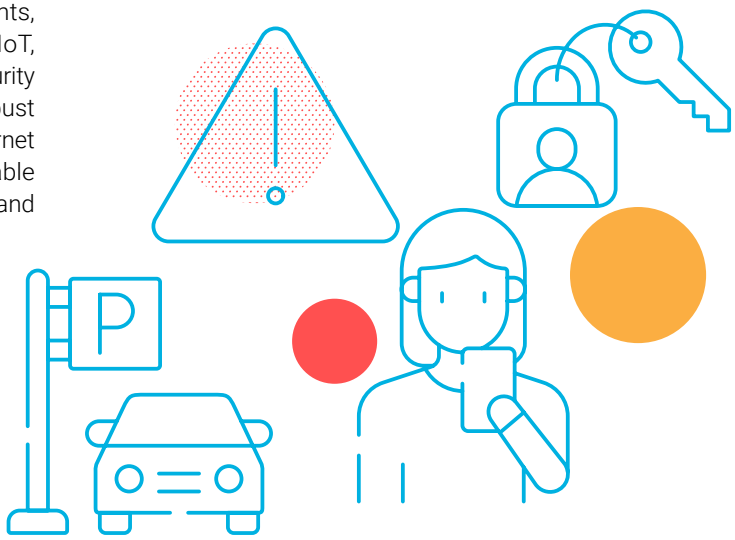
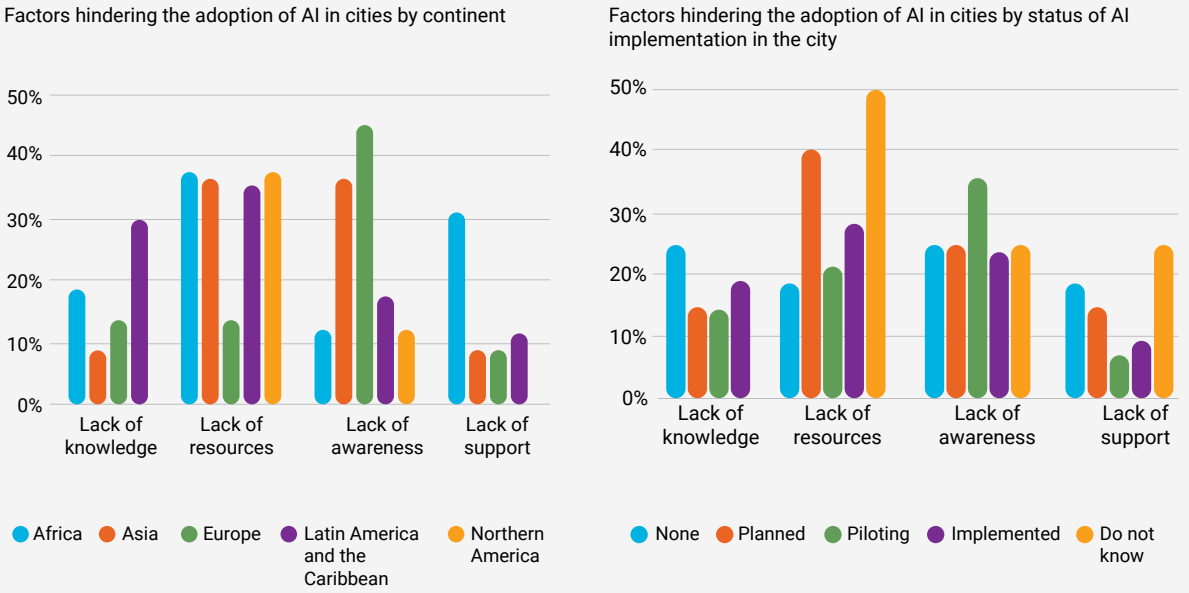


Figure 11. **Factors hindering the adoption of AI in cities.**



Introduction of AI into urban environments, especially when combined with technologies like IoT, Blockchain, and others, adds layers of complexity to security measures.

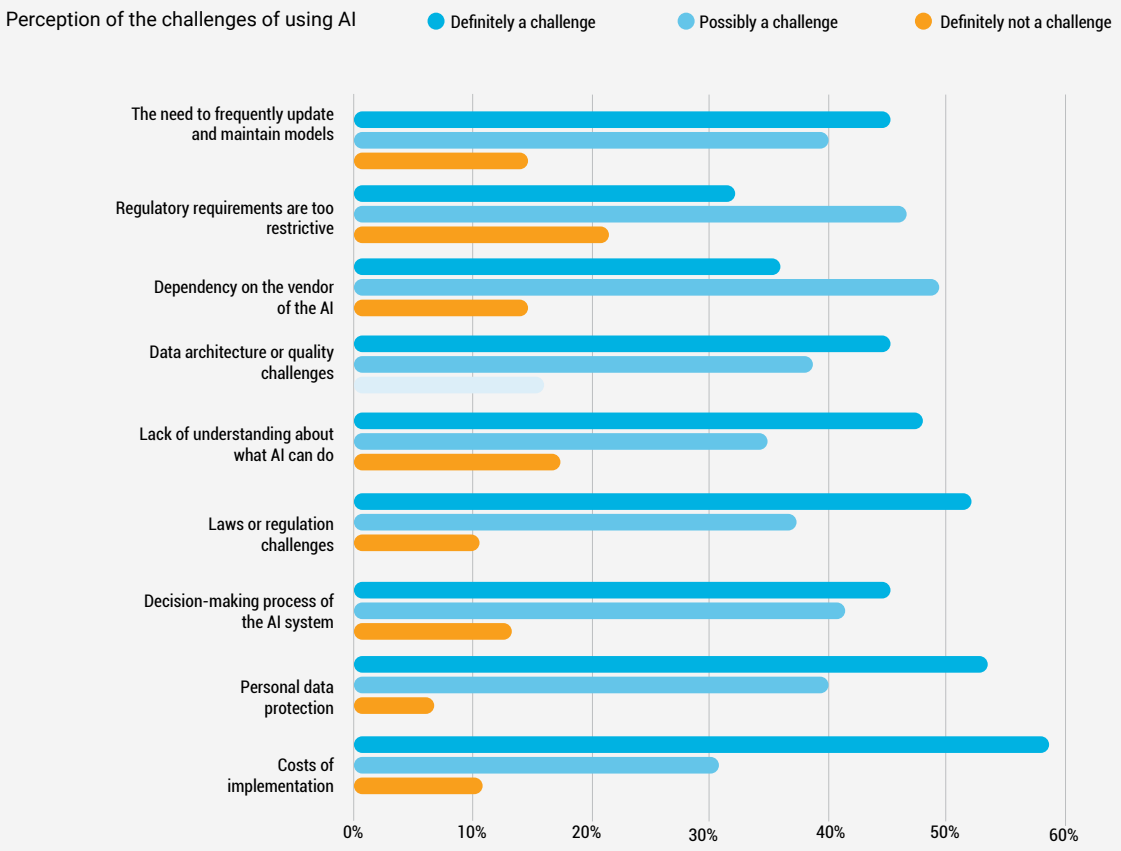
Municipalities face additional obstacles when it comes to the integration of AI, with an emphasis on the critical aspect of knowledge and expertise. This challenge is closely related to the need for a comprehensive understanding of AI capabilities and the ability to articulate the rationale behind decisions made by AI solutions. These obstacles collectively highlight a significant knowledge and skills gap pertaining to AI technology, which in turn affects its adoption, design, and effective implementation within urban settings.

Moreover, some respondents have highlighted specific challenges in the AI landscape, such as delays in model updates, data architecture or quality issues, and strictness of regulatory requirements (see **Figure 12**). These factors have a detrimental impact on the decision-making process surrounding the adoption and utilization of AI solutions. According to the respondents, the topmost challenges are as follows:

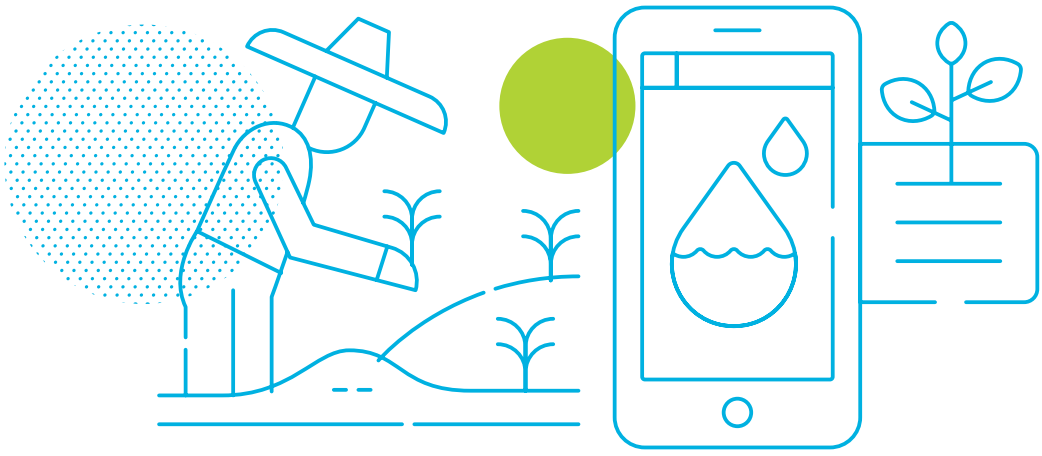
- **Cost of implementation:** A significant concern, reported by 58% of respondents.
- **Personal data protection:** Worries about safeguarding personal data, expressed by 53% of respondents.
- **Laws and regulation challenges:** Legal and regulatory obstacles, cited by 52% of respondents.
- **Lack of knowledge and understanding about AI capabilities:** A knowledge gap regarding the extent of AI's potential is a concern for 45% of respondents.

Additionally, the need for frequent model maintenance is highlighted as an ongoing challenge. These findings underscore the importance of addressing the cost-related, legal, and knowledge-based hurdles that cities face when implementing AI, with the aim of facilitating smoother adoption and more effective utilization of AI solutions.

Figure 12. Challenges of AI implementation in cities



As an example, in the deployment of an AI-enabled sowing app in the Indian states of Andhra Pradesh and Karnataka (**Box 3; UNESCAP, 2019**), project implementers encountered a significant challenge. They observed that most farmers lacked awareness and understanding of AI technology. This knowledge gap had a direct impact on how the farmers perceived and trusted the value of the AI tool. Consequently, the project implementers emphasized the importance of grassroots problem-solving and the necessity of ensuring that data standards are tailored to the local context. These considerations were deemed crucial for the effective implementation of AI in this agricultural setting, highlighting the need for localized solutions and educational efforts to bridge the knowledge gap and build trust among end-users.

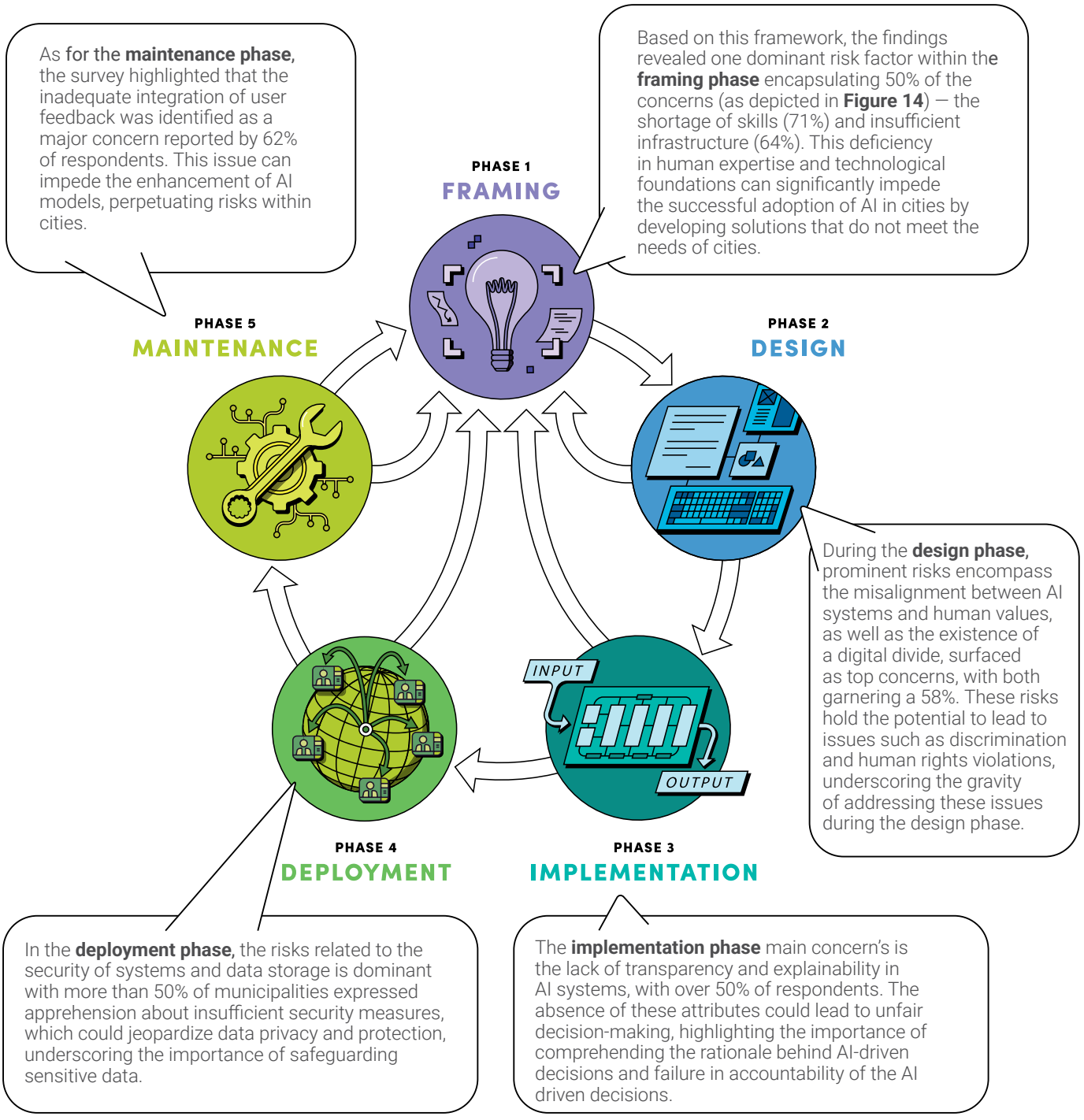


Box 3.

Challenges of AI as demonstrated in the Sowing App and Commodity Price Forecasting Model in Andhra Pradesh and Karnataka, India

Microsoft collaborated with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) to empower smallholder farmers in Andhra Pradesh and Karnataka, India, through AI-enabled agricultural solutions (UNESCAP, 2019). The initiative aimed to optimize crop yields using an AI-driven sowing app, which identified the optimal sowing week based on local rainfall data, weather forecasts, price forecasting model predicting crop yields and market prices to support government pricing policies. While the outcomes were promising, challenges emerged during implementation. The persistent issues of unreliable Internet connectivity and limited mobile phone penetration in rural areas hindered widespread adoption and accessibility of the AI tools. Moreover, farmers' limited awareness of AI technology affected their perception and trust in the solutions. Overcoming these challenges required grassroots problem-solving approaches, tailored data standards, and targeted educational efforts to bridge the knowledge gap and instill trust among farmers. The project underscored the importance of localized solutions and community engagement in integrating AI in the agricultural sector, highlighting the need for contextually relevant strategies to ensure the successful adoption of AI-driven solutions by smallholder farmers.

Along the challenges of AI implementation in cities [6], UN- Habitat proposes a framework with a set of risks that cities are likely to face through the AI lifecycle. It aims to guide cities in the process of implementing AI. It organizes AI-related risks into five distinct phases: framing, design, implementation, deployment, and maintenance.

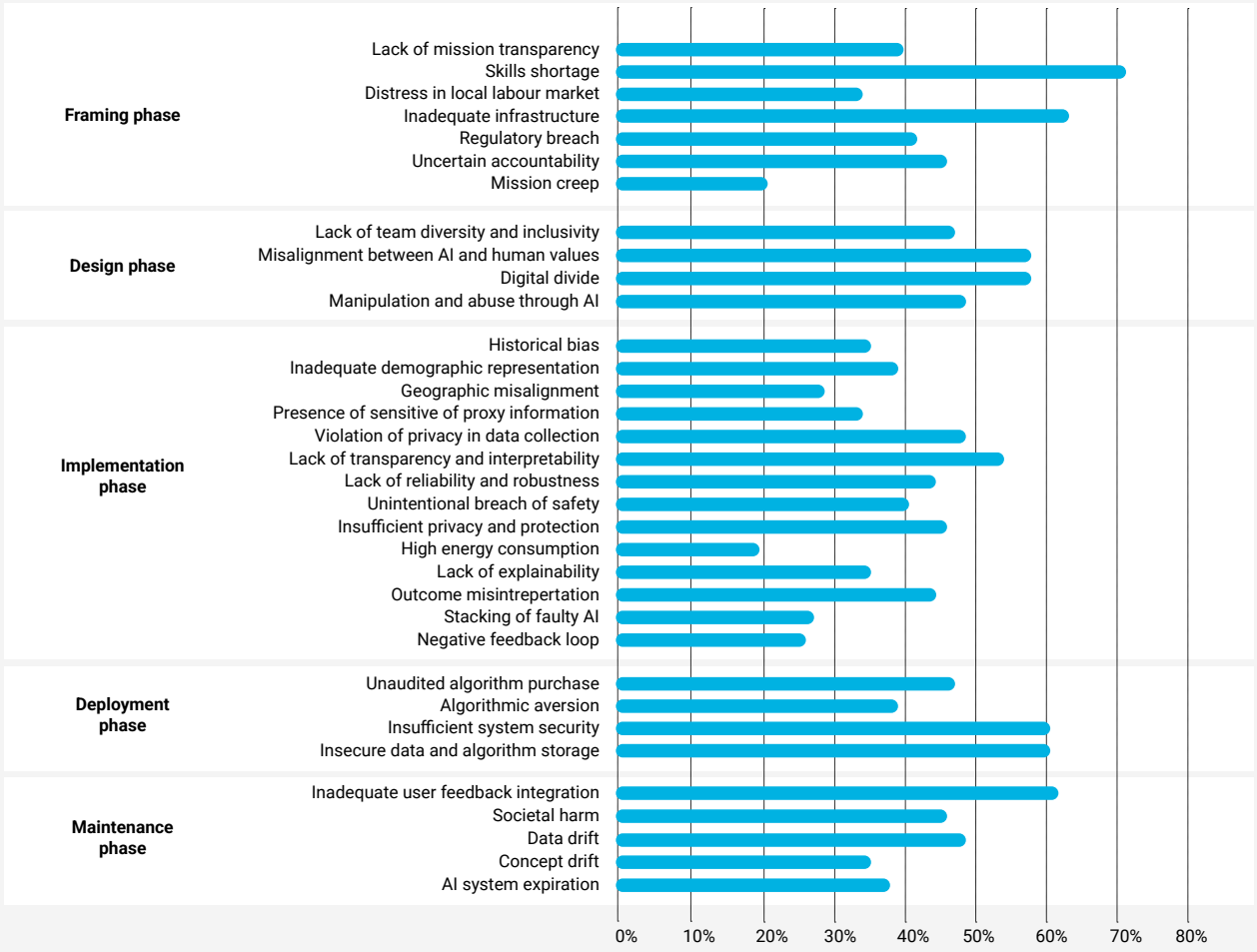


The survey's insights emphasize the need for cities to identify potential risks at every stage of AI adoption and diligently seek mitigation strategies. By addressing these challenges, cities can proactively reduce the negative implications of AI and ensure its responsible and effective integration within urban landscapes.

6 AI in Cities: Risks, Applications and Governance (UN-Habitat 2022)

Figure 13. **AI risks in implementing AI in cities.**

How does the city perceive the associated risks with AI?

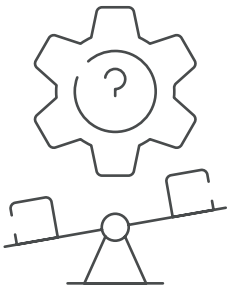


While the integration of AI in urban settings holds immense potential, it is not without its share of risks, some of which could yield significant consequences if not proactively addressed. A comprehensive review of literature and interviews with various cities confirm the risks identified by the Global survey and are highly apprehensive concerning these risks, particularly in relation to privacy and human rights. For instance, the deployment of facial recognition technology by the metropolitan police of London highlighted the risks of breaching ethical standards and human rights laws. Similarly, the Khon Kaen Smart Health model in Thailand grappled with potential privacy and security risks associated with sharing healthcare information among institutions, particularly considering the heavy workload of healthcare workers. In Sweden, the introduction of automated social assistance in Trelleborg raised concerns among social workers who feared job displacement, and observers voiced concerns about excluding vulnerable populations from the benefits of such technology.

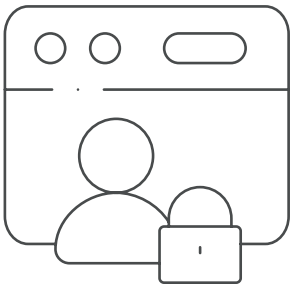
Among the top concerns associated with AI implementation are:

Misinformation and Deepfakes: The spread of false or misleading information through AI-generated content, including deepfake videos, is a source of substantial concern. Such misinformation can have far-reaching implications on public perception, trust, and even political stability.

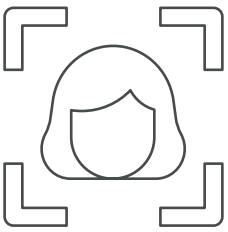
Bias and Discrimination: AI systems, if not designed and monitored properly, can perpetuate biases and discrimination, particularly in areas like hiring, lending, and law enforcement. Addressing these biases is crucial for fairness and equity.



Privacy violation: Safeguarding personal data and privacy remains a critical challenge. AI applications often involve collecting and processing sensitive information, raising questions about data protection and the potential for misuse. The use of AI for real-time surveillance, such as monitoring households with smart meter devices, raises questions about intrusions into personal lives and the potential for abuse. Even unintentional sharing of personal information by smart devices can have far-reaching consequences. Securing data and ensuring responsible data practices are critical.



Ethical concerns: The process of acquiring, customizing, or designing AI without considering contextual factors may lead to solutions that do not uphold societal ethics, norms, and values. The deployment of live facial recognition technology in public spaces is a contentious issue, and poses risks to ethical standards and human rights laws. It includes the above mentioned concerns among others.



Additional challenges arise from the deployment of AI include lack of transparency and explainability, lack of proportionality within a certain context, lack of human oversight and determination, lack of responsibility and accountability, lack of sustainability through extensive energy, water and raw material consumption.

In conclusion, the implementation of AI in cities necessitates a careful consideration of specific challenges and risks related to the technology, as they have the potential to impact human rights and fundamental freedoms, including, but not limited to, privacy, human rights, employment, and societal well-being. Addressing these is pivotal for realizing the full benefits of AI while ensuring responsible and equitable use in urban environments.

Box 4.

Risks of AI as demonstrated in automated social protection services in Trelleborg, Sweden

In the municipality of Trelleborg, a notable transformation has occurred through the adoption of AI technologies since 2016. The municipality has harnessed the power of Robotic Process Automation (RPA) to streamline and manage various aspects of citizen social assistance (Misuraca & van Noordt, 2020). This innovative approach has enabled the automated decision-making system to efficiently handle applications related to home care, sickness benefits, unemployment benefits, and tax matters. It has stood as a successful exemplar, inspiring others to explore similar possibilities. However, the initiative has not been without its share of criticisms. Social workers, who play a pivotal role in providing assistance and support to citizens, expressed apprehensions that these AI-driven tools might gradually replace them in their jobs. The fear of job displacement among the workforce remains a legitimate concern. Furthermore, external observers have also voiced their reservations. They are apprehensive that while AI can enhance efficiency, it might inadvertently exclude certain vulnerable segments of the population from accessing the social assistance they need. This exclusion raises important ethical and equity considerations when implementing AI in the realm of social services.

The case of Trelleborg highlights the complex interplay of technological advancement, workforce dynamics, and societal inclusivity. While AI has demonstrated its potential to improve processes, it also underscores the necessity for careful planning and measures to ensure that vulnerable citizens are not left behind in the pursuit of efficiency and automation.

Capacity gaps and needs

The challenges and risks associated with AI in municipalities shed light on the existing capacity gaps within cities and underscore the essential requirements to address these gaps. This report discerns several key capacity gaps from the findings:

1. **Guidelines, decision tools, and sandboxes:** Cities need well-defined guidelines, decision-making tools, and sandbox environments to assess opportunities and risks of implementing AI systems. These resources should encompass an assessment of the risks to fundamental rights and freedoms,, a justification of the choice to deploy an AI system based on proportionality, legitimacy and scientific foundations, usage protocols, and cost considerations associated with acquiring or developing AI-based solutions, prior to the acquisition and deployment of the AI system.

2. **Resource allocation for Responsible AI:** Adequate resources are vital for the responsible planning, design, and implementation of AI solutions within urban settings. This includes financial, technological, and human resources, ensuring that AI initiatives are carried out efficiently and ethically.

3. **Institutional awareness:** Building awareness among institutions and key stakeholders about the risks of AI is imperative. There is a critical need for AI awareness and proficiency. Cities require institutions dedicated to disseminating knowledge, providing guidance, and fostering a collective understanding of AI's challenges and opportunities.

4. **Digital public infrastructure support:** To bolster AI initiatives, there is a pressing need for robust digital public infrastructure. This infrastructure should facilitate data sharing, interoperability, and accessibility, providing a solid foundation for AI applications in various city services.

5. **Incentivizing open-source solutions:** Encouraging the use of open-source software and open databases on digital public infrastructure is crucial. Incentives should be in place to promote transparency, collaboration, and community-driven development of AI solutions, ensuring inclusivity and equity.

Addressing these capacity gaps and needs is essential to empower cities to harness the benefits of AI while effectively managing the associated challenges and risks. It paves the way for responsible and inclusive AI integration in urban environments.

CASE STUDY

The City of Helsinki in Finland (2020) has introduced the AI Register, a groundbreaking initiative that promotes transparent and human-centered AI integration in city governance. This AI Register is a one-stop portal that provides accessible, comprehensive information about the AI systems and algorithms used by the city government. Key features include transparency, a feedback mechanism, and accountability. The AI Register empowers citizens to stay informed about AI applications, encourages community engagement, builds public trust, and contributes to the development of AI systems that prioritize human needs. Helsinki's AI Register sets a global example for responsible and transparent AI practices in city governance.

3.3 Governance and Partnerships

AI governance, a cornerstone of Responsible AI practices, encompasses formalized mechanisms that play a critical role in adopting, implementing, and utilizing AI technologies within urban settings. These governance mechanisms such as norms, standards, regulations, procedures, roles, responsibilities, and ethical values, collectively guiding cities in planning, designing, and deploying AI to foster responsible, resilient, inclusive, and sustainable urban environments. This section delves into four interconnected aspects of AI governance and partnership, namely AI Governance, AI Strategy, AI Regulations and Policy, and the AI Ecosystem, shedding light on the strategies and frameworks that cities employ to harness the potential of AI for their communities.

AI governance

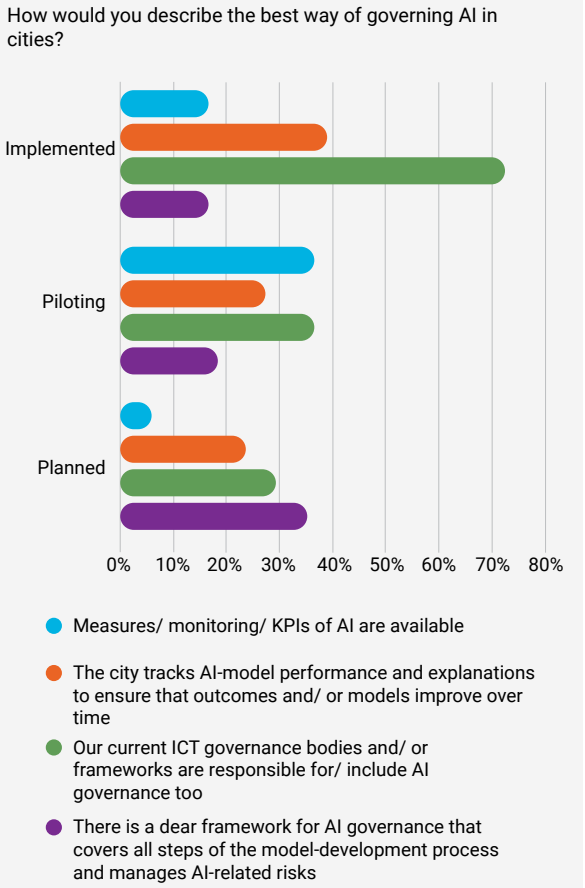
AI governance measures and initiatives encompass a comprehensive array of strategies, ethical guidelines, policies, regulations, and even legislative actions intended to provide a framework for the planning, design, and utilization of AI in urban environments. The analysis of survey results provides valuable insights into the current state of AI governance within cities.

The survey reveals that only 15% of cities with implemented or piloted AI solutions possess a well-defined AI governance framework (see **Figure 14**). Interestingly, 72% of those with implemented solutions and 35% with pilot solutions rely on existing ICT governance bodies to manage AI. This approach may prove insufficient, as AI introduces distinct challenges and risks that extend beyond conventional ICT systems. Encouragingly, 38% of cities with AI implementations actively monitor model performance and seek continuous improvement. Some cities have even proactively established Key Performance Indicators (KPIs) and measurement mechanisms for AI initiatives. These governance measures are essential to ensure the responsible use of AI despite the insufficient initiatives to establish these mechanisms in cities that plan to use AI (5%).

Notably, 35% of cities at the planning stage established dedicated AI governance frameworks, likely drawing from the valuable lessons learned by early adopters who faced challenges due to the absence of such frameworks as seen in **Figure 14**.

Findings from the Global survey (see **Figure 15**) reveal a nuanced landscape of AI governance. Notably, 61%. of

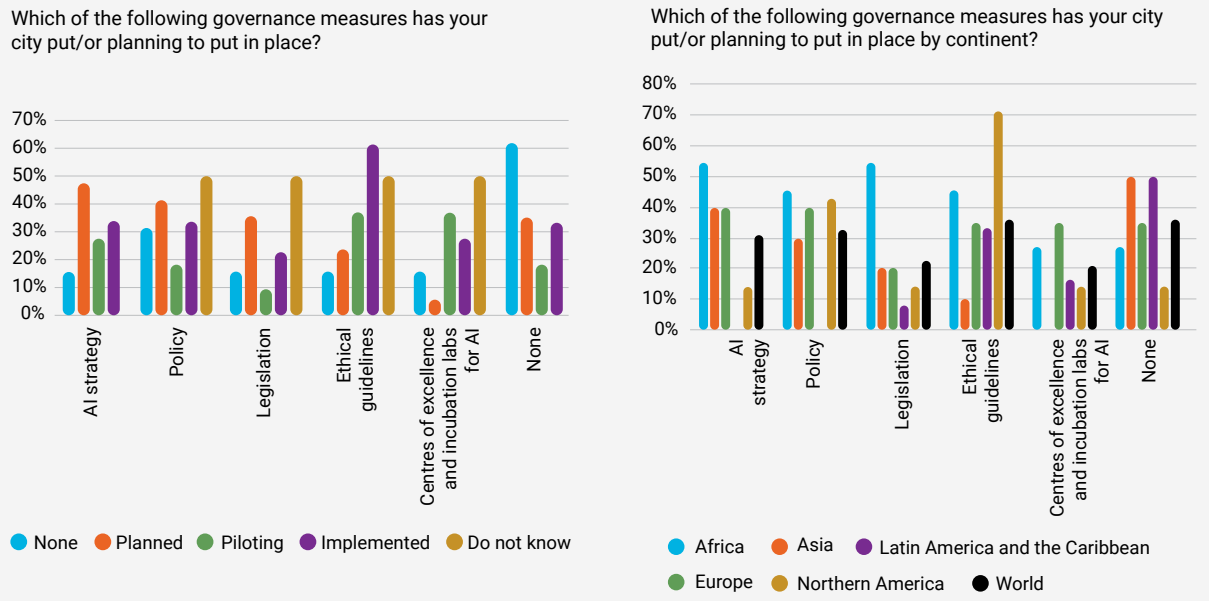
Figure 14. Ways used by cities to govern AI.



cities planning AI initiatives are yet to implement specific governance measures. Conversely, among the cities with developed AI pilots, 48% adhere to established AI strategies, while 41% have formulated dedicated AI policies. In cases where AI are already implemented, approximately 37% of cities have opted for ethical measures alone.

A significant proportion of cities surveyed across Asia and Latin America currently lack AI city-specific governance as seen in **Figure 15**. AI governance frequently follows the national authorities, who define comprehensive policies, strategies, and legal frameworks to govern AI. However, a noticeable gap exists when considering city-level guidelines and initiatives.

Figure 15. Available AI governance measures in cities

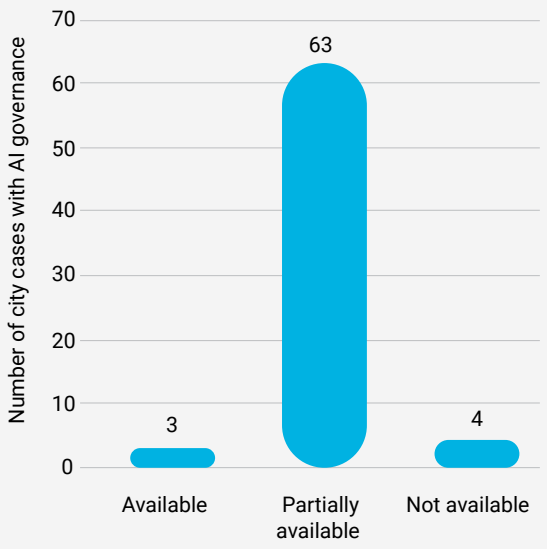


The analysis of case studies further revealed a consistent pattern in establishing AI governance for local government. Among the cities featured in the case repository, only three have taken the initiative to establish dedicated AI governance measures—namely, the Hong Kong Special Administrative Region of China and Barcelona in Spain (Hong Kong Office of the Privacy Commissioner for Personal Data, 2021; Barcelona City Council, 2021). These cities serve as exemplars in proactively shaping AI governance. Most cities included in the case repository predominantly rely on existing national AI strategies to inform and mold their AI governance approaches. **Figure 16** indicates that many cities opt for a centralized approach to AI governance, aligning themselves with the strategy, policies, and frameworks established at the national level. These findings emphasize the need for more localized and context-specific governance mechanisms.

Nevertheless, there are noteworthy instances of cities (35%) forging strategic partnerships with centers of excellence or AI incubation labs to steer their AI initiatives and establish a clear strategic direction for the implementation of AI within their urban domains. Regrettably, such collaborative approaches remain relatively scarce among cities. Similarly, from the case repository, some cities have exhibited promising partnerships with AI centers of excellence. Such instances remain a rarity rather than the norm in the urban landscape. This scarcity underscores the limited prevalence of collaborative endeavors dedicated to steering and enhancing AI governance within city environments.

Nevertheless, some cities around the world have taken proactive steps to address this gap. They have initiated partnerships with centers of excellence or AI incubation labs, focusing on the governance of AI solutions. Through these partnerships, these cities aim to articulate a clear vision and direction for designing, implementing, and utilizing AI technology within their urban landscapes. It's important to note that such actions are currently limited to a select number of cities.

Figure 16. **Number of city cases with available, partially available, and not available governance of AI (N=70)**



Correspondingly, these findings emphasize the multifaceted nature of AI governance, highlighting variations in governance approaches across different phases of AI adoption. They underscore the critical need for developing more localized governance mechanisms within cities, especially in regions where such initiatives currently lag. The lack of local governance initiatives may hinder the ability to ensure responsible and ethical AI use, raising concerns about transparency, accountability, and societal implications of AI applications.

As highlighted during the EGM discussion, the lack of AI governance at the local level may empower technology firms to dominate discussions, potentially exacerbating concerns such as diminished public trust, increased inequality, and reduced public participation. When technology firms drive AI discussions without proper governance it might prioritize profit over societal welfare. Furthermore, firms proprietary interests is making AI decision-making processes less transparent. This can lead to a lack of accountability, as proprietary algorithms may not be subject to scrutiny or audits. Companies may develop AI solutions that cater to profitable markets or niches, potentially neglecting social and economic issues exacerbating inequalities by leaving certain segments of the population underserved. When governance discussions are dominated by private entities, the public's concerns may be marginalized. This can result in biased AI systems that perpetuate discrimination.

Therefore, as cities continue to embrace AI technologies, it becomes increasingly important to establish effective governance frameworks and mechanisms that ensure AI is developed and implemented in ways that benefit and safeguard the interests of their residents and promote the responsible and equitable use of AI prioritizing transparency, and address societal issues, while also engaging a diverse set of stakeholders, including the public, in the decision-making process.

AI strategy

Effective AI implementation in cities focuses on the development of a clear and comprehensive AI strategy. This strategy can be embedded within the broader framework of a city's digital transformation strategy or its overarching data strategy, which may be set at the city or national level. In cases where the national level defines the AI strategy, it becomes important for cities to adopt and contextualize this strategy to align with their needs and available resources. However, more cities are starting to define their own AI strategy.

Analysis of the global survey responses (**Figure 17**) reveals that cities in AI adoption's planning and pilot stages predominantly rely on the national AI strategy. However, when it comes to cities that have already implemented AI, a notable 65% of them have taken the initiative to formulate their own city-specific AI strategies. This divergence may signify that cities with AI implementations have recognized the necessity for tailored strategies catering to their distinct requirements and objectives.

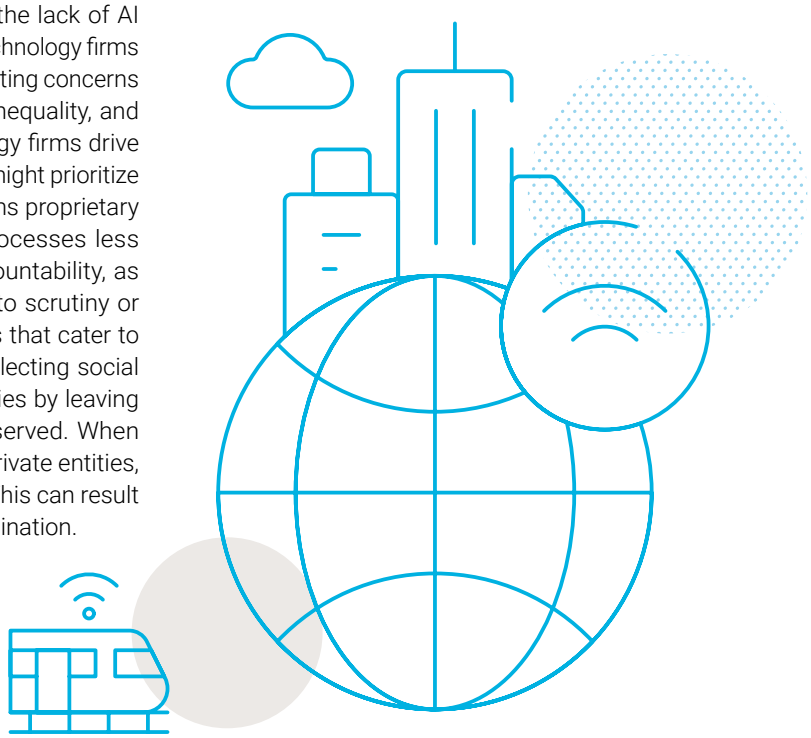
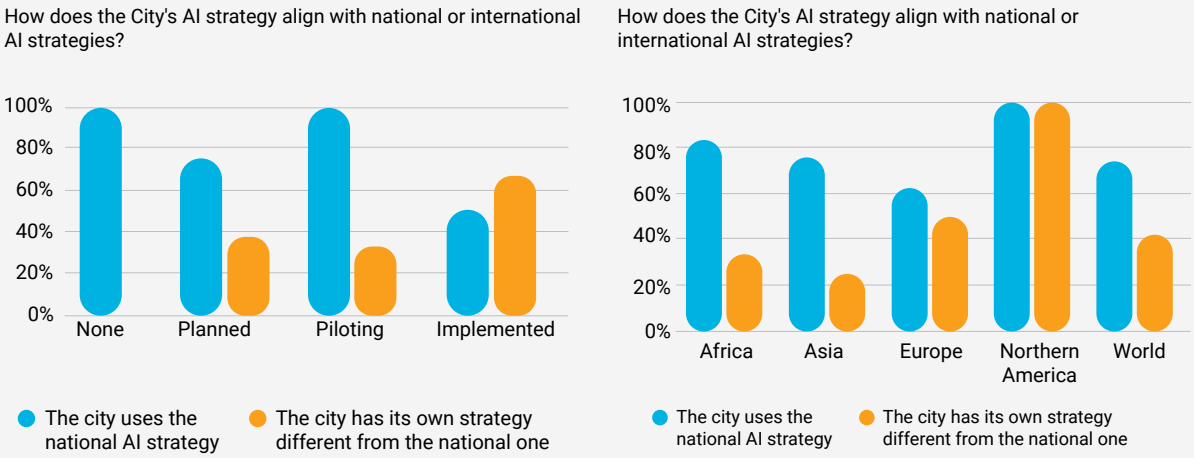


Figure 17. Alignment of city's AI strategy with national strategy

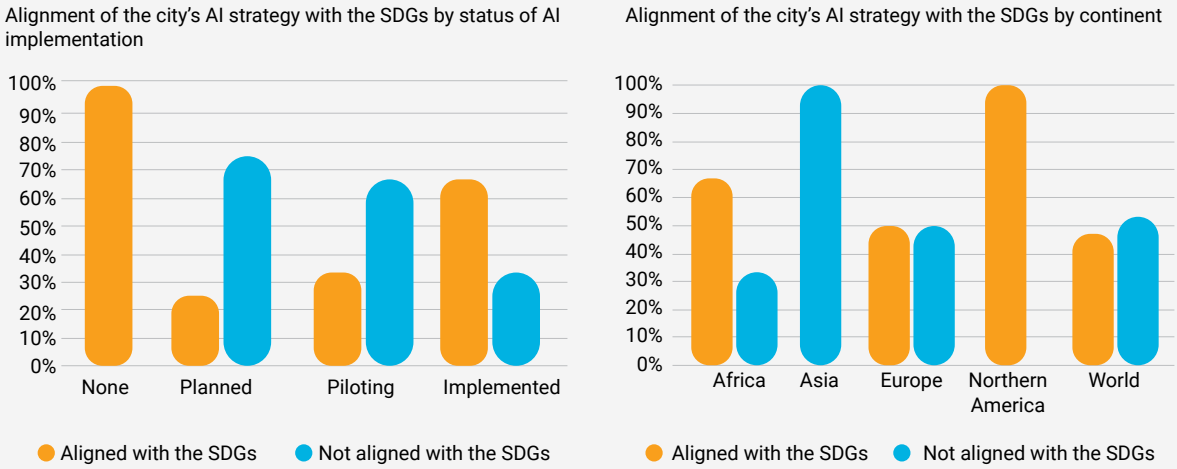


Furthermore, for an effective AI strategy, it is essential to encompass various facets that advance technology's use towards sustainable development. A critical component of these strategies is ensuring that AI promotes sustainability and contributes to the United Nations Sustainable Development Goals (SDGs). As illustrated in **Figure 18**, the alignment of AI strategies with the SDGs varies among different stages of AI initiatives.

Among planned initiatives, a mere 25% have integrated the SDGs into their city-specific AI strategies. However, in the pilot stage of AI adoption, there is a slight improvement, with 32% aligning their strategies with the SDGs. The most significant alignment occurs among cities that have already implemented AI with city-specific strategies, reaching an impressive 68% alignment with the SDGs. Notably, this alignment is more prevalent in African cities at 67% and European cities at 50%.

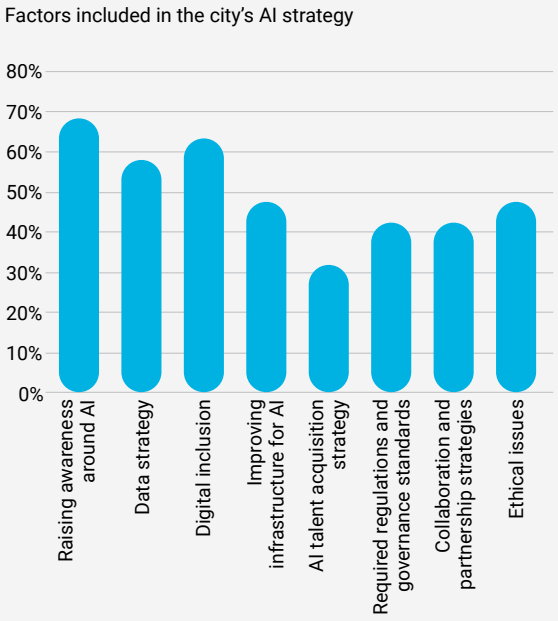
This data underscores the growing recognition that AI should be harnessed as a driver of sustainability and a means to contribute to globally agreed-upon development goals.

Figure 18: Alignment of city's AI strategy with national strategy and SDGs



As mentioned previously, a comprehensive AI strategy must encompass various parameters that support the responsible planning, design, and use of this technology. Figure 19 reveals that many of the surveyed cities, accounting for 68%, have adopted strategies to raise AI awareness and foster the technology's acceptance and utilization. Digital inclusion ranks as one of the most critical dimensions included in AI strategies, with 62% of respondents prioritizing it. Following closely is the incorporation of a data strategy into their AI strategy, mentioned by 58% of the respondents.

Figure 19: Factors included in the city's AI strategy.



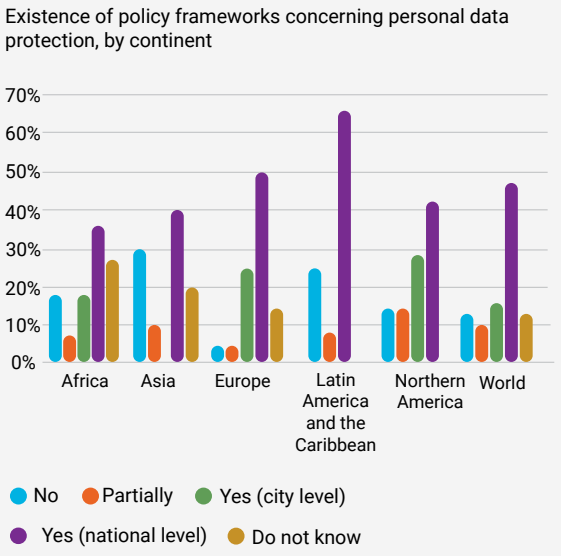
Cities also recognize the importance of addressing ethical issues, with 49% acknowledging these concerns in their AI strategies. Additionally, 47% of the cities aim to improve their infrastructure to better accommodate AI, while 42% have strategies related to the necessary regulations and standards. Collaboration and partnership strategies are a part of the AI strategy for 42% of the respondents as indicated in **Figure 19**.

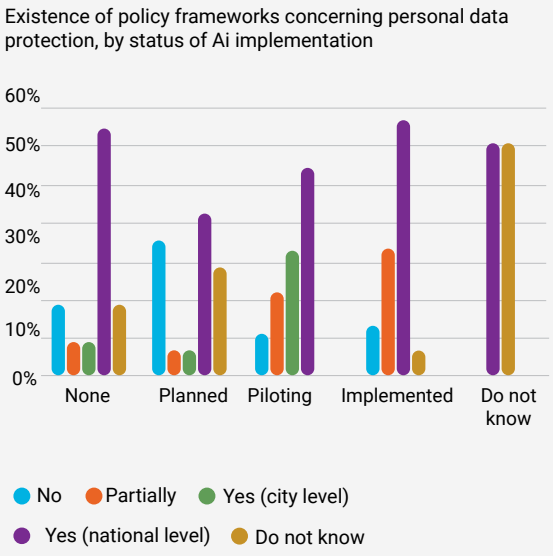
While there is widespread recognition that a lack of skills and competence poses a significant barrier to AI implementation, only a minority of cities (30%) have incorporated policies to address this challenge within their AI strategies. This gap highlights the need for more comprehensive efforts to bridge the skills and competence gap in AI adoption and implementation.

Policy and regulations

Policies are placed to enforce the governance of AI in the process of planning, designing, and using AI solutions. Policies related to AI can be stipulated in specific independently or included in other policy frameworks related to digital transformation. It is important to enforce policies about data governance, data exchange as well as data privacy in AI since the technology uses data to develop its solutions. **Figure 20** shows that most cities have policy frameworks that include personal data protection. All respondents from cities that implemented AI solutions demonstrate the availability of such frameworks in their cities with data protection components, unlike other cities that are in the process of implementing AI (**see Figure 20**).

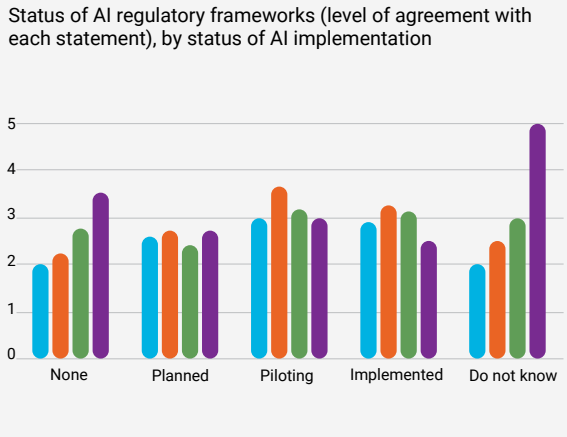
Figure 20: Results showing policy frameworks with personal data protection.

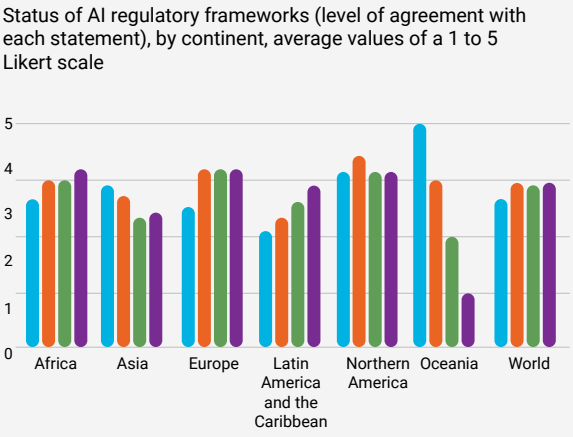




On the other hand, regulations are enacted to guide and provide accountability in the process of planning, designing, and using AI solutions. Since AI technology uses data to develop systems, it is necessary for cities to have regulations that govern the use of data for resilient, inclusive, and sustainable communities. The findings in **Figure 21** demonstrate the need for regulations and human resources to address legal challenges related to AI solutions. Thus, the technology requires legal skills and competence to adopt it responsibly.

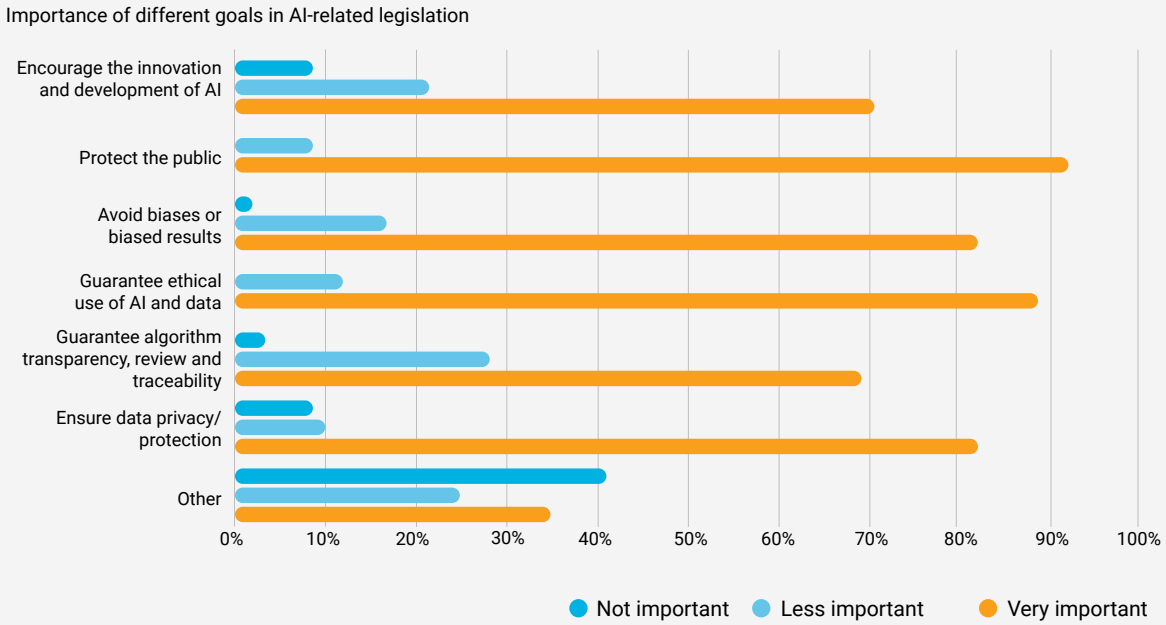
Figure 21: Status of AI regulatory frameworks in cities





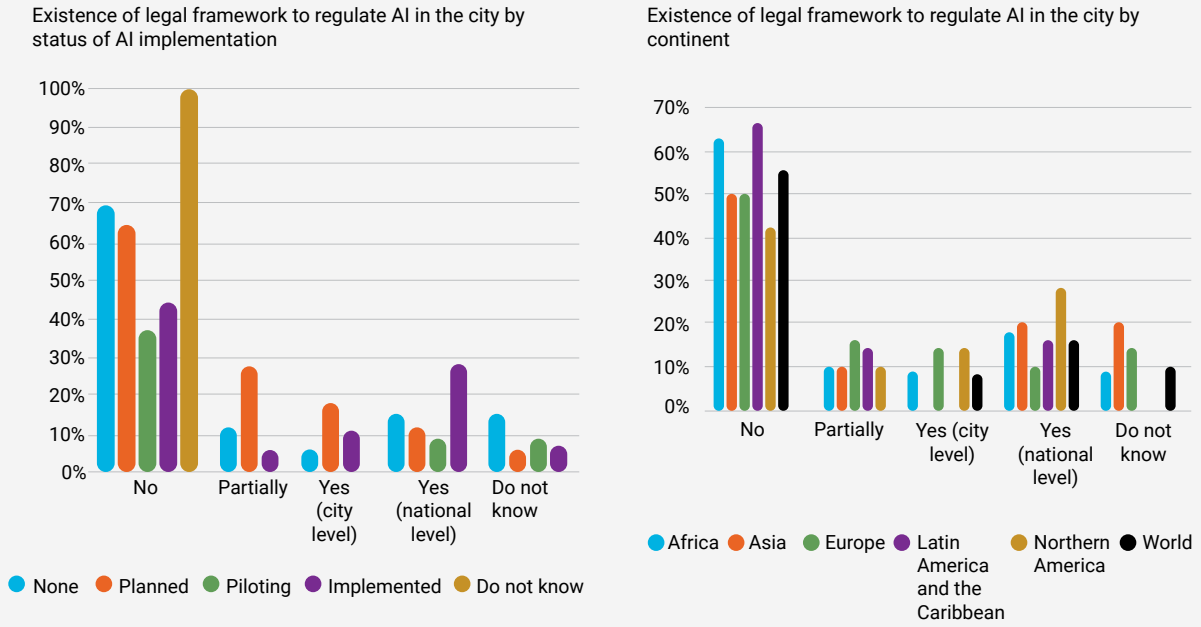
Further, AI related legislation should address some factors that promote fair communities while upholding ethical practices, societal norms, and values. The global survey explored the significant of some of these factors from cities and uncovered the high interest in protecting public interest (91%), guarantee ethical use (89%), ensure privacy (82%), and avoid biases (82%) as shown in Figure 21. These findings cement the demand for cities to use AI responsibly for better societies.

Figure 22: Goals of AI-related legislation in cities



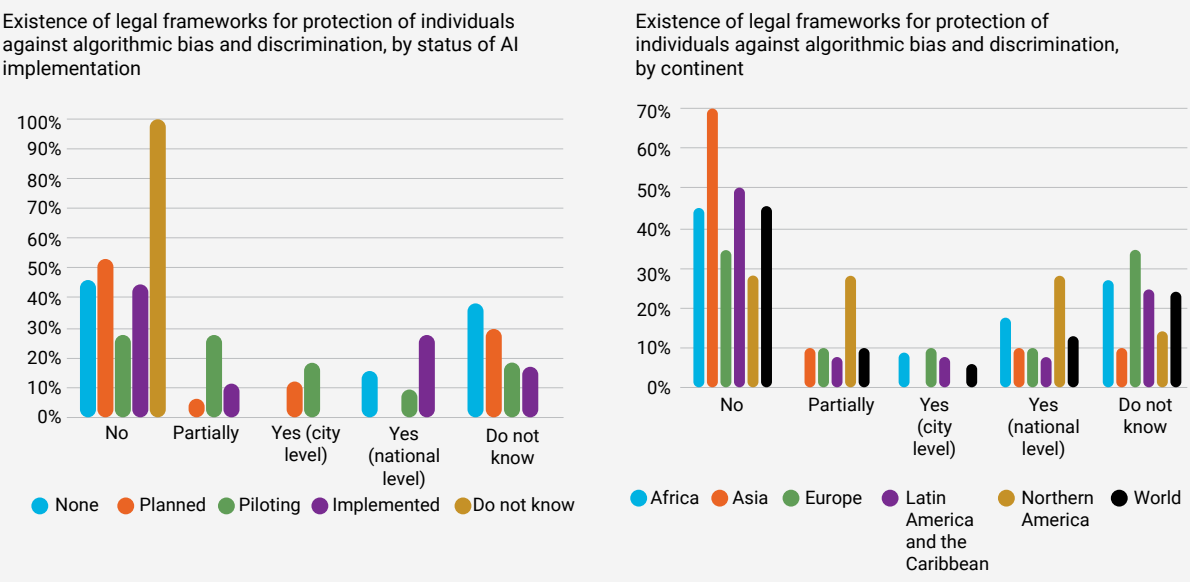
The regulation components include a legal framework that designates the required legal aspects, enforcements, and accountability related to proposed digital solutions. Due to the peculiar risks and threats posed by the technology, it is imperative to have dedicated legal frameworks to regulate AI solutions. However, the survey findings revealed a lack of such initiative from responded cities as shown in **Figure 23**.

Figure 23: Availability of legal framework to regulate AI in cities



The global assessment explored the existence of individual protection against bias and discrimination from cities with the legal framework for regulating AI. Findings uncover a lack of such enforcement at the city and local level (**see Figure 24**) despite its significance highlighted in Figure 24. Failure to address this goal in the legal framework may lead to poor accountability in designing biased AI-driven solutions.

Figure 24: Availability of legal framework to regulate AI in cities



Box 5.

AI strategy, policy and regulation as demonstrated in Barcelona, Spain

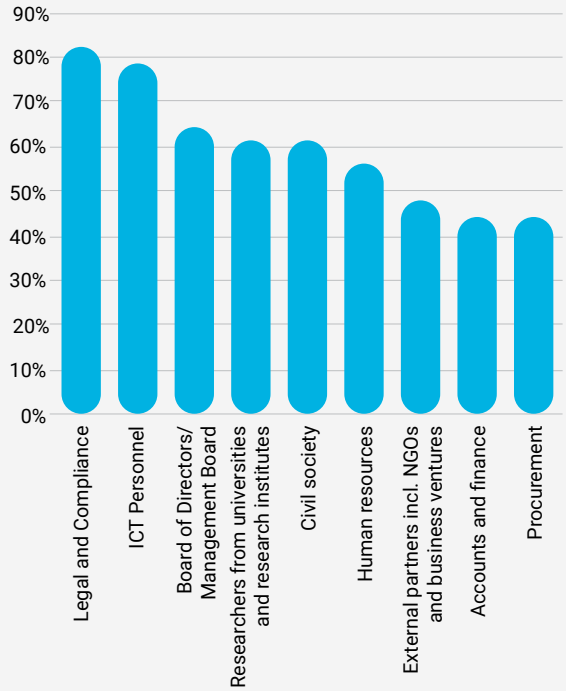
Barcelona has implemented several AI initiatives such as the Misty II social robot for improving the quality of life of senior citizens and the IRIS and MARIO systems for reporting incidents and claims (Barcelona City Council, 2020; Barcelona City Council, 2021). These local AI projects are aligned and guided by the local policy entitled **"Government measure for a municipal algorithms and data strategy for an ethical promotion of artificial intelligence".** This policy was enacted by the Barcelona City Council in 2021, and covers several areas of AI implementation, including **managing risks, ethical use, data privacy, and transparency, among others.**

AI for cities ecosystem

Creating an enabling environment that fosters inclusivity, responsibility, and sustainability in AI is essential for the successful adoption of the technology in urban settings. This is a complex initiative compelling the involvement of multiple stakeholders and requires different types of expertise. The development of a multi-stakeholder approach and collaboration, encompassing the local government entities, regulators, universities, civil society, and private sector is critical to the success of AI implementation, use, and governance. It is critical to not only identify these relevant stakeholders but also actively engage them in the formulation of regulations and policies for the city. However, involving multiple stakeholders with divergent interests can be quite challenging.

Figure 25. Stakeholders involved in AI policies

Perceived importance of different stakeholders involvement in AI policies set up (based on the % of "Very important" responses)

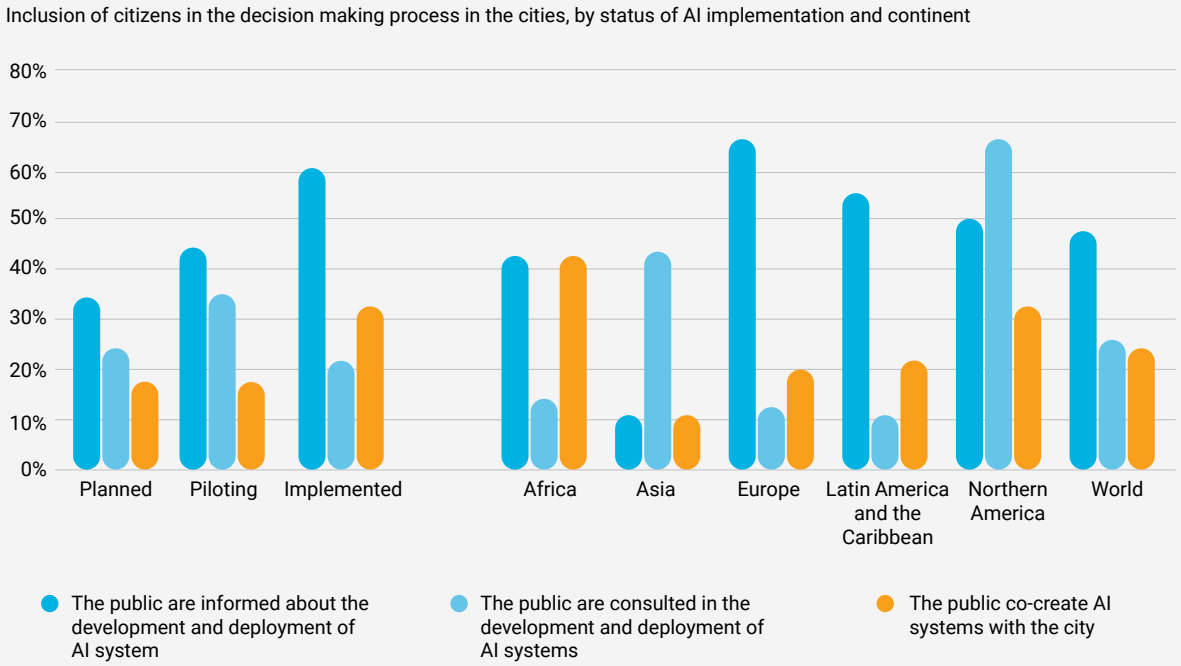


The Global Assessment's surveyed the stakeholder involvement in AI policies. The results are ranked by order of importance to highlight the role of actors in the AI ecosystem the prioritization of stakeholder involvement in AI policy development. Legal actors and regulators (81%) remains at the top the list, followed closely by ICT personnel and experts (78%). Policy and decision makers (64%) also play a critical role in AI policy formulation. Moreover, researchers and academics (61%) and citizen representatives and civil society groups are recognized as important contributors to the AI policy development process (see **Figure 25**).

However the classification underscores a global prioritization of stakeholders for legal and technical expertise in shaping AI policies at the local level over city representatives and civil society. The preference for prioritizing the establishment of legal frameworks, even if it leads to potentially slower regulatory processes compared to civil society participation, reflects the acknowledgment of the critical role regulations play in the responsible adoption of AI technologies.

Legal processes are often seen as a fundamental basis for ensuring accountability, ethics, and long-term stability in AI governance. While it is not the mechanisms, this preference acknowledges the importance of laying foundation that can guide and manage AI's evolving landscape and its societal impacts.

Figure 26. Citizens involvement in AI system development and deployment



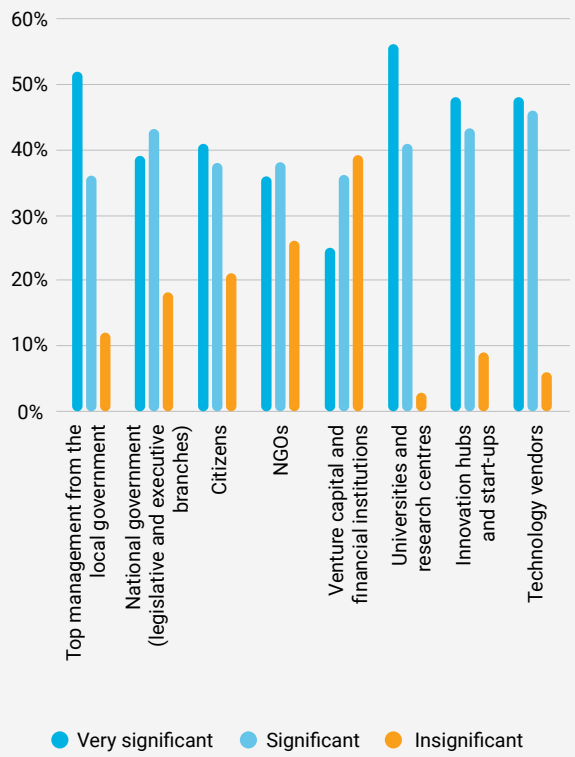
European and Latin American cities are the most proactive in informing their residents about AI development and deployment, with rates of 68% and 56%, respectively.

AI governance must actively involve citizens in the co-creation of solutions along the AI lifecycle to ensure the solutions serve the collective welfare and align with citizens' best interests. The survey findings revealed a pertinent trend in citizen engagement regarding AI systems within their cities. As AI initiatives progress through different phases, citizens are becoming progressively more informed, with awareness increasing from 35% during the planning phase to 44% during the pilot phase and significantly reaching 61% when AI is implemented. However, there remains room for greater citizen participation and engagement. For instance, only 32% of cities with AI solutions co-create solutions with citizens. This could be an effort made after lessons learned from their early solutions on the significance of co-creation.

A notable observation from the survey is the regional variation in citizen involvement, as depicted in **Figure 26**. European and Latin American cities are the most proactive in informing their residents about AI development and deployment, with rates of 68% and 56%, respectively. American cities excel in consulting their citizens during the pilot phase (68%) followed by Asian cities at 42%. Interestingly, African cities are the most active in involving citizens in the development and deployment of AI systems. This may be attributed to the fact that many African tech initiatives often originate from citizens or startups seeking to address pressing local challenges that are difficult for cities to tackle independently. These findings underline the potential for enhanced citizen engagement throughout the AI governance process to ensure the responsible and beneficial use of AI technologies in urban environments.

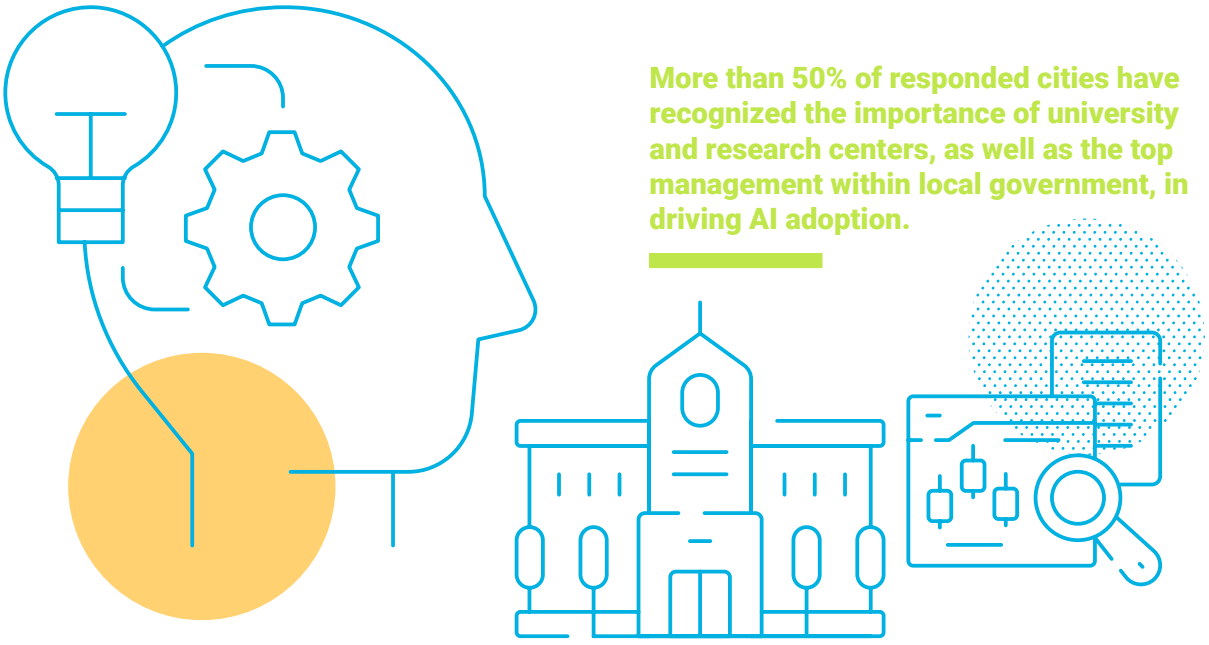
Figure 27. Significance level of stakeholders in the AI implementation.

City's relationship with different partners for AI systems



Incorporating stakeholders with diverse disciplines and backgrounds is paramount for the successful development of AI governance mechanisms influencing the wider community. The survey results in **Figure 27** underline the critical role that stakeholder relationships play in the process of AI adoption. More than 50% of responded cities have recognized the importance of university and research centers, as well as the top management within local government, in driving AI adoption. Partnerships with research institutes enable cities to explore technological solutions to societal challenges and facilitate the design and implementation of AI solutions. Simultaneously, the involvement and support of top management in local government advance the AI adoption process. Although other stakeholders were identified as significant but with lower percentages, their contributions to the success of AI projects in cities should not be underestimated, particularly the role played equivocally by the Innovation hub and start-ups, and the technology vendors (48%).

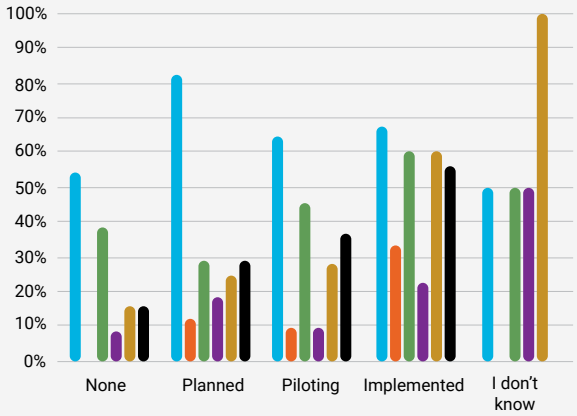
Establishing and maintaining ecosystems within cities that promote AI for sustainable development is crucial. While respondents do not predominantly view venture capital and financial institutions as significant (39%), however, the shortage of funds remains a key challenge in AI implementation. Consequently, financial support from such organizations is essential as long as it does not undermine the interests of local governments and citizens. Balancing these relationships is important to ensure that AI advances are ethically, equitably, and sustainably integrated into urban environments.



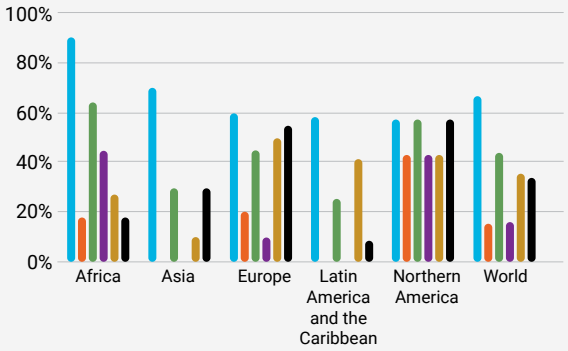
More than 50% of responded cities have recognized the importance of university and research centers, as well as the top management within local government, in driving AI adoption.

Figure 28: Status of AI ecosystem in cities.

City's partnership with external stakeholders in the implementation of AI systems, by status of AI implementation



City's partnership with external stakeholders in the implementation of AI systems, by continent



- The city is looking for partners to develop and implement Responsible AI solutions
- The city has an active program to develop and manage an AI ecosystem
- Our city promotes innovation and entrepreneurship by encouraging start-ups to support AI implementation
- We have defined responsibilities for each of the partners to ensure accountability
- Partner organisations are looking for cities to sell their AI solutions to
- Partner organisations want access to city data

- The city is looking for partners to develop and implement Responsible AI solutions
- The city has an active program to develop and manage an AI ecosystem
- Our city promotes innovation and entrepreneurship by encouraging start-ups to support AI implementation
- We have defined responsibilities for each of the partners to ensure accountability
- Partner organisations are looking for cities to sell their AI solutions to
- Partner organisations want access to city data

The study delved into the AI ecosystem within cities, examining the status of partnerships between urban centers and external collaborators. As **Figure 28** reveals, most cities seek partnerships to develop and implement AI solutions at all stages of development, with a notable emphasis on the planned phase, involving 82% of the respondents across various regions. Notably, in Africa, partners play a critical role, with 90% of respondents recognizing their significance.

Around 60% of cities that responded leverage ecosystem relationships to foster innovation, encouraging startups to contribute to AI implementation, particularly in North America and Africa. Despite its evident importance for successful adoption, only a few cities have established dedicated programs to manage their AI ecosystems. Consequently, there's a lack of clear definitions of partners' responsibilities for accountability, as illustrated in **Figure 28**, which may lead to misunderstandings within the AI ecosystem.

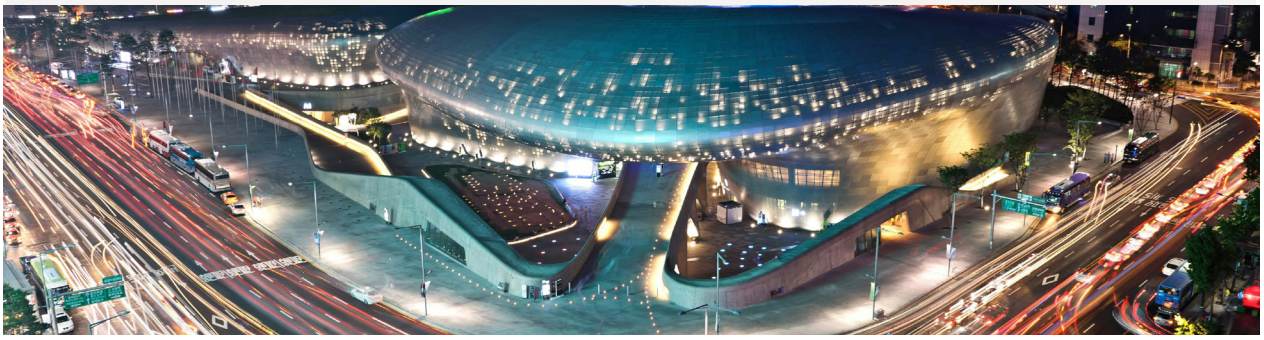
Furthermore, partner organizations are actively striving to provide AI solutions to cities, as observed in Europe. During the COVID-19 pandemic, many external partners applied AI to enhance the delivery of community services. However, these organizations often seek access to city data, potentially raising privacy concerns, especially when clear terms of understanding are lacking. The cases of the AI ecosystem in the cities of Seodaemun-gu (Seoul, South Korea) and Quezon City (Philippines) are described in **Box 6** and **Box 7** as examples of successful collaborative AI initiatives in an urban setting.

Box 6.

AI Ecosystem in action: AI speakers in the city of Seodaemun-gu (Seoul, South Korea)

In the city of Seodaemun-gu, located in Seoul, South Korea, a compelling example of the AI ecosystem at work unfolds through an innovative partnership. The city government collaborates with external experts from SK Telecom, IT firm Lucis, and social media company Kakao Talk to address a pressing issue: senior citizen loneliness, particularly among socially disadvantaged elderly individuals living alone.

The solution involves the deployment of AI speakers designed to provide companionship and support for senior citizens. These AI speakers offer more than just music; they create the illusion of having a conversation with a friend. What's more, they are equipped to recognize and respond to emergency signals promptly. This breakthrough initiative enables the delivery of personalized caregiving services to vulnerable individuals in single households, effectively mitigating the risk of solitary deaths. It exemplifies the power of AI within a collaborative ecosystem, showcasing how technology can enhance the quality of life and well-being in urban settings.



Despite the crucial role of partnerships in successfully implementing, utilizing, and governing Responsible AI, they come with their own set of challenges. As highlighted in **Figure 29**, these challenges extend beyond data access to encompass issues related to data privacy and protection, a concern for over 60% of respondents. Finding the right partners who prioritize the welfare of both the city and its citizens is another substantial challenge, with more than 55% of respondents expressing concerns. The continued responsibility of the system, from planning to decommissioning, and the need for governance mechanisms to address anomalies are equally pressing, each a concern for 45% of the respondents.

Box 7.

AI Ecosystem in action: KIRA COVID-19 chatbot and data management platform (Quezon City, Philippines)

A compelling example of the AI ecosystem at work unfolds through an innovative partnership in one of the pilot sites of the Department of Health (DOH) – Philippines for their COVID-19 chatbot and data management platform project called Knowledge Informs Responsible Action or KIRA (Distor & Moon, 2022). Quezon City actively collaborated with the national government agency to shape the early stages of the KIRA project. The project also involved collaboration with technology partners including start-ups AI4GOV, aiah, and Senti for the development of KIRA. Big tech companies like Google, Facebook, and Viber also provided advertising and platform support for the deployment stage. At the same time, international organisations like Plan International, United Nations Development Programme, and the World Health Organisation supported the implementation of the project through funding.

KIRA, launched by the DOH in 2020 to combat the COVID-19 pandemic, initially prioritized providing verified information, combatting misinformation, and facilitating connections between citizens and local health units for timely response. With over 1 million users and 1,400 local health units nationwide including Quezon City, KIRA has facilitated nearly 35 million interactions, significantly enhancing data processing and contact tracing speeds. Since 2021, KIRA has pivoted towards vaccination efforts, introducing new features like vaccine education, crowdsourced demand and hesitancy data, and citizen satisfaction feedback. Comprising a chatbot accessible via various platforms (DOH's website, Viber, and Facebook Messenger) and a real-time dashboard, KIRA enables data-driven decision-making for both national and local governments. Citizen-submitted information undergoes classification using natural language processing, with a free SMS version also available to reach those without web access, all linked to the same dashboard.

These challenges often arise due to a lack of clearly defined responsibilities within AI ecosystems, as indicated in **Figure 29**. Therefore, it is imperative for cities to establish well-defined AI ecosystems and governance mechanisms that guide their collaborative efforts, ultimately ensuring the successful implementation and ethical use of AI for the benefit of urban communities. **Box 8** illustrates the partnership challenges in the case of Copenhagen, Denmark.

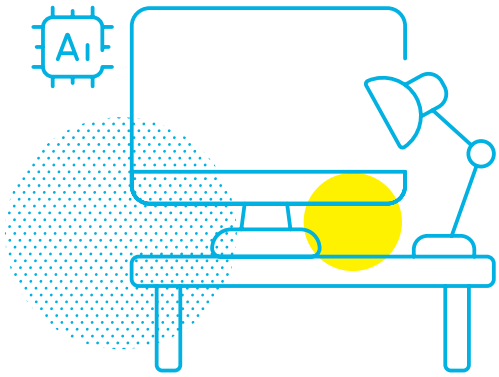
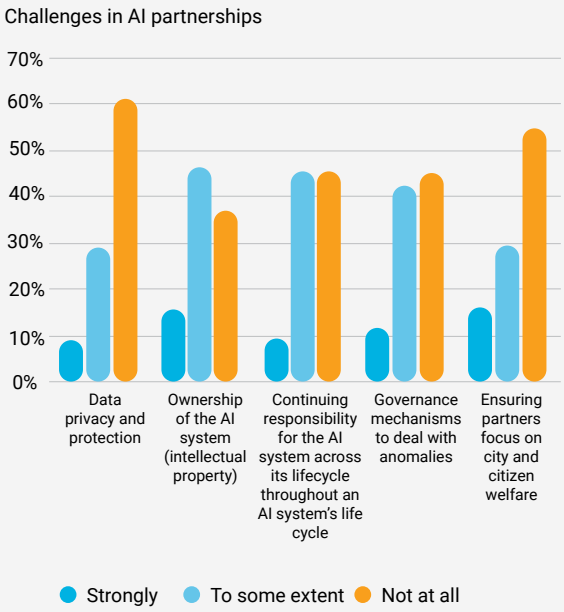


Figure 29: Challenges of AI partnership in cities



Box 8.

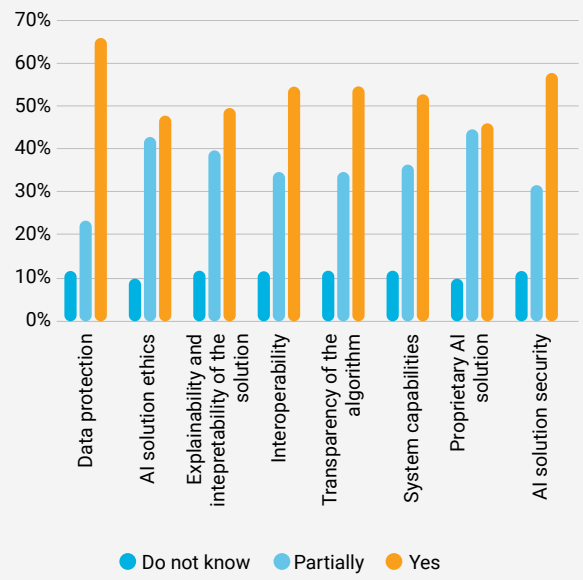
Navigating partnership challenges for AI-powered energy optimization in copenhagen

The Copenhagen Solutions Lab (2021) embarked on an AI-powered energy optimization project aimed at enhancing energy usage in buildings, with a focus on electricity and heating. The project involved a multitude of stakeholders, including Danfoss-Leanheat, Varmelast, Copenhagen Municipality, IBM, Energi Denmark, Energitnet, and others. However, effective communication and alignment among these diverse stakeholders proved to be a significant early challenge. It took approximately six months to establish a common mission and vision for all partners, with clear role definitions and reasoning—an essential step for the successful implementation of the energy optimization solution.

From a project manager standpoint	From a software standpoint
• Align interests and goals between stakeholders,these should be linked. • Be open about the needs of the market. • A good solution partner shouls also be a trusting partner. • Be open to re-formulate and adapt contracts. It is a learning opportunity for everyone.	• Look at the landscape in terms of data and hardware. • Focus and work towards a centralization strategy. • Work together with partners to try different kinds of AI technologies on a larger scale. • Work with flexibility.

Challenges within the AI ecosystem of responsible cities extend to the procurement process of AI solutions. The acquisition of AI solutions plays a pivotal role in ensuring responsible and effective AI implementation. The survey findings highlight the critical criteria that municipalities consider during the procurement of AI solutions.

Figure 30: Requirements in the procurement processes of AI solutions in cities



As depicted in **Figure 30**, all the specified requirements are given due consideration in municipal AI procurement processes. Notably, data protection emerges as the top priority, with an impressive consideration rate of 66%. Following closely, AI solution security is a significant concern, ranking at 58%. Interoperability and transparency of algorithms share equal importance at 54%. System capacities are also highlighted as crucial components, with a consideration rate of 52%.

This comprehensive focus on various criteria during AI procurement underscores cities' dedication to ensuring responsible, secure, and effective AI implementations that align with the needs and expectations of their urban environments.

The presence of a governance framework is crucial for the successful implementation of AI in cities. However, the absence of standards, regulations, or guidelines at either the national or local level raises concerns and reinforces the potential threats and risks to the community, potentially leading to project failures.

Furthermore, the analysis of case studies underscores that projects involving relevant external stakeholders were more likely to succeed. This indicates that governance, partnerships, and the involvement and collaboration of multiple stakeholders are among the best practices for AI in cities. Nevertheless, the exact role and contribution of these stakeholders to Responsible AI practices remain somewhat ambiguous.

Capacity needs in governance and partnership

1. **Operationalization of national AI governance:** Cities require the adaptation and operationalization of national AI governance initiatives at the local level, ensuring that these initiatives are relevant and effective in urban settings including regulatory frameworks, AI strategy for cities addressing challenges and opportunities, AI development, partnerships, and public procurement,
2. **Enforcement of data protection and privacy:** Mechanisms for enforcing data protection and privacy legislation must be established to safeguard citizens' rights and data in the context of AI implementation.
3. **City AI agenda:** There is a need for comprehensive city AI agendas that encompass governance, institutional design, policies, technical infrastructure, and citizen involvement to drive Responsible AI development and use.
4. **AI governance entities:** Establishing dedicated bodies or offices for AI governance within cities is essential to oversee and regulate AI initiatives effectively.
5. **Participation and involvement:** Identifying and addressing gaps in the participation and involvement of multiple actors in local AI initiatives, ensuring diverse perspectives and expertise.
6. **Awareness, training, and knowledge dissemination:** Providing resources for raising awareness, offering training, and disseminating knowledge about Responsible AI practices within cities.
7. **Sustainable AI partnership ecosystem:** Promoting the establishment of AI ecosystems and creating incentives for the sustainability of partnerships in AI development.
8. **Data governance:** Establishing data governance strategies, standards, and interoperability measures, including data reuse policies for effective data management.
9. **Accountability and risk management:** Developing mechanisms for accountability and risk management to address potential challenges and risks in AI governance within cities.
10. **Ethical guidelines:** Creating and implementing ethical guidelines and frameworks to govern Responsible AI practices in urban environments.
11. **Public partnership and procurement Models:** Developing capabilities and models for public partnerships and procurement to facilitate co-creation for Responsible AI in cities.
12. **Support for the AI Ecosystem:** Providing support and facilitation for the AI ecosystem, focusing on the development of Responsible AI solutions tailored to city needs.
13. **Policy Transparency:** Lack of transparency and accountability may lead to skepticism and challenges in gaining public trust in AI initiatives. Transparent policies are crucial for implementing and governing AI responsibly and ensuring accountability.

CASE STUDY

The Barcelona City Council in Spain has taken a proactive approach to AI governance by introducing a local policy in 2021 titled "Government measure for a municipal algorithms and data strategy for an ethical promotion of artificial intelligence." This policy serves as a comprehensive framework to guide the responsible implementation of AI within the city. It addresses multiple critical aspects, including risk management, ethical considerations, data privacy, and transparency. Barcelona's Ethical AI Policy encompasses several key components, reflecting the city's commitment to fostering a Responsible AI ecosystem. This case study highlights the significance of local governments in developing AI policies that align with ethical and societal values, demonstrating the city's dedication to harnessing AI for the benefit of its residents while ensuring transparency, accountability, and data protection. Barcelona's forward-looking approach to AI governance serves as an exemplary model for other cities striving to implement AI in an ethical and responsible manner.

3.4 AI Capabilities in cities

In the context of AI adoption within cities, capabilities are the fundamental building blocks that empower municipalities to implement AI responsibly. These encompass a wide array of essential components, including processes, tools, resources, skills, and behaviors. Together, these capabilities facilitate the successful planning, design, implementation, and governance of AI initiatives, aligning them with the overarching goals of creating inclusive, resilient, and sustainable urban environments.

Figure 31. AI capabilities to implement, use and govern AI in cities

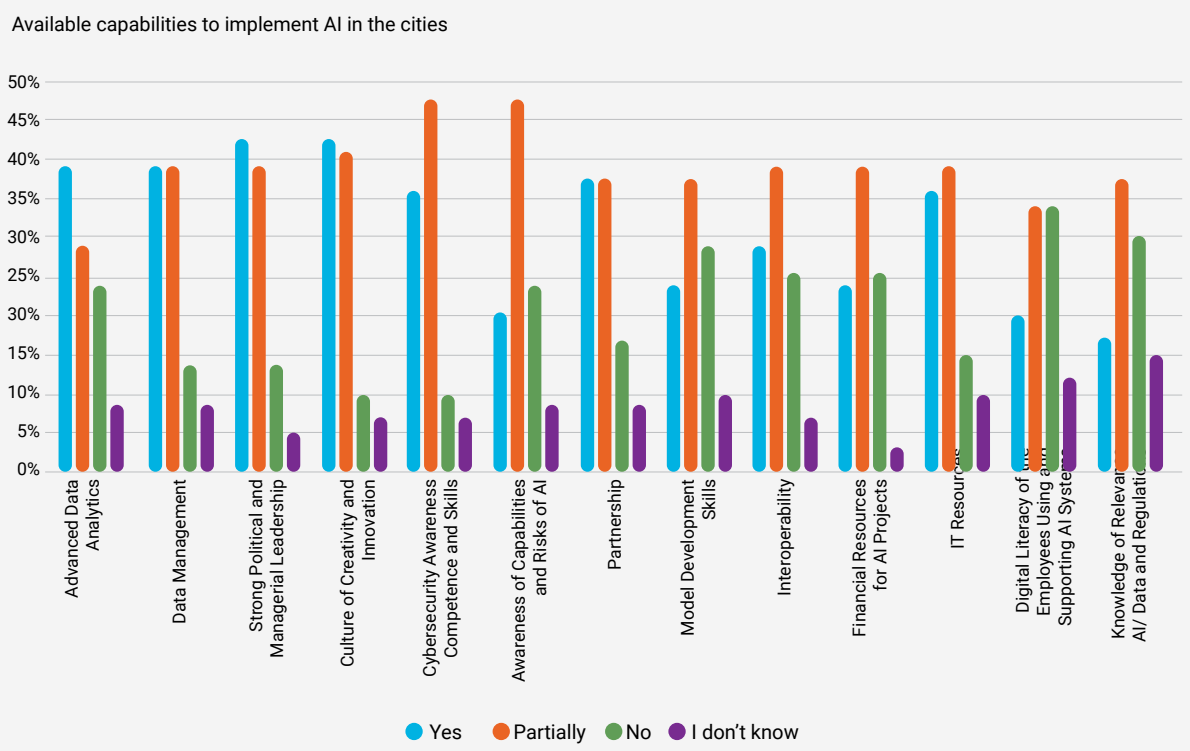


Figure 31 describes the AI capabilities for surveyed cities to successfully implement, utilize, and govern AI solutions. These capabilities serve as the foundation upon which Responsible AI practices are built in urban environments.

Notably, strong political and managerial leadership, coupled with a culture of creativity and innovation, are recognized as available or partially available by 42% of the respondents. These leadership qualities are important for steering AI initiatives in the right direction, fostering innovation, and ensuring that AI solutions align with the city's goals. Surveyed cities further highlighted the presence of creativity and innovation culture (42%) to foster the design of AI-driven solutions. Advanced analytics and data management capabilities follow closely, with over 35% of respondents acknowledging their availability or partial availability. These capabilities pertain to extracts insights, making informed decisions, and leveraging the power of AI.

The results also reveal that cybersecurity awareness competencies and skills, as well as an understanding of AI capabilities and risks, are partially available for 47% of the respondents. Given the importance of data security and risk management in AI applications, these competencies are integral for safeguarding city AI systems. Additionally, partnerships, model development skills, interoperability, and financial resources for AI projects are seen as partially available by over 35% of respondents. These capabilities underpin collaborative efforts, technological advancements, and financial sustainability, crucial for AI projects' success.

On the other hand, there are capabilities that are identified as notably absent. Digital literacy among employees, both in utilizing and supporting AI systems, is considered lacking by 34% of respondents. Additionally, 31% of respondents express a knowledge gap in understanding relevant AI data and regulations. These analyses align with the knowledge gap identified in the city's professionals.

Diverse capabilities offer a comprehensive view of the AI landscape within cities. To provide a structured understanding, we categorize these capabilities into three distinct levels: Organization, Technology, and Process. By delving into these categories, we aim to gain a deeper insight into the multifaceted AI capabilities and their role in Responsible AI adoption and utilization within urban environments.

Organisational capabilities

Municipal organizations are at harnessing the potential of AI technology to transform urban living. This transformation however, necessitates robust organizational capabilities that empower cities to not only adopt AI but to do so responsibly and effectively.

At the core of these organizational capabilities lie the skills and competencies required to support AI integration. Furthermore, they encompass the acquisition of the right talent to help municipal entities grasp and execute the opportunities presented by AI. By developing these capabilities, cities pave the way for responsible, innovative, and inclusive AI implementation that aligns with their specific urban objectives.

This section shed light on the critical facets that underpin a city's readiness for AI from skills and competencies to strategic talent acquisition.

Figure 32: Availability of AI talents and competence in cities

Talent and competencies availability in AI, by continent

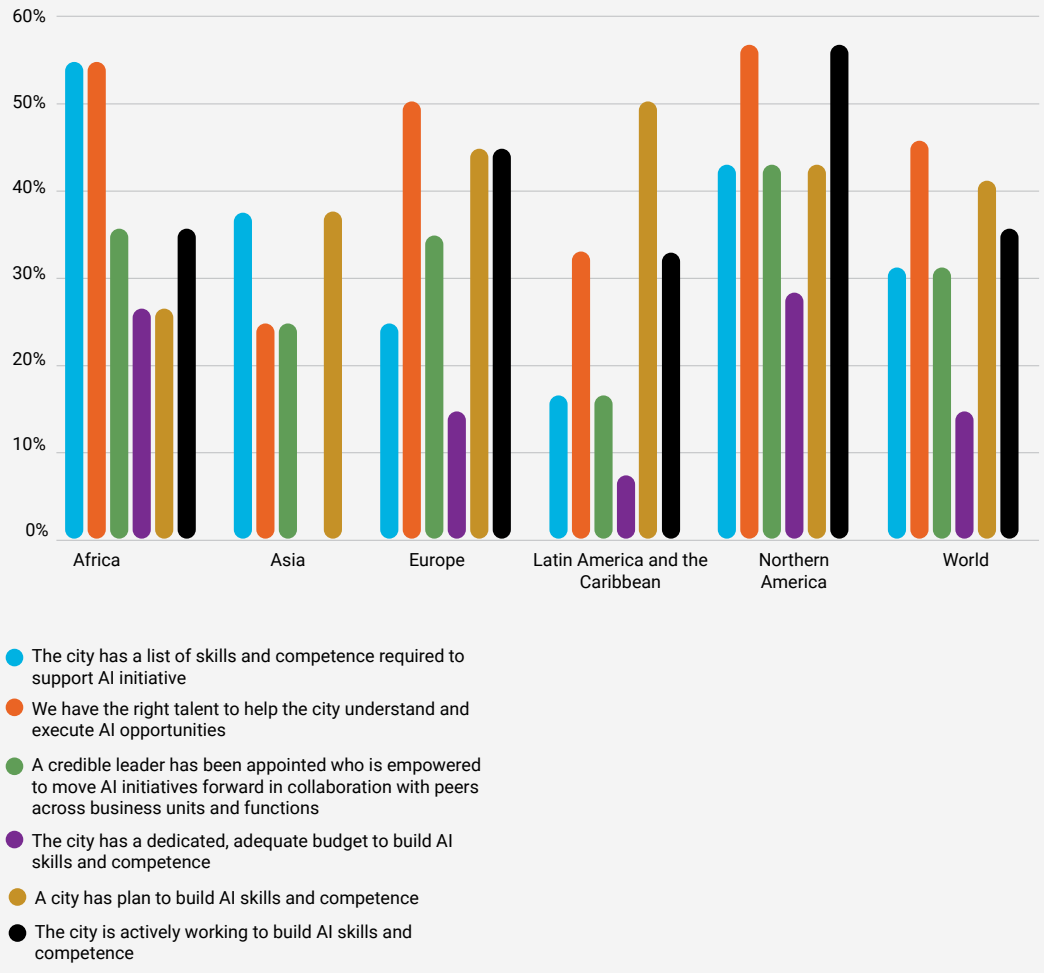
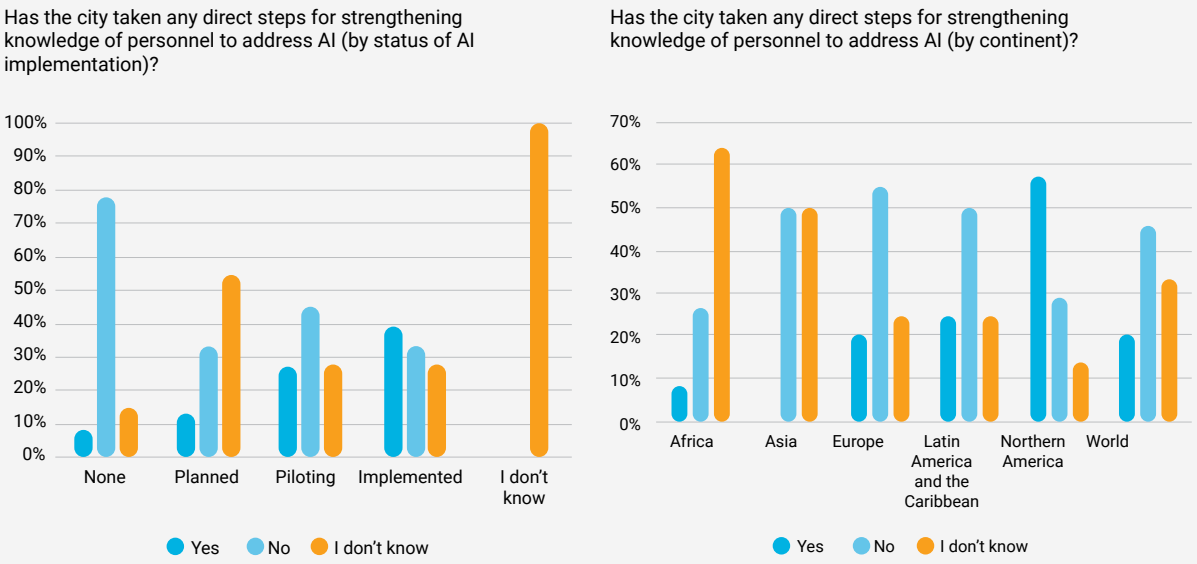


Figure 33: City's initiatives to strengthen AI knowledge.



Moreover, **Figure 33** underscores the limited number of initiatives aimed at enhancing the AI knowledge of surveyed municipal personnel, which is a critical component of Responsible AI adoption. Merely 12% of cities have concrete measures in place to strengthen the knowledge and expertise of their workforce to tackle AI-related issues. However, this figure shows promise as it increases to 28% during the piloting phase and further to 38% at the implementation stage.

It is important for AI knowledge to be instilled to cities from the planning phase. These deficiencies in most cities worldwide in initiatives geared towards providing personnel with AI knowledge and skills on a global scale may contribute to poor AI solution design and usage. European cities effort in this regards is very low with only 20% of the cities enhancing their personnel's AI knowledge. The most notable continent for these initiatives is North America, where approximately 60% of the respondents have confirmed proactive efforts to bolster the AI knowledge of their workforce. This emphasis on personnel development is essential for the effective and responsible adoption of AI technologies.

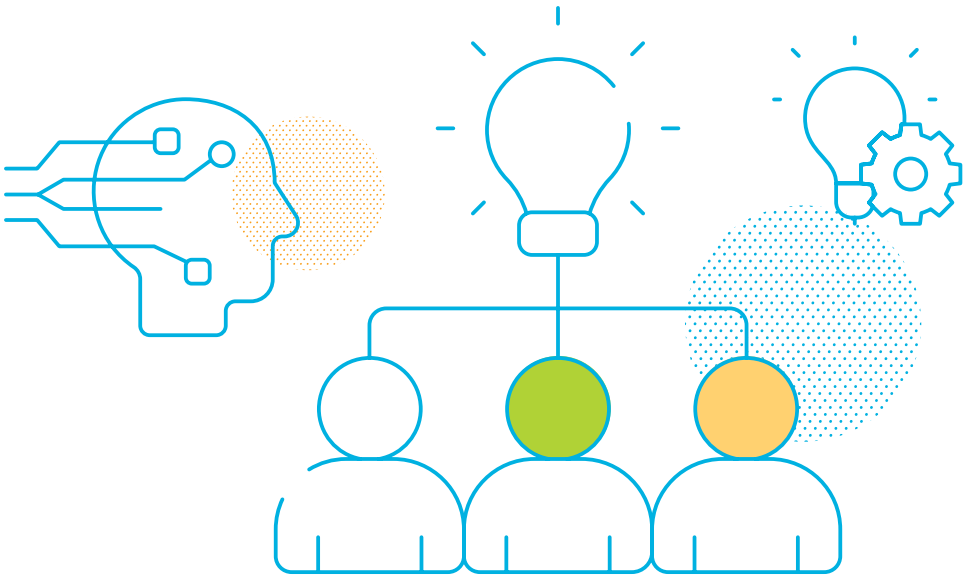


Figure 34: Ways of funding AI projects in cities

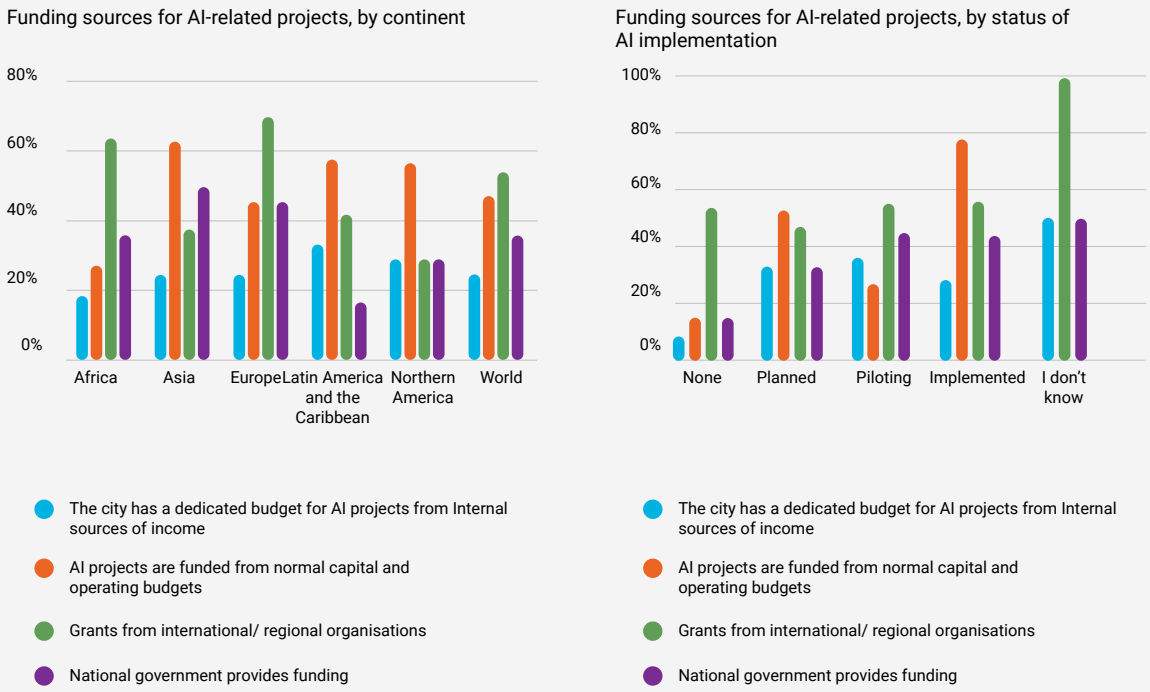


Figure 34 sheds light on the budget allocation strategies for AI projects among the. surveyed cities at different stages of AI implementation. A significant proportion of cities planning to implement AI (52%) and those actively implementing AI (79%) are primarily funding their AI projects from regular capital and operating budgets or internal sources of income. This budget allocation approach is most prominent in Asia and North and South America.

However, the reliance on internal budgets and operational income can lead to disparities among cities with varying income levels. Cities with lower income may face challenges in allocating sufficient funds for AI initiatives, potentially leaving them lagging in the adoption of AI technologies.

In contrast, a considerable number of cities, especially in Africa and Europe, anticipate funding from regional or international donors for their AI projects, with more than 50% of the respondents. While external funding can provide valuable resources, it may also introduce challenges related to project implementation and sustainability.

To ensure the successful completion and long-term sustainability of AI projects, it is crucial for cities to diversify their funding sources, accommodating the financial capabilities of different urban centers and minimizing the risk of leaving certain cities behind in the AI adoption journey.

Technology capabilities

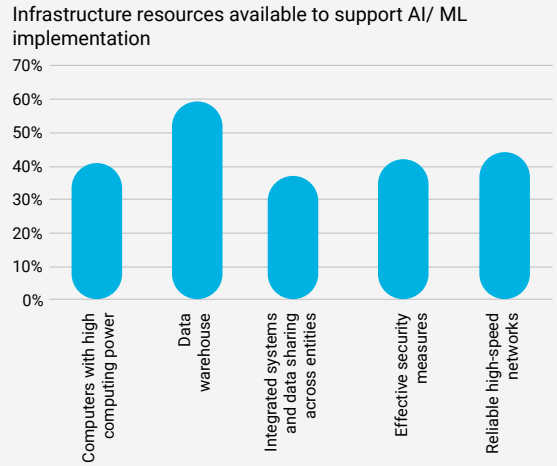
Key technological capabilities are fundamental for the successful implementation of AI in cities, encompassing various components and infrastructure necessary to support AI systems. These capabilities are part of the preconditions for ensuring AI operates effectively and securely in urban environments.

One of the critical technological prerequisites is the presence of robust data warehouses, considered essential by nearly 60% of the survey respondents. These data warehouses serve as repositories for the vast amounts of data required for AI systems to function effectively. Additionally, more than 40% of the respondents identified the need for high-speed networks, which are required to facilitate efficient data transfer and communication between AI components. However, these high-speed networks are not uniformly available across all cities, and their accessibility varies. (see **Figure 35**)

Effective security measures and high-performance computing systems are also essential technological capabilities to process and analyze data while ensuring data protection and privacy. Security measures are essential for safeguarding data and AI systems from potential threats, yet the survey reveals that a significant number of cities lack these capabilities (see **Figure 35**).

Furthermore, cities need to define data storage mechanisms and establish comprehensive data dictionaries to provide a standardized reference for data-related terms and structures. However, a considerable number of cities surveyed have yet to define these data dictionaries, highlighting an area for improvement in the development of technological capabilities (see **Figure 36**).

Figure 35: Status of infrastructure resources available to support AI implementation.



In summary, these technological capabilities are the foundational building blocks of AI implementation in cities, underpinning the effective operation, security, and accessibility of AI technologies within urban contexts.

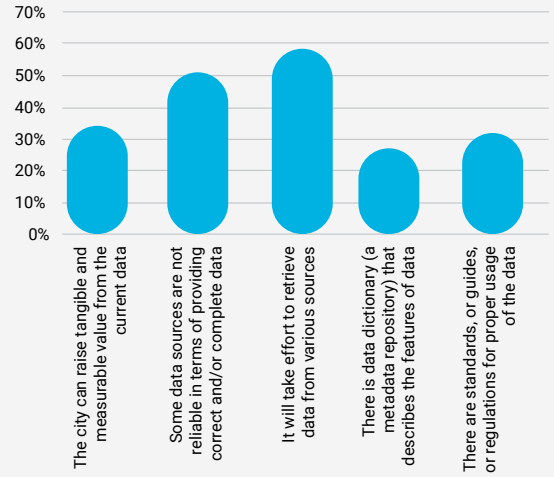
Process capabilities

Efficient AI implementation relies on well-established processes that enable easy access to data and the seamless sharing of information across various systems, fostering effective data analytics and AI integration.

As indicated by **Figure 35**, a mere 17% of surveyed cities have successfully integrated their systems and established data-sharing standards. This limited integration creates challenges in extracting data, hampering the flow of information essential for AI-driven analytics.

Also, the quality of data extracted from these systems is of paramount importance as it directly influences the effectiveness and reliability of AI applications. However, a concerning 52% of cities express uncertainty about the reliability of data obtained from their available sources, casting doubt on the trustworthiness of the information being used (**see Figure 36**).

Figure 36: Data status in cities



Moreover, the use of consistent data standards is crucial for interoperability and consistency across various data sources. Yet, only 32% of cities have defined or adopted existing standards for data usage, revealing a need for more widespread implementation of these standards to promote data integrity and interoperability within AI systems.

In summary, the absence of integrated systems, data-sharing standards, and the uncertainty regarding data reliability in many cities highlight a pressing need for improved data management practices to underpin the successful and responsible use of AI technologies. These challenges underscore the significance of robust data infrastructure in enabling efficient AI implementation within urban contexts.

To gain more insight into different AI capabilities in an actual use case, **Box 9** illustrates the case of eThekwini (South Africa).

Box 9.

Enhancing land monitoring with BEAM: a showcase of AI capabilities in eThekwini, South Africa

In partnership with the United Nations Innovation Technology Accelerator for Cities (UNITAC), the eThekwini Municipality in South Africa embarked on a transformative journey to enhance its land monitoring capabilities. This joint initiative, known as the Building and Establishment Automated Mapper (BEAM) project, was conceived to address the challenges associated with tracking rapid land-use changes within the region (UN-Habitat, 2022).

At the core of the BEAM project is an innovative tool that harnesses the power of machine learning to analyze satellite imagery and aerial photographs. The primary goal is to expedite the identification of informal settlements and structures, a process that was traditionally time-consuming and resource-intensive. By employing AI-driven technologies, eThekwini Municipality significantly accelerates the identification and tracking of land-use changes, ultimately leading to more agile and informed decision-making.

The BEAM project also prioritizes knowledge and skill transfer. This knowledge-sharing aspect ensures that eThekwini's existing system architecture can seamlessly accommodate the new model. The project's success hinges on the effective assimilation of AI capabilities within the municipality's operations.

The objective of BEAM is to equip the local government with a powerful tool for more precise and efficient urban planning. By rapidly identifying informal settlements and evolving land-use patterns, eThekwini can better target upgrading initiatives and service delivery interventions. This, in turn, enhances the overall effectiveness and efficiency of government services and interventions.

Recognizing the importance of ongoing learning and collaboration, the BEAM project has established an Advisory Committee. Comprising various stakeholders and partners with vested interests, this committee will continue to benefit from the project's insights and experiences as it moves through the implementation phase.

The BEAM project exemplifies how AI capabilities can drive transformative change within a municipality. By combining technological innovation, knowledge transfer, and collaborative governance, eThekwini is poised to leverage AI to address pressing urban challenges and improve the quality of life for its residents.

Capacity gaps and needs

1. **Identification of priority skills and competence:** There is a pressing need to identify and prioritize the specific skills and competencies at the organizational, process, and technological levels that are crucial for the responsible design, implementation, use, and governance of AI in urban environments.

2. **Defining adequate business models:** A need exists for defining appropriate business models that support the responsible adoption of AI across its lifecycle in cities. The development and implementation of such models are critical for sustainable AI integration.

3. **Co-creation and co-design approaches:** Cities should adopt co-creation and co-design approaches for AI solutions establishing a systematic methods for end-user participation . This method promotes collaborative efforts to develop AI technologies, fostering innovation and addressing unique urban challenges. This approach ensures that AI solutions are designed with the direct input of those who will use them.

4. **Enhancing security measures and cybersecurity guidelines:** The demand for increased security measures and competencies is essential. Developing robust cybersecurity guidelines tailored for Responsible AI in cities is crucial to protect against potential threats and breaches.

These capability needs underscore the importance of a strategic and holistic approach to building AI capabilities within cities. Addressing these gaps will enable urban environments to harness AI's potential for responsible, inclusive, and sustainable development.

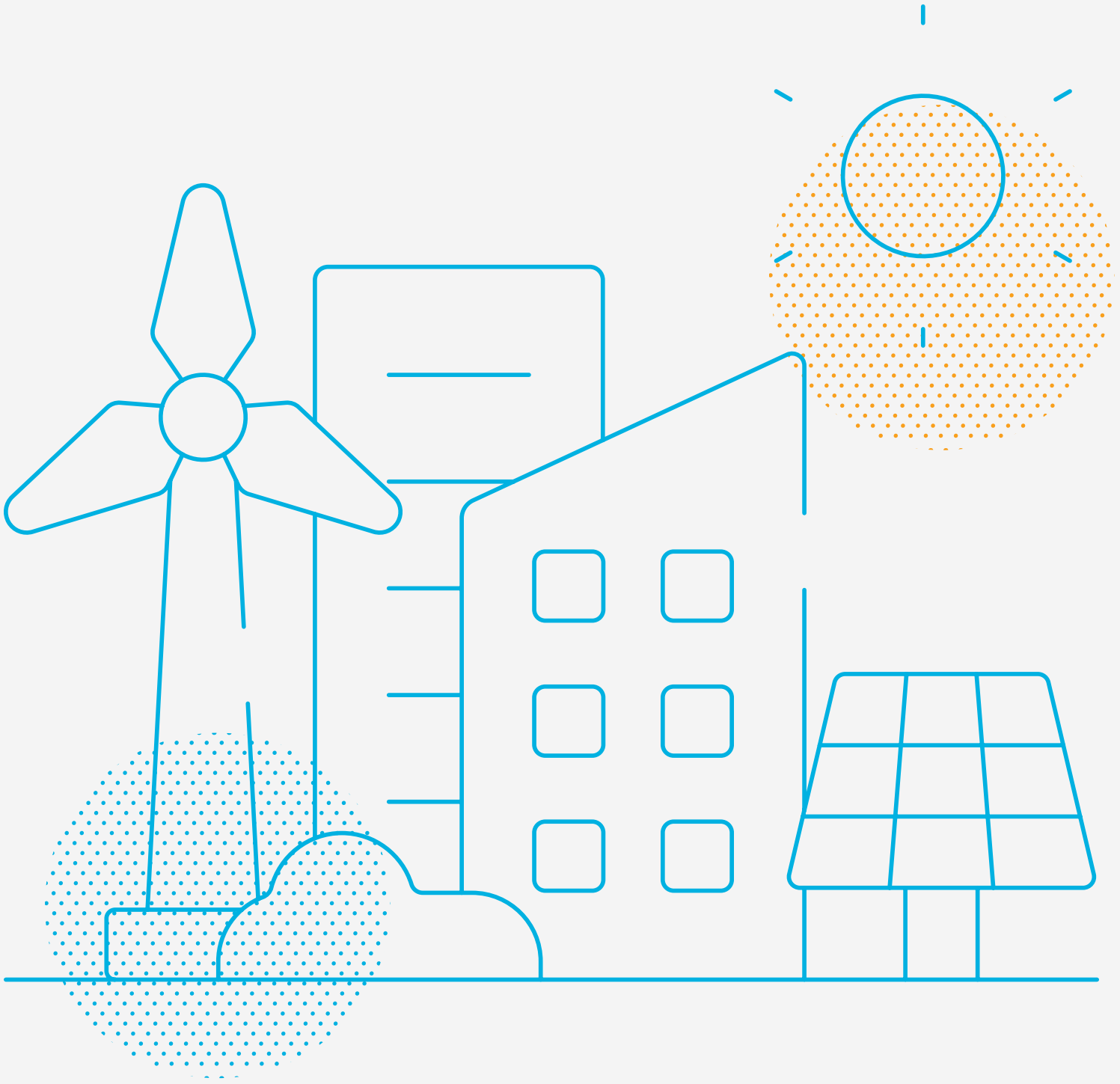
CASE STUDY

The city of Belo Horizonte has implemented a notable Cloud data analysis project that spans various municipal departments. With support from the municipal public company and a private cloud infrastructure, this initiative aims to enhance decision-making processes within the city. Notably, experiences related to decision-making during the COVID-19 pandemic played a pivotal role in shaping this endeavor.

To bolster the project's success, the municipality initiated internal workshops to train its professionals. This approach allowed the dissemination of both technical and procedural capabilities among public servants. The outcome of these efforts was the emergence of a new pilot project, focusing on AI initiatives that leverage the city's organizational resources and involve "business process" owners. Belo Horizonte's journey underscores the city's commitment to building AI capabilities and fostering a data-driven decision-making culture. This case study exemplifies the significant impact that targeted capability-building initiatives can have on the responsible

04

AI for Resilient, Inclusive, and Sustainable Cities



Amidst the expanding urbanization, the imperative for cities to become resilient, inclusive, and drivers of sustainable development has never been more pronounced. The rapid pace of urban growth necessitates cities' capacity to proactively prepare for future challenges in the economy, environment, governance, and society.

In this context, it's critical to acknowledge the digital divide and gender disparities in technology access and utilization, which are more pronounced in some regions than others. Bridging these gaps is essential for fostering truly inclusive and sustainable urban communities.

Artificial Intelligence emerges as a transformative opportunity, offering tools and techniques to tackle pressing urban challenges. These AI-driven solutions for cities hold the potential to create a substantial impact, not only on economic vitality but also on environmental sustainability and societal well-being. This section captures AI's role in building resilient, inclusive, and sustainable cities, exploring the innovative approaches, strategies, and initiatives for urban future.

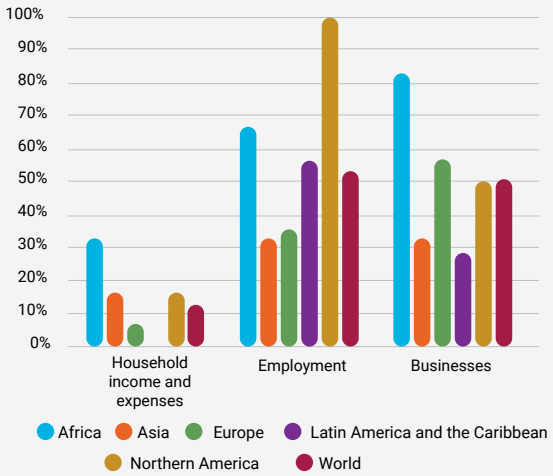
Economic sustainability

The economic sustainability findings emphasize the significant contribution of AI in cities to areas such as employment and business growth, as illustrated in **Figure 37**. It's worth noting that, despite prevalent concerns regarding job displacement due to AI adoption and implementation, a majority of cities across the globe, especially in regions such as Africa (68%) and Latin America and the Caribbean (58%), are actively harnessing AI's potential to bolster their business ecosystems.

The African continent, in particular, stands out with a remarkable 82% of cities embracing AI to drive business-related initiatives, while European cities are also prominent in this regard at 58%. This trend underscores the pivotal role of AI in fostering economic sustainability and job creation, challenging the prevailing fears of job loss and highlighting the technology's capacity to fuel business expansion.

Figure 37. AI contribution to economic sustainability

Areas in which AI adoption coontributes to economic sustainability,by continent



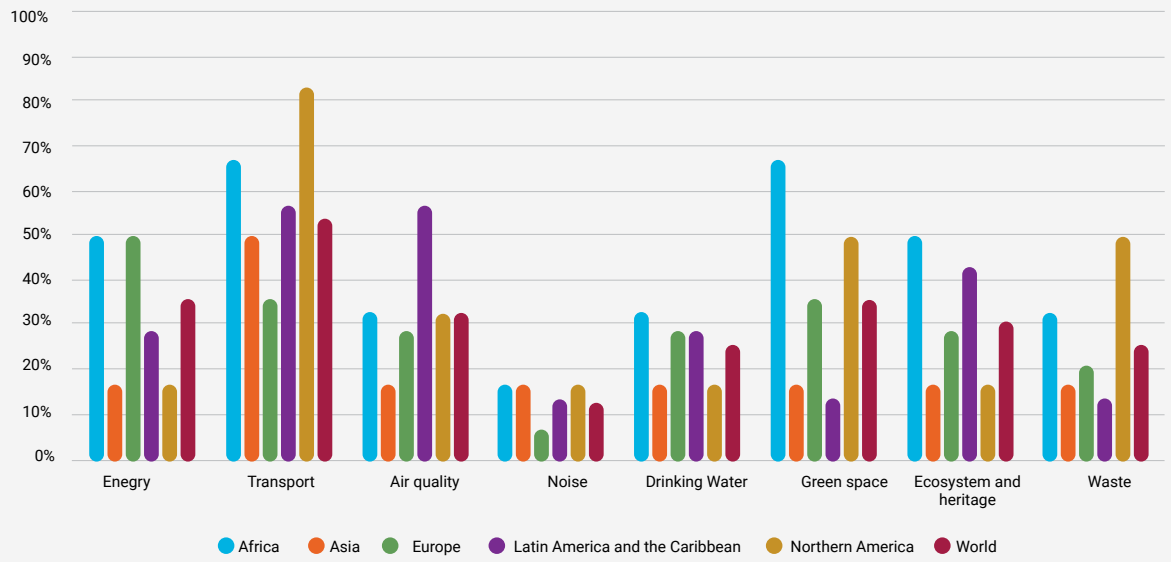
Environmental sustainability

The growing environmental challenges faced by cities, exacerbated by increasing population size and density, have put urban areas at greater risk of air, land, and water pollution. The far-reaching impacts of climate change further intensify these challenges, affecting cities worldwide as well as the surrounding rural areas. In response, numerous AI projects within cities have emerged to address various environmental issues, encompassing areas like waste management, air pollution reduction, energy consumption optimization, and broader environmental monitoring. An example is presented in **Box 10**.

65

Figure 38. AI contributions to environmental sustainability

Areas in which AI adoption contributes to environmental sustainability, by continent



The far-reaching impacts of climate change further intensify these challenges, affecting cities worldwide as well as the surrounding rural areas.

As depicted in **Figure 38**, existing AI applications in surveyed cities are actively engaged in mitigating environmental concerns. Of primary focus of cities worldwide is the management of transport-related pollution and traffic for more than 68% of the respondents from African cities followed closely by American cities with 56% and Asia with 50%, reflecting the critical need to enhance urban mobility while minimizing its environmental footprint. Latin America cities highlighted the importance of air quality 58% as well as green spaces 50%. Additionally, energy consumption and monitoring are addressed to a lesser extent, with cities increasingly adopting AI solutions to combat environmental challenges and create more sustainable and livable communities such as African and European cities for 50%. North American Cities 50% are adopting AI to contribute to ecosystem and heritage more specifically.

AI could show important potential in environmental crises in several other areas such as water scarcity or climate change impact in combination with other technology such as IoT.

Box 10:

BencanaBot - Harnessing AI for urban resilience in Jakarta, Indonesia

In the city of Jakarta, Indonesia, Yayasan Peta Bencana, a dedicated disaster relief nonprofit, has pioneered the use of AI through the BencanaBot (Diwakar, 2021). This AI-assisted chatbot empowers local communities to actively contribute to disaster management, integrated into popular messaging platforms, including WhatsApp, Twitter, Facebook Messenger, and Telegram. Its primary function is to guide and assist locals in submitting real-time disaster reports through BencanaBot are instantly mapped on the PetaBencana.id platform, providing a live and comprehensive overview of the unfolding situation. The chatbot ensures inclusivity by allowing anonymous reporting, fostering engagement from individuals who might be hesitant to disclose their identity, particularly in underfunded communities. The platform serves as a coordination hub where community members can access and share critical updates. This facilitates informed decision-making for safety and response efforts. BencanaBot enables the collection of collaborative evidence verified by government agencies, enhancing the reliability of the information shared on the platform. BencanaBot boasts an intuitive design, making it accessible to users with varying levels of technological proficiency reaching all segments of the population.

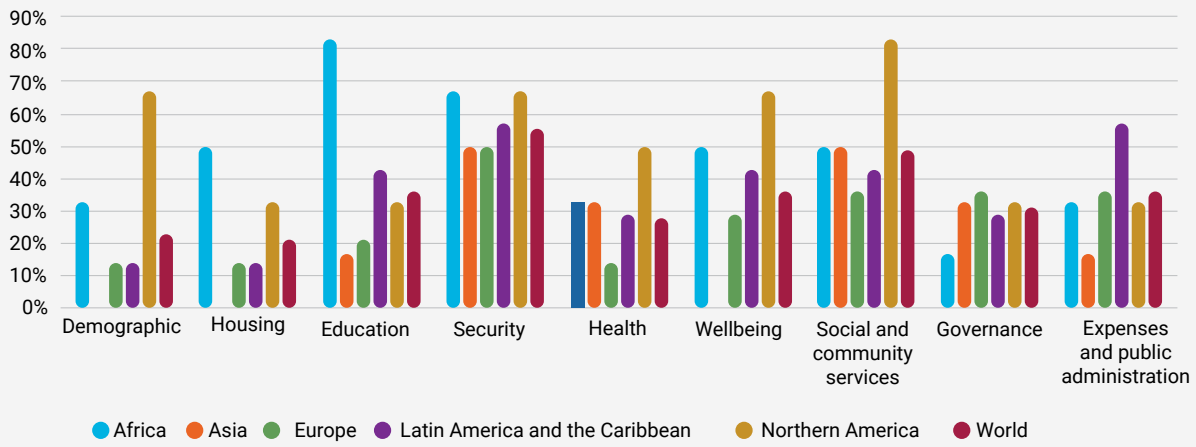
BencanaBot stands as a testament to the transformative power of AI when applied to urban resilience. By seamlessly integrating technology with community engagement, Jakarta exemplifies how Responsible AI can be a cornerstone in building sustainable, resilient, and inclusive cities, particularly in the face of unforeseen challenges such as natural disasters.

Social and institutional sustainability

AI technology plays a pivotal role in fostering social and institutional sustainability within cities. Respondents from various urban areas have highlighted the diverse ways in which AI projects contribute to the well-being of their communities. These contributions span multiple domains, including demographics, housing, education, security, healthcare, public administration, social services, governance, and expenses as seen in **Figure 39**.

Figure 39. AI Contributions to social and institutional sustainability

Areas in which AI adoption contributes to social and institutional sustainability, by continent



One of the top priorities for cities globally is investing in AI to enhance social security. Education emerges as a particularly vital dimension for AI utilization, with a remarkable 82% of African cities emphasizing its significance. Furthermore, social and community services also feature prominently in the AI initiatives, with 50% of Asian cities recognizing their importance. In the Americas, cities are increasingly investing in AI to improve expense management and public administration, with over 55% of the cities directing their efforts toward these areas.

Despite the positive impact, it's crucial to acknowledge and address the risks associated with AI, such as potential social inequalities, discrimination, and exclusion. Responsible AI implementation is essential to mitigate these challenges. The widespread adoption of AI in cities reflects its transformative potential to contribute to social and institutional sustainability. Balancing advancements with responsible practices is vital to ensure an inclusive and equitable impact on urban communities.

Enhancing sustainability through Responsible AI: Global survey insights on SDGs

An approach to designing, implementing, and utilizing AI holds substantial promise in advancing economic, environmental, and social sustainability, fortifying cities' resilience while ensuring inclusivity. Survey respondents underscored the multifaceted impact of cities aligning with various Sustainable Development Goals (SDGs), revealing a nuanced landscape (**see Figure 40**).

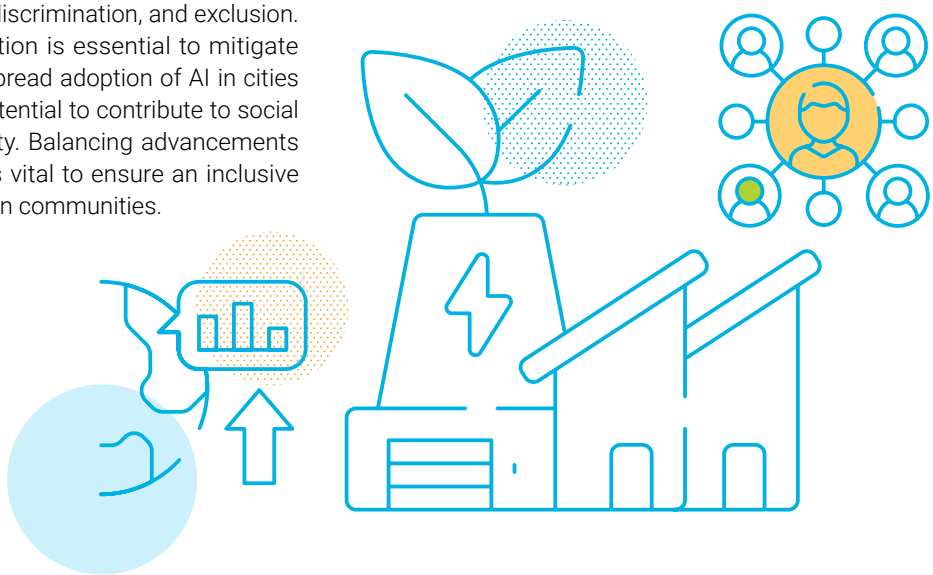
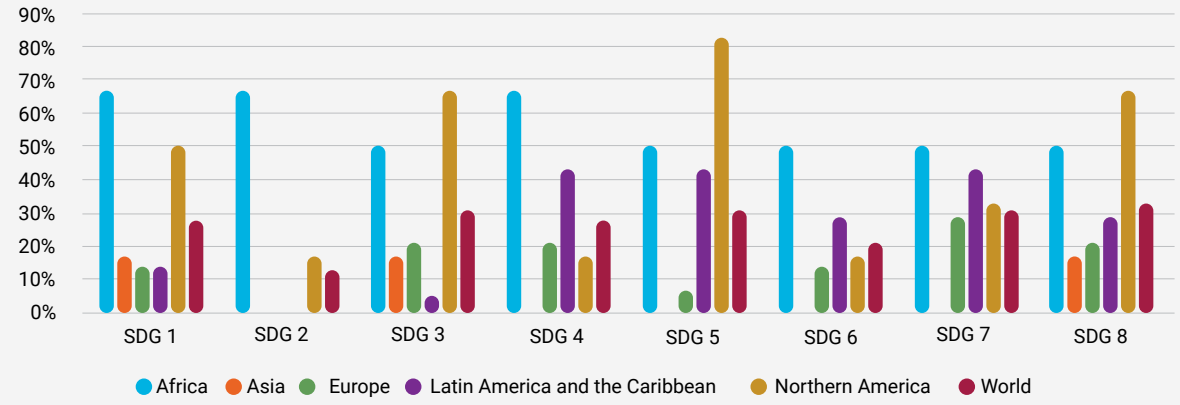
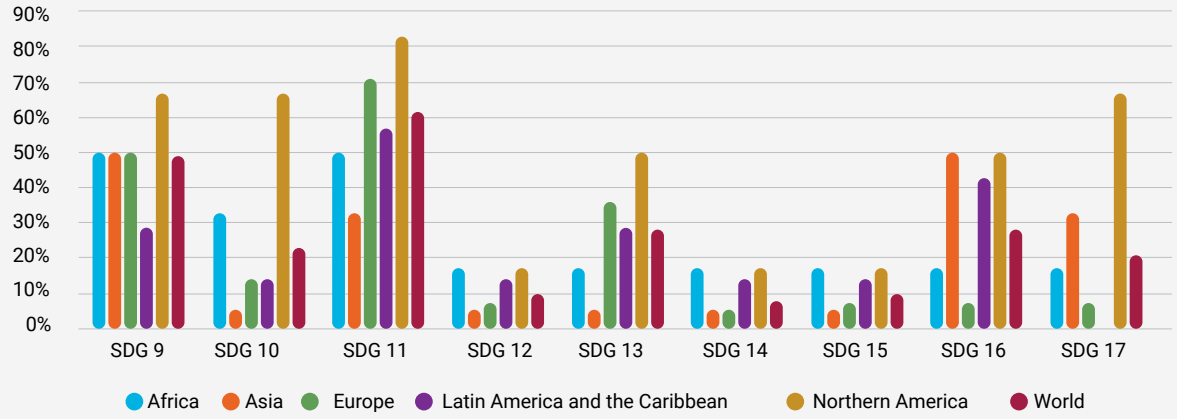


Figure 40. **AI Contributions to social and institutional sustainability**

SDGs supported by AI adoption in the city, by continent (SDGs 1to 8)



SDGs supported by AI adoption in the city, by continent (SDGs 9-17)



AI demonstrates potential in significantly contributing to SDG 9 (Industry, Innovation, and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 16 (Peace, Justice, and Strong Institutions), with a consensus of over 65% among respondents, marking these as pivotal objectives.

African cities, through AI adoption, showcase notable alignment with SDGs related to no poverty and hunger (SDG1 and SDG2), quality in education (SDG4), and Good health and Well-being (SDG3), emphasizing the technology's diverse impact on regional priorities. In Asia, while the emphasis on SDG alignment is less pronounced, the technology's potential to address sustainability goals remains a substantial consideration. North American cities particularly prioritize SDG 3 (Good Health and Well-being), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 10 (Reduced Inequalities), reflecting distinctive regional emphases compared to other continents.

Figure 41. AI for cities compliance with the SDGs

The case study analyses also highlighted the support of SDGs from many AI projects in the case repository. **Figure 41** presents findings from the survey and case repository related to SDGs promoted by AI. The intersection of AI projects with specific SDGs, notably SDG 16, SDG 9, and SDG 11, suggests intentional efforts to bolster Peace, Justice, Strong Institutions, Industry, Innovation, Infrastructure, and Sustainable Cities and Communities. However, some SDGs may warrant increased attention, prompting exploration of AI opportunities and digitalization, especially in specific regions, to amplify sustainability impacts.

These findings underscores the potential of Responsible AI in propelling cities toward SDG achievement, emphasizing strategic alignments, regional nuances, and the imperative to explore untapped opportunities for digitalization and sustainable development.

Core values for Responsible AI

In navigating the dynamic intersection of responsible use, design and implementation artificial intelligence (AI) and urban development, the impact goes beyond achieving the Sustainable Development Goals (SDGs). There is also core values embedded within this transformative landscape that underline Responsible AI, serving as ethical anchors in the pursuit of resilient, inclusive, and sustainable cities. These values become the driving force behind AI initiatives, shaping the very essence of city infrastructure, services, governance, and civic engagement. The Global survey attempts to assess some of these foundational principles, revealing the commitment to better city living through enhanced infrastructure, improved services, and advanced governance. Beyond the technology perspective, these values extend to civic empowerment, the integration of cultural and ethical principles, and the promotion of social inclusion, equity, and environmental sustainability. This section explores the multiple dimensions of core values, recognizing transparency, openness, accessibility, and inclusion as imperative facets in the responsible application of AI for cities.

Figure 42. Core values of AI solutions in cities

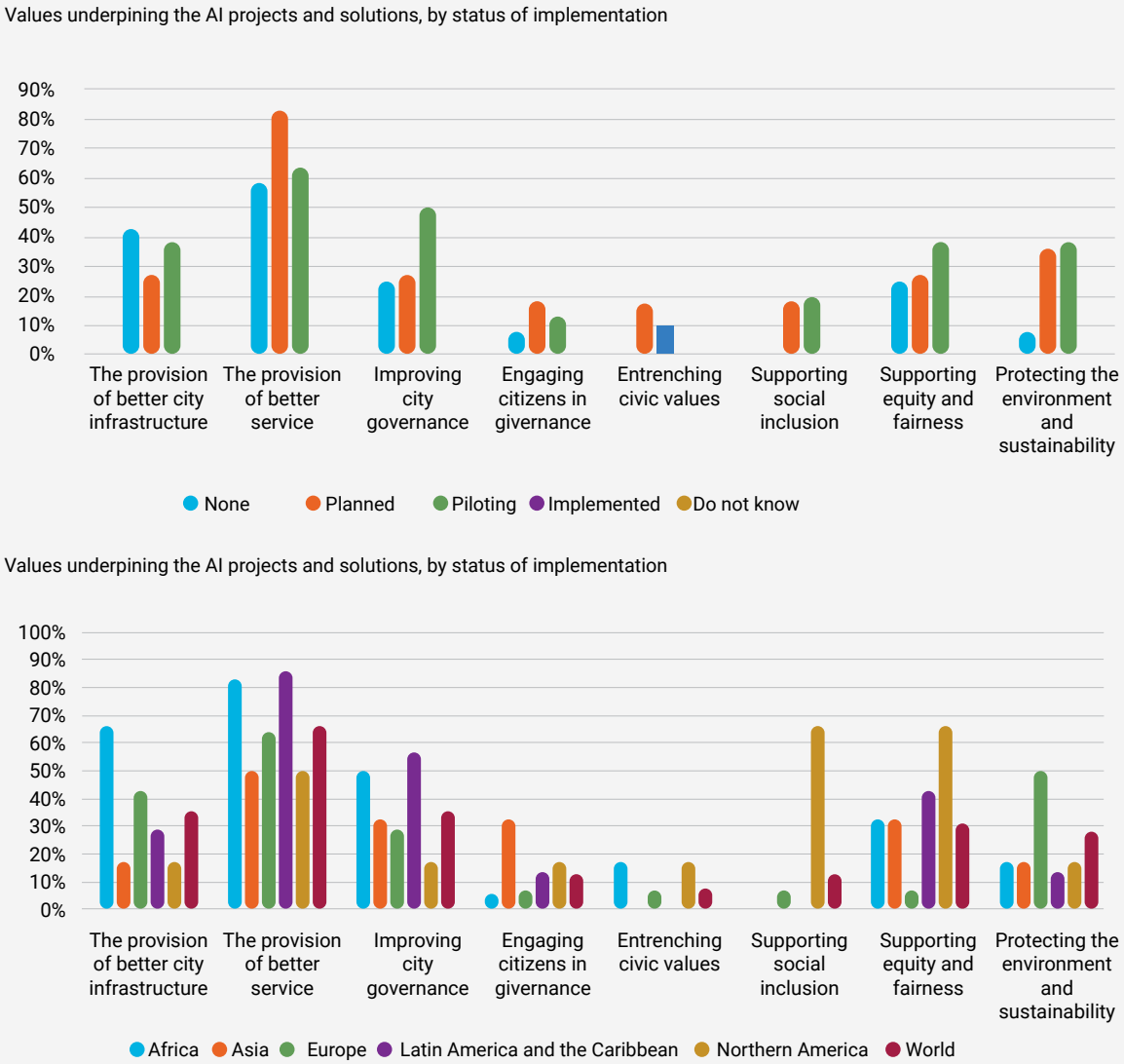


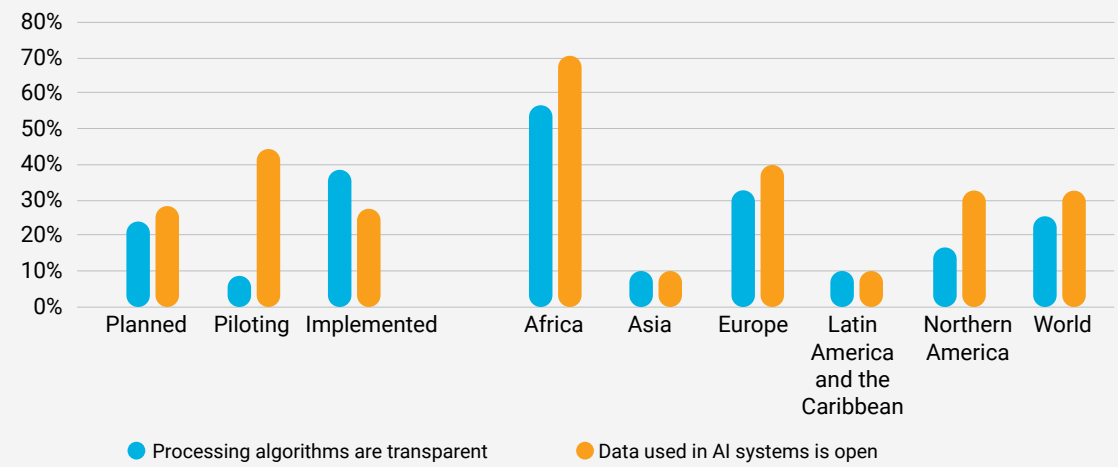
Figure 42 clarifies the core values steering AI initiatives within participating municipalities. A universal pursuit emerges, with all respondents expressing a keen interest in enhancing service delivery, notably pronounced in Latin American cities (85%) and closely followed by their African counterparts (82%). Concurrently, there's a unanimous dedication to fortify city governance by cities worldwide.

Upon closer examination, distinctive regional priorities are also observed. Africa, in particular, underscores the pivotal importance of fostering an improved city infrastructure, commanding attention at 68%. While these values form the bedrock for elevating urban living standards, it's essential to recognize their inherent limitations. Prioritizing enhanced services or infrastructure alone does not inherently guarantee inclusivity and may inadvertently perpetuate biases, especially when fueled by skewed data.

The nuanced narrative takes center stage when we delve into values explicitly geared toward fostering inclusion. While cities universally aspire for efficiency, **Figure 43** signals a critical gap, values like supporting equity, fairness, and social inclusion are not uniformly supported. Instead, they emerge as focal points for only a limited number of cities. This disparity highlights a critical occasion for cities to recalibrate their focus, placing greater emphasis on values that pave the way for not just efficient but profoundly inclusive AI solutions and social perspective.

Figure 43. Accessibility and inclusion of AI-based solutions in cities

Transparency and openess of the AI- based solution in the city, by status of AI implementation and continent



While cities universally aspire for efficiency, there is a critical gap, values like supporting equity, fairness, and social inclusion are not uniformly supported.

In the pursuit of Responsible AI, achieving true inclusion in cities is critical, alongside the broader goals of resilience and sustainability. The factors shaping AI inclusion are manifold, with accessibility and availability standing out as fundamental elements. Ensuring solutions cater to all end users, regardless of their status, and involving them actively in the adoption process are markers of inclusive AI design.

However, **Figure 43** casts a revealing light on the existing gaps. The low participation of end users in co-designing AI solutions and the limited public consultation in the development and deployment phases underscore a critical shortfall. While African cities demonstrate a commendable 58% transparency in algorithm processes, a stark contrast emerges in Asia, Latin America, and North America, where algorithmic transparency appears to be lacking.

Similar trends unfold in the openness of data used in AI systems. A substantial 70% openness, primarily in the piloting phase (42%), is observed as well in African cities, with European cities trailing at 40%. These disparities hold significant implications, potentially resulting in designs that fail to align with end users' needs and expectations.

The survey emphasizes that policy transparency is pivotal for Responsible AI governance. It gauges accessibility and inclusivity by assessing public awareness, consultation, and engagement in the development process. While most respondents acknowledge public awareness, North American and European regions excel in public consultation, albeit with limited involvement in co-creation.

Recognizing that AI inclusion hinges on defining core values, **Box 11** delves into a project exemplifying AI's role in fostering inclusivity within cities.

Box 11.

AI for inclusivity - Transforming urban accessibility in Mexican cities with Project Sidewalk

Project Sidewalk is an open-source initiative actively implemented in three Mexican cities—Mexico City, La Piedad, and San Pedro Garza García (Project Sidewalk, 2023). This innovative project integrates remote crowdsourcing, AI technologies, and online satellite imagery to meticulously map and assess sidewalks. By employing user-generated labels, the project is dedicated to enhance city planning, developing accessibility mapping tools, and training machine learning algorithms for the automatic identification of accessibility issues. Project Sidewalk harnesses remote crowdsourcing to collect data through user-generated labels. This data is instrumental in improving city planning strategies. Labels contribute to the development of mapping tools. Machine learning algorithms play a pivotal role in automating the detection of accessibility challenges. By training these algorithms with crowdsourced data, Project Sidewalk seeks to create a reliable system for identifying and addressing issues in urban infrastructure.

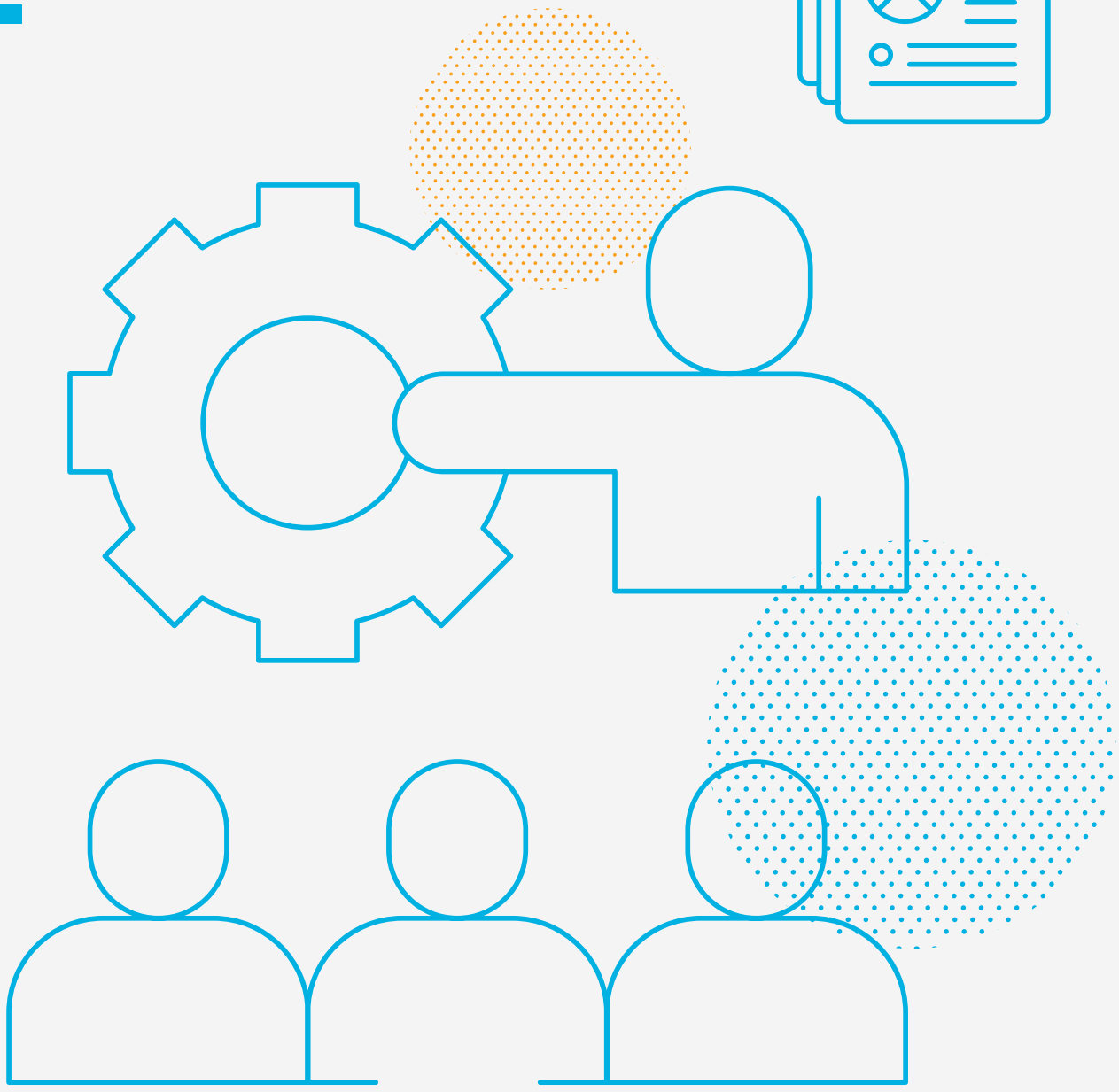
Project Sidewalk envisions a fundamental shift in urban design by actively combating the issue of inaccessible infrastructure. Recognizing that such challenges perpetuate systemic exclusion, particularly for individuals with disabilities, the project strives to improve the overall quality of life for all city residents. Through its multifaceted approach, Project Sidewalk contributes to the creation of more inclusive, navigable, and equitable urban space.

Capacity gaps and needs

1. **SDG integration:** Including the assessment and monitoring of the Sustainable Development Goals (SDGs) within the AI governance structure to align AI initiatives with broader societal goals.
2. **Promotion of open technologies:** Fostering open technology, open knowledge, open innovation, and open data as core components of AI solutions in cities.
3. **Equity and fairness:** Prioritizing values such as equity and fairness is essential to design AI solutions that benefit all segments of the population.
4. **Social inclusion:** Promoting social inclusion through AI initiatives helps address disparities and ensures the benefits reach diverse communities.
5. **Accessibility and inclusion:** Ensuring the accessibility and inclusion of AI solutions for all end users is vital for their success and impact.
6. **Transparency and openness of AI solutions:** Transparency in AI solutions, including algorithms and data

05

Conclusion and Key Recommendations for Responsible AI in Cities



In conclusion, the critical role AI plays in influencing government and public services for urban development is underscored by the increasing interest demonstrated by the commitment of cities worldwide. This report highlights the measures taken by cities, showcasing a rising trend in the utilization of AI and/or the strategic planning of pilot programs for AI applications tailored to urban settings.

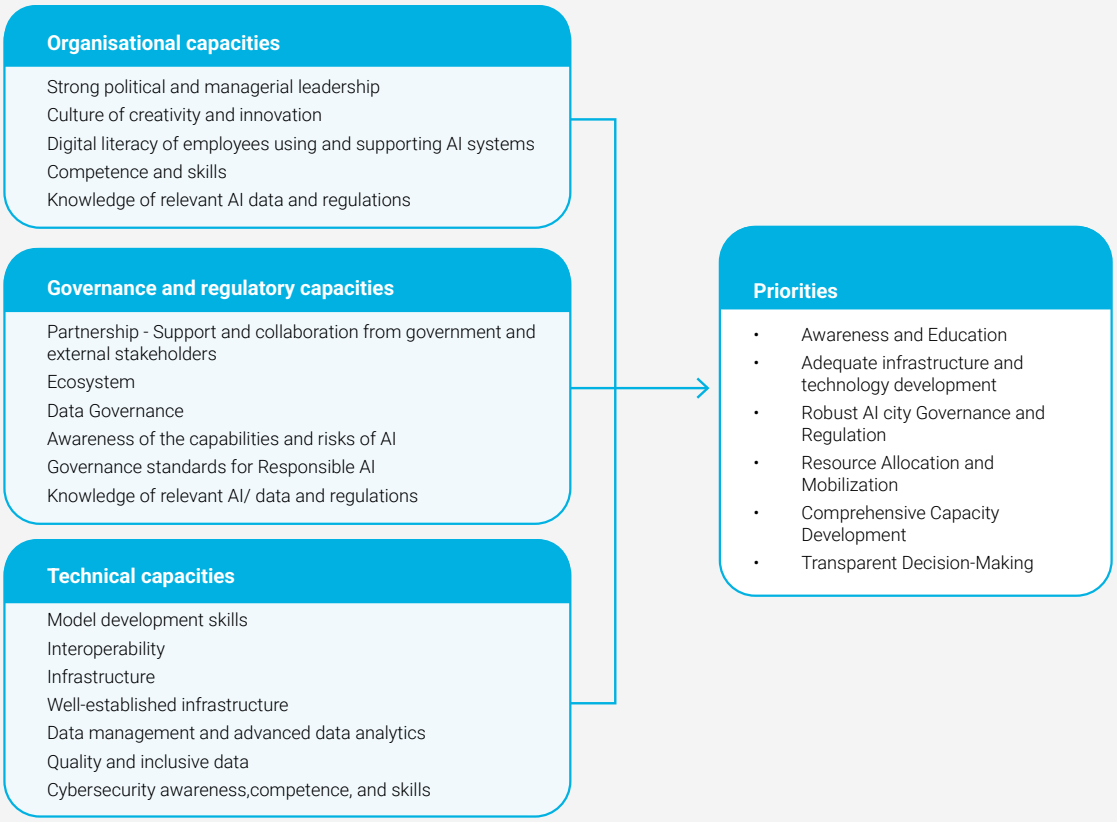
The implementation of AI in cities has exhibited notable benefits but has also opened new ways for fostering sustainable and inclusive urban environments. The transformative potential of AI resonates in its capacity to improve service delivery, optimize municipal operations, and enhance interactions with residents and citizens. Specifically, AI technologies such as analytics, predictive machine learning, and decision-making support systems prove instrumental in addressing urban challenges, refining urban planning processes, and optimizing service provision.

While existing research predominantly delves into the technical facets of AI, this report underscores the need to broaden the scope of inquiry. Social impacts, citizen inclusion and participation, the requisite capabilities and knowledge sharing, and the multi-stakeholder perspective constitute integral dimensions that requires attention. Through a comprehensive desk review, a global survey, and multiple case analyses, the report offer an assessment of the current state of AI in cities. The overarching goal is to identify capacity gaps and needs, and determine the essential capabilities for designing, implementing, and governing Responsible AI in urban settings.

5.1 Capacities gaps and needs summary

The capacities gaps and needs refer to the ability of the cities to initiate AI projects implement, govern and maintain them. The capacities gaps and needs identified throughout the data analysis can be summarized in three main categories: organizational, governance and regulatory, and technological needs and gaps. From these gaps and needs, some elements needs to be addressed in priorities before entering in any AI initiatives by municipalities (**Figure 44**).

Figure 44. Summary of the capacities needs and gaps



- Understanding the current landscape reveals significant gaps in organizational capacities critical in effectively initiating and developing AI projects in cities, such as the need for stronger political and managerial leadership and the lack of transparency in decision-making making, which often lead to issues in term of resource allocation and mobilization. Many cities also lack a culture and environment for creativity and innovation, and thus demanding to establish and foster co-design of AI-driven solutions in cities to develop collaboratively. Widespread gaps in digital literacy and competencies among city employees, spanning both end-users and AI support personnel, present a challenge to the optimal utilization of AI technologies, emphasizing the pressing need for continuous learning, upskilling initiatives, and comprehensive capabilities development. City administrators frequently lack a comprehensive understanding of relevant data management and regulations, posing ethical and legal risks to AI initiatives. This multifaceted portrayal of gaps and limitations in organizational capacities underscores the challenges cities face in leveraging the potential of AI while navigating ethical, legal, and skill-related obstacles.

- **Governance and regulatory capacities needs and gaps:** The governance and regulatory capacities analysis demonstrated the need for AI-dedicated measures, such as AI principles, AI strategy, AI policy, and data governance operationalized at the local level. Most cities face difficulties in establishing governance standards, providing a guiding framework of AI ethical practices, and complying with regulations, but they also fail to align with the SDGs. Also, cities frequently face challenges in establishing robust and effective data governance frameworks, and many cities struggle to cultivate awareness of the capabilities and risks associated with AI. Establishing these governances and regulations also demands strong partnerships and collaboration with governmental and external stakeholders to support the process and monitor the implementation. However, developing a resilient ecosystem demands strategic planning and coordination, requiring a comprehensive approach that is often lacking.

- **Technological capacities needs and gaps:** Technical capacities are the key drivers behind successful AI integration, constituting a diverse range of essential elements. Cities often lack one of the fundamental expertise for developing effective AI models and the skills and competencies for model development. The seamless integration of AI with existing systems depends on interoperability, often presenting challenges for cities. Despite the critical importance of a robust technical infrastructure for successful AI deployment, many cities face challenges in establishing this foundational framework. Additionally, many cities often lack the capacities and proficiencies in data management and advanced analytics, which emerge as critical needs. This underscores the significance of fostering quality and inclusivity in data practices, like the need for data co-creation. Furthermore, cybersecurity is a notable weakness in local government settings, highlighting the need to build awareness, competence, and skills in cybersecurity to fortify AI systems against potential threats and safeguard their integrity. Addressing technical capacity gaps becomes imperative as cities strive for successful and Responsible AI integration, from model development to implementing robust cybersecurity safeguards.

Recognizing these identified gaps and needs in organizational, governance, and technical capacities, in the following section, we present key recommendations tailored to address these identified challenges and guide cities toward effective and Responsible AI integration.

5.2. Key recommendations for AI in cities

Building upon the insights gained from the global survey and the comprehensive analysis of the capacities gap and needs in the preceding sections, the upcoming recommendations are defined to address the identified challenges directly. As we delve into the key recommendations, we aim to provide actionable guidance for municipal managers and decision-makers to navigate the complexities of implementing Responsible AI in urban contexts. These recommendations are designed to contribute to organizational efficiency, governance resilience, and technical capabilities, aligning with the unique needs of cities for a transformative impact of AI. The proposed recommendations are organized into three main areas: (1) AI for public service and local government, (2) Responsible AI in cities, and (3) the capabilities of Responsible AI. Each area corresponds to specific aspects crucial for realizing the full potential of AI while ensuring ethical and responsible deployment in our urban landscapes.

1. AI for local government and public services

Recommendation 1.1. Establish foundations for Responsible AI

Building a robust foundation for Responsible AI in local governments demands a holistic strategy. Training programs are critical, spanning teams and departments to harness collective knowledge. Belo Horizonte's experience exemplifies the impact of internal workshops on enhancing decision-making processes among public servants. Preparing for Responsible AI necessitates a strategy integrating education, skills development, and inclusivity. This underscores the importance of education and skills development, especially addressing the lack of understanding about AI at higher management levels. An inclusive approach, as seen in Project Sidewalk in Mexican cities, is crucial for addressing systemic inequities and the digital divide. To bridge knowledge gaps, municipalities should prioritize upskilling initiatives, research, and studies, catering to technical and social aspects and disseminating competence to public sector professionals and citizens, focusing on scalable skills grounded in data science techniques. This collective expertise ensures equitable participation and establishes a robust foundation for successful AI integration in cities. City managers are recommended to implement a comprehensive strategy encompassing education, skills development, and inclusivity across all government levels.

Recommendation 1.2. Define a governance model of Responsible AI

City managers are recommended to develop a comprehensive governance model for AI in cities, prioritizing data governance, compliance with data protection regulations, citizen awareness, and joint planning aligned with SDGs. A comprehensive governance approach should promote experimentation, and investing in digital infrastructures contributes to the responsible and sustainable integration of AI in cities. Also, promoting data governance should be at the core of the governance model to ensure the ethical, responsible and effective implementation of AI technologies, recognizing data as a fundamental asset supporting AI applications in compliance with data interoperability standards. Furthermore, compliance with regulations governing personal and sensitive data protection is essential and underlines the need for robust data encapsulation practices (figure 35). The city of Belo Horizonte's Cloud data analysis project showcases the success of knowledge-sharing initiatives within municipal departments.

Moreover, continuous monitoring, evaluation, and auditing of AI's potential benefits and risks, particularly in compliance with SDGs, form a crucial component of this governance model. Simultaneously, addressing the challenges and risks of AI involves rule-setting, clear decision criteria, governance support for internal development or external partnerships, and dedicated teams for public procurement and acquisition of AI-based government technologies. Specifically concerning the procurement process, existing tools such as UNESCO's Ethical Impact Assessment could support responsible entities in ensuring that their procured (or in-house designed) AI systems comply with global standards on the ethical deployment of AI. This model serves as a foundation for navigating the complexities of AI implementation, fostering trust and transparency for the citizen, and maximizing the benefits across various domains of city life.

Recommendation 1.3. Structure the governance of Responsible AI in cities.

To structure the governance of Responsible AI in cities, city leaders should establish a dedicated governance body, supported by a regulatory framework, overseeing AI-related projects. This body, including a multisectoral technical-scientific committee, ensures transparency, accountability, and ethical considerations. As seen in Project Sidewalk in Mexican cities, incorporating algorithmic and co-creation councils is vital for auditing and mitigating risks. Mechanisms for citizen participation and control, aligning with SDGs, should be embedded in the structures, making citizens essential veto players in auditing and mitigating risks related to human rights, privacy, and the spread of disinformation and in alignment with the SDG. Adopting a risk and benefit assessment framework, like the UN-Habitat model, enables informed decision-making. The governance model must foster stakeholder commitment to provide accurate information, promote collaboration, transparency, and citizen engagement, and ensure responsible and beneficial outcomes for urban communities. Top of FormBottom of Form

Recommendation 1.4. Building the ecosystem of Responsible AI

We recommend that city managers and stakeholders collaborate to cultivate a dynamic AI ecosystem for urban development. To build an AI ecosystem for urban development, city managers and stakeholders should require a holistic approach encompassing various dimensions, ensuring ethical, responsible, inclusive, and sustainable

deployment of AI technologies, fostering a multi-stakeholder approach, and promoting innovation, co-creation, and collaboration. The ecosystem should also emphasize citizen involvement to ensure that AI solutions align with the needs and values of the people, fostering trust and acceptance as seen in Latin American and African cities. Furthermore, active international collaboration and inter-city exchanges leverage global experiences, enhancing AI solutions' effectiveness.

Moreover, the ecosystem plays a critical role in integrating ethical considerations and human rights prioritization by continuously updating the governance structures to adapt to technological advancements but also through public awareness and education programs to address biases, ensure fairness, and safeguard privacy. Robust data security measures, interoperability standards, and resilience strategies are central to preventing disruptions and ensuring sustainability. A comprehensive AI ecosystem integrates these considerations, enabling responsible, inclusive, and sustainable urban development through AI technologies.

2. Responsible AI in cities

Recommendation 2.1. Defining the principle of Responsible AI.

City leaders should adopt clear principles for Responsible AI to guide its development, deployment, and governance in urban environments and compliance with the SDGs. Defining the principle should be a human-centred and inclusive approach that upholds human dignity, respects diversity, and mitigates biases. Ensuring AI systems are transparent and explainable is critical, fostering trust and accountability. The approach should uphold privacy and security standards to protect individuals' data rights and maintain public trust. The principles should draw from already existing global standards, including the UNESCO Recommendation on the Ethics of AI.

Furthermore, environmental sustainability, promoting energy efficiency and minimizing ecological impact should be integral to the city's Responsible AI principle, as also emphasised in the UNESCO Recommendation on the Ethics of AI. Emphasize inclusivity without bias across all cultures in the city. Commit to continuous improvement and adaptability, allowing Responsible AI principles to evolve with societal changes and technological advancements. This approach supports the ongoing enhancement of AI technologies, meeting the evolving needs of city residents while upholding ethical integrity and sustainability.

Recommendation 2.2. Prioritizing long-term sustainability

City leaders and policymakers should adopt a comprehensive approach to ensure the long-term sustainability of AI initiatives. Ensuring the positive impact of AI initiatives in cities while mitigating potential negative consequences is a critical goal for long-term sustainability. This involves strategic planning addressing AI implementation's environmental, economic, and social aspects, extending beyond ecological concerns to encompass AI applications' durability, scalability, and societal implications.

Building sustainable AI solutions requires City leaders to prioritize fairness, transparency, and inclusivity in AI design, implementation, and governance, upholding ethical practices to build trust and ensure equitable distribution of AI benefits across diverse populations.

Cities are recommended to establish mechanisms for continuously evaluating and adapting AI systems, regularly assessing environmental impact, economic efficiency, and societal outcomes to inform necessary adjustments. Adopting these recommendations will contribute to developing resilient, future-proof AI ecosystems that serve the best interests of cities and their inhabitants over the long term.

Recommendation 2.3. Promoting inclusion and resilience

Ensuring the responsible deployment of AI technologies in cities necessitates a commitment to address bias and foster inclusion and resilience. City stakeholders should prioritize the integration of inclusive design principles in AI development, actively involving marginalized communities and considering diverse perspectives, including gender-specific considerations, ensuring accessibility and benefit to all. To achieve mechanisms such as collaborative governance, strategic investments in raising awareness by highlighting examples of the disparities in algorithmic transparency across different regions, digital literacy to reduce the digital divide, revising regulations to ensure equitable distribution of data, and implementing proactive measures to monitor and mitigate bias and gender discrimination should be fostered.

3. Capabilities of Responsible AI in cities

The core capabilities of AI in cities encompass a range of essential elements to ensure ethical, responsible, effective, and inclusive deployment of AI technologies. Among these, organisational capabilities contribute to developing, implementing, and maintaining a Responsible AI strategy tailored to urban environments. These capabilities span a spectrum that extends from policy creation and adaptation within the public sector to the organizational competencies that make designing, implementing, and maintaining AI strategies feasible. Furthermore, they facilitate the support of the AI ecosystem, connecting actors, fostering spaces for intersection and dialogue, defining rules and criteria for development, and financing partnerships. The technical, transversal, and specific capabilities facilitate the execution of interoperable AI ecosystems, define standards, make data available, and extend structures to meet the particularities of end users, diversity, and disparities.

The following recommendations emphasize these key capabilities throughout the AI life cycle as defined by UN-Habitat.

Recommendation 3.1. Framing Responsible AI

City leaders should prioritize the development of comprehensive policies aligned with ethical considerations, sustainability, and local community needs. This involves crafting an AI strategy tailored to unique local dimensions and establishing a clear legal and regulatory framework with compliance mechanisms. Stakeholder engagement, public participation, and collaboration with the private sector are crucial for a holistic and inclusive approach. A people-centric approach must be ensured by providing end users with the necessary information, fostering critical thinking, and raising awareness about AI. Essential capabilities to achieve this may include strategic capabilities to facilitate processes and partnership capabilities. Developing essential capabilities for framing AI includes strategic elements to facilitate policy creation and adaptation, AI strategy formulation, and the definition of a people-centered approach. Additionally, partnership capabilities are crucial for stakeholder and citizen engagement, fostering collaboration in the AI ecosystem.

Recommendation 3.2. Design Responsible AI

To design AI responsibly, city leaders should create an environment supporting experimentation, development, and public procurement arrangements. This includes establishing sandboxes, testbeds, and ethical guidelines for benchmarking and reviewing AI applications. Transparency should be prioritized in AI systems and decision-making processes, with the promotion of civic engagement to democratize AI adoption. Human rights considerations and robust privacy protection measures should be integrated into the AI design process. Accomplishing these requires capabilities such as innovation capabilities and dynamic capabilities for learning and adaption. Developing essential capabilities for framing AI includes fostering innovation to create an enabling environment for experimentation and development. Throughout the procurement process, AI systems should be checked for compliance with existing global ethical standards, for example through the UNESCO Ethical Impact Assessment tool.

Recommendation 3.3. Implementing Responsible AI

Cities need to develop capabilities for establishing AI governance standards and making data governance fundamental is crucial. A dedicated AI governance structure ensures transparency, participation, and collaboration. Partnerships and collaborations should be fostered to develop a robust AI ecosystem alongside digital literacy programs for public professionals and expanded network access for all social groups. Strengthening data management and analytics capabilities is vital for effective AI implementation. Among the essential capabilities for implementing Responsible AI the organisational capabilities for Responsible AI and data Governance and digital literacy and skills development, the partnership and collaboration capabilities, the technical capabilities for AI technology, digital infrastructure, data management and analytics and the operational capabilities for local public services are critical to acquire and develop.

Recommendation 3.4. Maintaining/evaluating/ monitoring AI

Beyond the maintenance and assessment of AI performance at the technical level, to navigate the evolving landscape of AI in urban environments, city leaders and stakeholders should prioritize evaluation and monitoring through continuous public awareness campaigns and keeping citizens informed about AI capabilities and associated risks. Cities can foster an engaged community with an understanding of AI's role in urban development. Additionally, supporting stakeholder capacity building is essential, enhancing skills for AI model development and emphasizing interoperability. Robust cybersecurity awareness measures should be implemented to protect AI systems and ensure their reliability. City leaders must establish mechanisms for sustainability measurement, evaluating the long-term impact and adherence to ethical principles. Finally, involving end users in assessments is essential, gathering valuable insights for continuous

improvement and refining AI strategies based on real-world impacts. This comprehensive approach will contribute to AI's responsible and sustained integration, aligning with public policy planning and community needs. The key capabilities to develop for maintaining and monitoring Responsible AI such as learning capabilities and capacity building, communication capabilities and technical and operational capabilities

By focusing on these core capabilities throughout the AI lifecycle, city leaders and stakeholders can foster Responsible AI practices, ensuring ethical considerations, inclusivity, and sustainability in urban development.

References

Ahn, M. J., & Chen, Y. C. (2020, June). Artificial intelligence in government: potentials, challenges, and the future. In The 21st Annual International Conference on Digital Government Research (pp. 243-252). https://doi.org/10.1145/3396956.3398260.

Analytics India Magazine. (2020). How The Indian Government Is Championing the AI Revolution. Retrieved from https://s3.ap-south-1.amazonaws.com/cdn.aimresearch.ai/AI_in_Indian_Government_AIM_Research_e77249b88f.pdf.

Barcelona City Council. (2020, February 8). Misty II, a robot for improving the quality of life of the elderly living alone. Retrieved from https://isocial.cat/en/misty-ii-a-robot-to-improve-the-quality-of-life-of-the-elderly-living-alone/.

Barcelona City Council. (2021). The Municipal Algorithms and Data Strategy for an Ethical Promotion of Artificial Intelligence. Retrieved from https://ajuntament.barcelona.cat/digital/en/technology-accessible-everyone/ethical-use-artificial/ethical-use-artificial-intelligence/municipal.

Berryhill, J., Heang, K. K., Clogher, R., & McBride, K. (2019). Hello, World: Artificial intelligence and its use in the public sector. OECD Observatory of Public Sector Innovation. https://oecd-opsi.org/wp-content/uploads/2019/11/AI-Report-Print.pdf.

Broem, D. (2021, July 7). AI Governance in the City of Amsterdam: Scrutinising Vulnerabilities of Public Sector AI Systems. Retrieved from https://repository.tudelft.nl/islandora/object/uuid%3Abd37fe4c-4c55-4e6f-8b94-9d9a0cdf7dc4

Chand, S. (2022, July 13). Intelligent moves: First step in AI-based traffic system in Delhi. Retrieved from https://timesofindia.indiatimes.com/city/delhi/intelligent-moves-first-step-in-ai-based-traffic-system-in-delhi/articleshow/92837249.cms.

Chen, T., Ran, L., & Gao, X. (2019, June). AI innovation for advancing public service: The case of China's first Administrative Approval Bureau. In Proceedings of the 20th Annual International Conference on Digital Government Research (pp. 100-108). https://doi.org/10.1145/3325112.3325243.

City of Helsinki. (2020). AI Register. Retrieved from https://ai.hel.fi/en/get-to-know-ai-register/.

City of Melbourne. (2021). Laneway waste management pilot – Bullens Lane. Retrieved from https://participate.melbourne.vic.gov.au/emerging-tech-testbed/bullens-lane?_ga=2.120835656.1907795044.1677845876-1402136046.1677845876.

City of Pittsburgh. (2018, April 4). City and Carnegie Mellon University Highlight Data Tool That Predicts Fire-Prone Buildings. Retrieved from https://pittsburghpa.gov/press-releases/press-releases.html?id=1654.

Copenhagen Solutions Lab. (2021, January 18). Artificial Intelligence will reduce the energy consumption in the City of Copenhagen. Retrieved from https://cphsolutionslab.dk/en/news/kunstig-intelligens-skal-reducere-energiforbruget-i-koebenhavns-kommune.

de Sousa, W. G., de Melo, E. R. P., Bermejo, P. H. D. S., Farias, R. A. S., & Gomes, A. O. (2019). How and where is artificial intelligence in the public sector going? A literature review and research agenda. Government Information Quarterly, 36(4), 101392. https://doi.org/10.1016/j.giq.2019.07.004.

Distor, C. B. & Moon, M. J. (2022). Artificial Intelligence and Big Data in COVID-19 Response: Lessons from the KIRA Chatbot and Data Management Platform of the Department of Health – Philippines. Great Transformation Research Review, 5. http://dx.doi.org/10.13140/RG.2.2.36497.51047/1.

Diwakar, A. (2021). How an Indonesian chatbot uses social media to manage disasters. Retrieved from https://www.trtworld.com/magazine/how-an-indonesian-chatbot-uses-social-media-to-manage-disasters-48717.

Hong Kong Legislative Council. (2022). Updated background brief on the implementation of the "iAM Smart" platform and e-Government services. Retrieved from https://www.ogcio.gov.hk/en/news/legco_papers/2022/10/doc/lb_20221010_2_en.pdf.

Hong Kong Office of the Privacy Commissioner for Personal Data. (2021). Guidance on the Ethical Development and Use of Artificial Intelligence. Retrieved from https://www.pcpd.org.hk/english/resources_centre/publications/files/guidance_ethical_e.pdf.

Ironside. (2022). Predictive Policing Success for Manchester PD. Retrieved from https://www.ironsidegroup.com/case-study/predictive-policing-success-manchester-police-department/.

Jha, A. K., Ghimire, A., Thapa, S., Jha, A. M., & Raj, R. (2021, January). A review of AI for urban planning: Towards building sustainable smart cities. In 2021 6th International Conference on Inventive Computation Technologies (ICICT) (pp. 937-944). IEEE. DOI: 10.1109/ICICT50816.2021.9358548

Jöhnk, J., Weißert, M., & Wyrtki, K. (2021). Ready or not, AI comes—an interview study of organizational AI readiness factors. Business & Information Systems Engineering, 63, 5-20. https://doi.org/10.1007/s12599-020-00676-7.

London Metropolitan Police. (2022). Facial Recognition Technology. Retrieved from https://www.met.police.uk/advice/advice-and-information/fr/facial-recognition-technology/#.

MacArthur, B. D., Dorobantu, C. L., & Margetts, H. Z. (2022). Resilient government requires data science reform. Nature Human Behaviour, 6(8), 1035-1037. https://doi.org/10.1038/s41562-022-01423-6.

Madan, R., & Ashok, M. (2023). AI adoption and diffusion in public administration: A systematic literature review and future research agenda. Government Information Quarterly, 40(1), 101774. https://doi.org/10.1016/j.giq.2022.101774.

Marvin, S., While, A., Chen, B., & Kovacic, M. (2022). Urban AI in China: Social control or hyper-capitalist development in the post-smart city?. Frontiers in Sustainable Cities, 4, 1030318. https://doi.org/10.3389/frsc.2022.1030318.

Medaglia, R., Gil-Garcia, J. R., & Pardo, T. A. (2023). Artificial intelligence in government: Taking stock and moving forward. Social Science Computer Review, 41(1), 123-140. https://doi.org/10.1177/08944393211034087.

Mehr, H. (2017). Artificial intelligence for citizen services and government. Harvard Ash Center for Democratic Governance and Innovation. https://ash.harvard.edu/files/ash/files/artificial_intelligence_for_citizen_services.pdf.

Mikalef, P., Lemmer, K., Schaefer, C., Ylinen, M., Fjørtoft, S. O., Torvatn, H. Y., ... & Niehaves, B. (2022). Enabling AI capabilities in government agencies: A study of determinants for European municipalities. Government Information Quarterly, 39(4), 101596. https://doi.org/10.1016/j.giq.2021.101596.

Misuraca, G., & van Noordt, C. (2020). Overview of the use and impact of AI in public services in the EU. European Union: Luxembourg. https://doi.org/10.2760/039619.

Molinari, F., van Noordt, C., Vaccari, L., Pignatelli, F., & Tangi, L., (2021). Beyond pilots: sustainable implementation of AI in public services. European Union: Luxembourg. https://doi.org/10.2760/440212.

O'Brien, C. (2020, February 20). Finnish city Espoo pioneers civic AI with education and explainability. Retrieved from https://venturebeat.com/ai/finnish-city-espoo-pioneers-civic-ai-with-education-and-explainability/.

Organisation for Economic Cooperation and Development-Observatory of Public Sector Innovation. (2018). Potential for mapping the world's land resources using satellites and artificial intelligence: an Australian case study in land use. Retrieved from https://oecd-opsi.org/innovations/potential-for-mapping-the-worlds-land-resources-using-satellites-and-artificial-intelligence-an-australian-case-study-in-land-use/.

Organisation for Economic Cooperation and Development-Observatory of Public Sector Innovation. (2020). Trancity. Retrieved from https://oecd-opsi.org/innovations/trancity/.

Project Sidewalk. (2023). Let's create a path for everyone. Retrieved from https://sidewalk-cdmx.cs.washington.edu/.

Shneiderman, B. (2021). Responsible AI: Bridging from ethics to practice. Communications of the ACM, 64(8), 32-35. http://dx.doi.org/10.1145/3445973.

Smart City Korea. (2021, March 10). Seoul, streetlights, traffic lights, WiFi, CCTV all at once... Completed the first construction of 26'smart poles'. Retrieved from https://smartcity.go.kr/en/2021/03/10/%EC%84%9C%EC%9A%B8%EC%8B%9C-%EA%B0%80%EB%A1%9C%EB%93%B1%E2%80%A7%EC%8B%A0%ED%98%B8%EB%93%B1%E2%80%A7%EC%99%80%EC%9D%B4%ED%8C%8C%EC%9D%B4%E2%80%A7cctv-%ED%95%9C-%EB%B2%88%EC%97%90-%EC%8A%A4/.

Smart Dublin. (2020, August 5). The Dublin Beat Understanding Citizen Sentiment. Retrieved from https://smartdublin.ie/the-dublin-beat-understanding-citizen-sentiment/.

United Nations Economic and Social Commission for Asia and the Pacific. (2019). Artificial intelligence in the delivery of public services. Retrieved from https://www.unescap.org/publications/artificial-intelligence-delivery-public-services.

UN-Habitat. (2022). AI & Cities: Risks, Applications and Governance. Retrieved from https://unhabitat.org/ai-cities-risks-applications-and-governance.

Uren, V., & Edwards, J. S. (2023). Technology readiness and the organizational journey towards AI adoption: An empirical study. International Journal of Information Management, 68, 102588. https://doi.org/10.1016/j.ijinfomgt.2022.102588.

Voda, A. I., & Radu, L. D. (2018). Artificial intelligence and the future of smart cities. BRAIN. Broad Research in Artificial Intelligence and Neuroscience, 9(2), 110-127.

Wirtz, B. W., Weyerer, J. C., & Sturm, B. J. (2020). The dark sides of artificial intelligence: An integrated AI governance framework for public administration. International Journal of Public Administration, 43(9), 818-829. https://doi.org/10.1080/01900692.2020.1749851.

World Bank. (2020). Artificial Intelligence in the Public Sector: Maximizing Opportunities, Managing Risks. Retrieved from https://openknowledge.worldbank.org/server/api/core/bitstreams/b04570ef-b033-5b25-ab7d-c18d44b6cd7d/content.

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