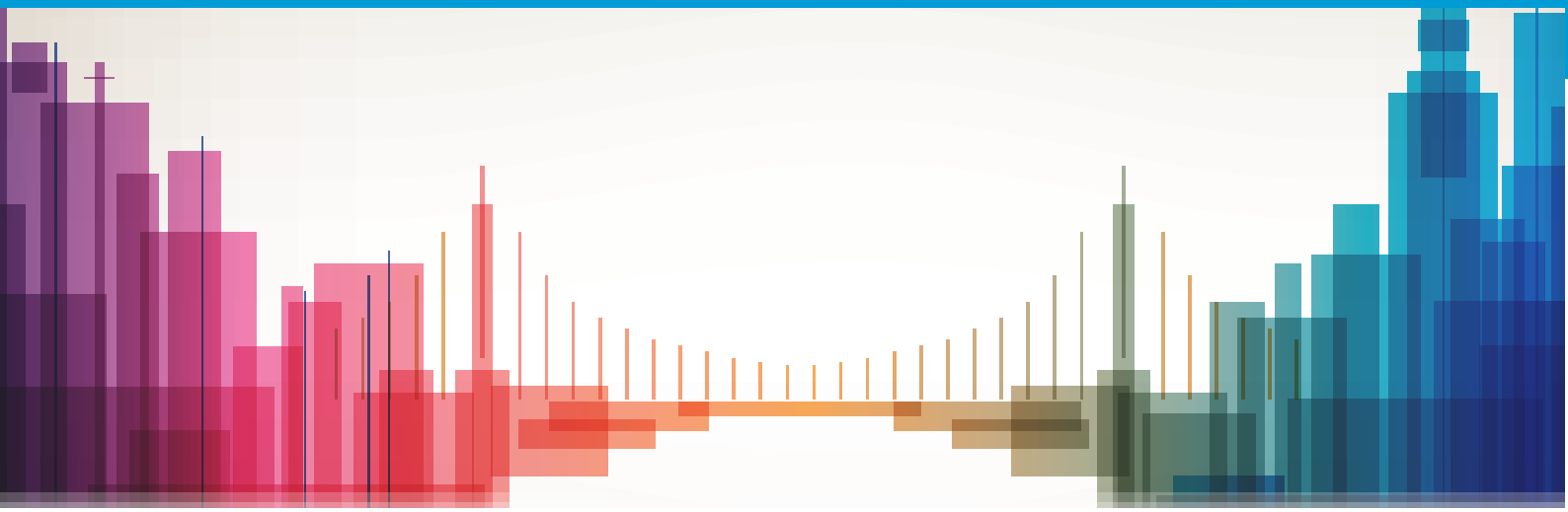
Guiding Principles and Frameworks for People-Centred Smart Cities in the AI era



Convention on Biological Diversity

United Nations ECLAC

Food and Agriculture Organization of the United Nations

UNIDO

ITU

UN-HABITAT

UNDP

United Nations Economic Commission for Africa

UNECE

unesco

UN environment programme

UNJSPF United Nations Joint Staff Pension Fund

UNEP FINANCE INITIATIVE

United Nations Framework Convention on Climate Change

unitar United Nations Institute for Training and Research

UNFPA

United Nations Department of Economic and Social Affairs

UN OFFICE 4 PARTNERSHIPS

UNU EGOV

UN Tourism

UN WOMEN

WORLD METEOROLOGICAL ORGANIZATION





Guiding Principles and Frameworks for People-Centred Smart Cities in the AI era

Foreword

This publication was developed within the framework of the United for Smart Sustainable Cities (U4SSC) initiative.

Acknowledgements

The development of this deliverable was led and coordinated by Cristina Bueti (ITU) and Aline Machado da Matta together with Edlam Abera Yemeru (UN-Habitat).

This publication was authored by Cristina Bueti (ITU), Aline Machado da Matta (UN-Habitat), Edlam Abera Yemeru (UN-Habitat), Roberta Maio (UN-Habitat), Xia Sha (ITU), Laura Zapater (UN-Habitat) and Yining Zhao (ITU).

The authors would like to thank the following contributing individuals: Ahmed Abdelhakim (CLEAR Engineering Consultants), Sylvester Ablorh (Judicial Service of Ghana), Amro Abouenein (World Meteorological Organization (WMO)), Franck Junior Aboya Messou (HOSEI University, Tokyo), Zach Abraham (Independent expert), Abdelruhman A. Abu-Hamdeh (BEN HAYYAN Laboratories/ Aqaba Special Economic Zone Authority (ASEZA)), Iqbal Ahmed (Alliance Finance PLC), Fatima Ait Moulid Deeney (AIT Advisory), Bukola Ajani (Association of Women in Fashion-Tech (WIFT)), Sheuly Akter (Independent expert), Martha Omoekpen Alade (Women in Technology in Nigeria (WITIN)), Fadwa AlBawardi (Fadwa AlBawardi Consulting (FSAB)), Olesia Angelova (University of North Carolina at Charlotte), Vanessa Aradia (Institute of Certified Bookkeepers (Global)), Mark Anthony Arcayan (Seoul National University (ASEAN Smart City Professional Program)), Nora Ogbeyalu Archy (Federal University of Education Pankshin, Plateau state, Nigeria), Paventhan Arumugam (Education and Research Network of India), Abdelhamied Ateya (Prince Sultan University), Hussein Auda (Hant International Consulting), Andrew Bacchus (Invisible Carbon), Shahnaz Badalova (State Committee on Urban Planning and Architecture, Republic of Azerbaijan), Dursun Yildirim Bayar (Ministry of Environment, Urbanization and Climate Change, Republic of Türkiye), Nader Beltaif (Almadar Aljadid), Alka Bharat (M.A.N.I.T., Bhopal), Amitabh Bhatnagar (AM-Intelligent), Geetika Bhatnagar (Indian Institute of Corporate Affairs (IICA)), Hiroua Goare Bienvenu (Nation Builders University), Kidistie Bizuneh (ATI), James Boogere (Rein4ce Learning (U) Ltd), Sofia Borushkina (Monash European Research Foundation; European University Institute (EUI)), Francesca Bosco (Independent expert), Vera-Karin Brazova (Ministry of Regional Development, Czech Republic), Ousmana Mbalia Camara (Ministère de la communication, de l'économie numérique et de l'innovation , Guinea), Santiago Caprio (Gobierno de El Salvador/ Politecnico di Milano), Antonio Carvalho e Silva Neto (City Hall of Maceió/ National Association of Local Secretaries of Innovation, Fórum Inova Cidades), Juan Carlos Castro Robles (Diputació de Barcelona & Universitat Oberta de Catalunya (UOC)), Ulkar Chalabi (Space Agency of the Republic of Azerbaijan, Azercosmos), Suman Chapagain (Practical Action), Ranganai Chaparadza (Capgemini Engineering, Germany), Ravi Kiran Singh Chevvan (IBM), Juliet Chinemelu (Akanu Ibiam Federal Polytechnic, Uwana), Charles Chishiri (Independent expert), Coral Cotto-Negrón (cibergente), Juan Sebastian Cruz Olaya (Office of the United Nations High Commissioner for Human Rights (OHCHR)), Madhu Sudan Dahal (Nepal

Telecom), Shubhaghato Dasgupta (UN-Habitat), Karim Hussein Dasuki Garcia (Corporación i-Cluster), Roop Kishan Dave (International Association of Disaster Management (IADM)/ ITU-APT Foundation of India (IAFI)), Vagner de Carvalho Costa (Ministry of Cities of Brazil), Amali De Silva-Mitchell (IGF-DC-DDHT), Rodolfo Milhomem de Sousa (Independent expert), Juan Francisco Delgado Morales (European Foundation of Innovation (INTEC)), Jane Derouiche (Access Partnership), Vemana Chary Deshoju (Malla Reddy Engineering College for Women), Victoria Desyat (Swiss Association of Women and Empowerment (ASWE)), Nasya Dimitrova (Independent expert), Tess Doezema (University of Vigo), Rui Duarte (Loop Future), Monica Duhem (Global Initiative for Inclusive Technologies – G3ict), Sebastiana Etzo (Independent expert), Zulfatu Umar Faruk (Nigeria Communication Satellite Ltd (NIGCOMSAT)/ Federal Ministry of Communications Innovation and Digital Economy (FMCIDE)), Brian Fugeti (Foster + Partners), Lei Gao (Centre for Asian and Transcultural Studies (CATS), Heidelberg University, Germany), Hassan Ghazal (National Center for Scientific and Technical Research (CNRST), Rabat, Morocco/ Royal Institute of Executive Management (IRFC), Salé, Morocco/ Laboratory of Precision Medicine and One Health, School of Medicine, Mohammed VI University of Sciences and Health (UM6SS), Casablanca, Morocco), Brian Gillikin (IBM/ University of Maryland/ UNU-MERIT), Ana Gómez Adeva (Colegio de Registradores de la Propiedad y Mercantiles de España (Spain)), Ashwin Gopinath (Independent Technology Expert, India), Bart Gorynski (bee smart city), Adina Gray (PurpleOwl AI), Alton Grizzle (United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris), Mesias Guevara (Colegio de ingenieros del Perú), Kevin Guezennec (UNESCO), Héctor Arturo Gutiérrez Calderón (Agencia Digital de Innovación Pública (ADIP), Gobierno de la Ciudad de México), Gedeon Hakizimana (Universidad Carlos III de Madrid), Radia Hambli (University Putra Malaysia), Mark Harbison (Tyne Solutions), Agron Haxhimali (Institute for Albanian Municipalities), Thomas G. Hedberg (International Medical Crisis Response Alliance), Mar Introini (thesustainabilityreader/G100), Birhan Abuhay Jemere (Debre Tabor University), Asif Kabani (Next Generation Leaders/ International Sustainable Development – Recource Centre), Aliaksandra Kakoichankava (Swiss Federal Technology Institute of Lausanne (EPFL)/ FiberLab), Aigerim Kalybekova (Institute of Ionosphere/ al-Farabi Kazakh National University), Makoto Kanagawa (Japan International Cooperation Agency (JICA)), Ayrton Kapiamba (Agence pour le Développement du Numérique, Democratic Republic of the Congo), Zadil Hayat Kassim (Sultan Sharif Ali Secondary School/ ChemBuddy Technologies), Ibrahim Khadar (Analytics 4 Development), Altaf Khan (Infxl LLC), Bereket Teklew Kibret (Addis Ababa Science and Technology University (AASTU)), Matthew Kilbane (Athena's Zephyr LLC), Linda Kinyanjui (Communications Authority of Kenya), Keri Kitson (K. Kitson & Co.), Besnike Kocani (UN-Habitat, Kosovo), Marta Koch (Imperial College London/ Massachusetts Institute of Technology), Naeem Komeilipoor (Findora AI), Sarah Kouadri (Solidarité Numérique dans le Domaine de l'Éducation et de la Santé (SNESC), Castres), Mohammad Amin Kuhail (Zayed University), Anna Kuznetsova (Verein Innovation und Soziales), Edwin Lai (Jacobs), Georgianna Laws (Geo Laws Consulting LLC), Jeannette Kah Le Guil (Disability Inclusive Development Programs and Services (DIDEPAS)), Valérie Lechêne (Agency to Impact (A2I)), Ricky Li (World Economic Forum), Palesa Libe (Independent expert), Yuyin Liu (Association for Computing Machinery/ GC NEXUS LLC), Nick Wilfred Lukumay (WorkSmart Africa), Delia Lungan (Public Interest AI/ Blue Point Model, Romania), Hatem Mabrouk (Tecnológico de Monterrey), Upenyu Machingambi (Mator Design), Telman Maharramov (UN-Habitat, Regional Office for Eastern Europe and Central Asia (RoEECA)), Oyena Mahlasela (Council

for Scientific and Industrial Research, South Africa), Arvea Marieni (BEAM CUBE, France), Hasha Seine Marige (Information and Communication Technology Association of Zimbabwe (ICTAZ)), Muhammad Aimal Marjan (AI Crowd Ltd), Jouni Markkanen (City of Tampere, Finland), Teron Marie McGrew (Teron Marie McGrew & Associates, LLC), Jose Manuel Mena Garcia (UN-Habitat, Regional Office for Latin America and the Caribbean (ROLAC)), Lada Miaous (Heartfelt Human Design (HHD)), Gordon Millichap (Millichap Architects), Shane Mitchell (UrbanPeer Ltd), Cosmas Mnyanyi (Open University of Tanzania), Mari Moisio (GloESDE Oy Finland), Santiago Molano Bernal (UN-Habitat), Luca Mora (Edinburgh Napier University), Devesh Mothilall (Johannesburg Municipality), Simbarashe Moyo (Independent expert), Florent Morice Mtuka (Ministry of Communication and Information Technology, United Republic of Tanzania), Mundeke Mundeke (Institut national de préparation professionnel (INPP)), Lars Münter (Nordic Wellbeing Academy), Nancy Muriithi (Cybersecurity & AI Governance Professional), Yvonne Baldwin Mushi (Ele-vate AI Africa), Dennis Mwaniki (UN-Habitat), Mariette Mwesha (Independent expert), Uttara Naidu (University of Liverpool), Narasimha Sharma Narayanam (Aganitha Space Technologies Pvt. Ltd., India), Sophie Naue (HafenCity University), Martha Ndiritu (Smart City Solutions), Robert Ndugwa (UN-Habitat), Carnot Nedoumbayel (Association pour la Défense des Personnes Vulnérables (ADPV)), Bruno Ngabirano (Skyebroad), Filip Novakovic (Cambridge University; JPMorgan), Ifeyinwa Nkemdilim Obiokafor (Admiralty University of Nigeria), Fredrick Ogenga (Center for Media, Democracy, Peace & Security, Rongo University/ The Peacemaker Corps Foundation Kenya), Hyun Seo Oh (Ministry of Science and ICT (MSIT)), Chris Obi Okeke (Charity Foundation For Livelihood Support (CFLS)), Rafiu Olaore (Youths Enterprise Development & Innovation Society (YEDIS)), Dmitry Ontoev (Department of Information Technologies of Moscow, Government of Moscow), Dominic Ooko (Communications Authority of Kenya), Anupam Pandey (Independent Researcher), Nabila Pangastuti (Blip Creative Works), Ksenia Pankova (MGIMO AI Centre), Alexandros Papadamos (Papadamos Advisory, Switzerland), Ed Parham (Space Syntax), Sung Jin Park (SPARKCITY), Fierza M. Pasaribu (Ministry of Communication and Digital Affairs, Indonesia), Sohel Pasha (United Nations Framework Convention on Climate Change (UNFCCC)), David Pastor Escuredo (Universidad Politécnica de Madrid and University College London), Dhiraj Patra (TradeOS), Stéphane Pean (Ker-Iz Consulting), Tim Pletcher (Petoskey Research Institute), Elena Poughia (Dataconomy Media), Gowtham Rajasekaran (Independent researcher), Ahmed Raji (Escola Pueri Domus), Irina Nandrianina Ralambonahary (ARTEC), Amit Rana (Independent expert), Sharif Rasel (Flinders University), Jess Reia (Digital Technology for Democracy Lab (DTD Lab), University of Virginia), Philipp Robeck (United Nations University Institute for Water, Environment and Health (UNU-INWEH)), Carolina Rodríguez Castellanos (United Nations Office for Project Services (UNOPS)), Naomi Rowan (Gratitude Worldwide Ltd.), Mehdi Saadallah (Atos Switzerland/ Vrije Universiteit Amsterdam), Kadra Saeed (Asian Development Bank), Teymur Safiulov (SASOK Foundation), Sadikou Salissou (United Nations Development Programme (UNDP)), Thuso Sehloho (Young AI Leaders Community Lesotho Hub & STEAMLes Robotics), Tuwilika Shaimemanya (UN-Habitat, Namibia), Ashish Sharma (Ncell), Himanshu Sharma (Department of Telecommunications, Ministry of Communications, Government of India), Sudarshan Sharma (Ananta Digital Pvr. Ltd.), Abbas Shieh (Independent smart city researcher), Naunidh Singh (Forsyth County Schools), Ying Sheng (UN-Habitat, China), Sanjeevani Singh (United Nations ESCAP (Thailand)), Adam Skali (CIeS e-Health Innovation Center), Priyank Soni (Boston Scientific), Karthikeyan Subramani (Tata Consultancy Services (TCS)), Andras Szorenyi (Global Cities Hub),

Israel Oluwaseun Taiwo (Surveying and Geoinformatics Department/ The Federal Polytechnic Ado-Ekiti), P Rajagopal Tampi (Independent expert), Reynier Tasico (Break The Fake Movement, SEED4Com and World Food Forum), Iman Tavassoly (QMed Insights), Mongkol Thitithamasak (United Nations, Thailand), Kathryn Travers (UN-Women), Kate Trout (University of Missouri, Columbia), Edith Turuka (Ministry of Communication and Information Technology, United Republic of Tanzania), Anant Tyagi (International Federation of Red Cross (IFRC)), Saurabh Upadhyay (Svyam Bane Gopal), Gaël Van Weyenbergh (Intergenerational Cooperation Network (ICN)/ IEEE SSIT Sustainability Technical Committee), Elisabetta Venezia (University of Bari Aldo Moro), Lorena Villar Adela (UN Tourism), Waqar Ahmed Wains (Media Initiatives for Social Change Org. (MISC), Lahore, Pakistan), Yonah Welker (Independent researcher), Rani Wemel (LTT Global Communications), DJ Wierz (The OCI Group), Emily Regan Wills (Université d'Ottawa), Val Wise (AI Canada), Togar Woodor (Take Poverty Out of Liberia (TPOL)), Bingyi Yang (China Academy of Information and Communications Technology), Sadaf Zahoor (Punjab Safe Cities Authority Pakistan), Hugo Isaak Zepeda (Neurabitat, Fundación Naucalpan 2077), Tiancheng Zhang (Cardinal Operations, China) and Martin Žnidaršič (Jožef Stefan Institute).

The authors wish to thank the U4SSC management team: Okan Geray (U4SSC Chair), Ramy Ahmed Fathy, Giampiero Bambagioni, Paolo Gemma, Wendy Teresa Goico Campagna, Tania Marcos and Emily Royall (U4SSC Vice-Chairs) for their assistance and contributions.

The authors also extend their gratitude to the contributing organizations along with their representatives: Oliver Hillel from the Convention on Biological Diversity (CBD), Lucy Winchester and Vera Kiss from the Economic Commission for Latin America and the Caribbean (ECLAC), Nevena Alexandrova from the Food and Agriculture Organization (FAO), Cristina Bueti from the International Telecommunication Union (ITU), Deniz Susar from United Nations Department of Economic and Social Affairs (UNDESA), Iryna Usava from the United Nations Development Programme (UNDP), James Murombedzi from the United Nations Economic Commission for Africa (UNECA), Dario Liguti and Tea Aulavuo from the United Nations Economic Commission for Europe (UNECE), Guilherme Canela from the Regional Bureau for Sciences in Latin America and the Caribbean of the United Nations Educational, Scientific and Cultural Organization (UNESCO), Gulnara Roll from United Nations Environment Programme (UNEP), Matthew Ulterino from the United Nations Environment Programme Finance Initiative (UNEP-FI), Motsomi Maletjane from the United Nations Framework Convention for Climate Change (UNFCCC), Soren Thomassen from United Nations Population Fund (UNFPA), Aline Machado da Matta and Isabel Wetzel from the United Nations Human Settlements Programme (UN-Habitat), Katarina Barunica Spoljaric and Nicholas Dehod from the United Nations Industrial Development Organization (UNIDO), Ebru Canan-Sokullu from the United Nations Institute for Training and Research (UNITAR), Dino Cataldo Dell'Accio from United Nations Joint Staff Pension Fund (UNJSPF), William Kennedy from the United Nations Office for Partnerships (UNOP), Soumaya Ben Dhaou from the United Nations University – Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV), Laura Capobianco from the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women), Roberta Boscolo from World Meteorological Organization (WMO) and Sandra Carvao from the World Tourism Organization (UN Tourism).

Disclaimer

The opinions expressed in this publication are those of the authors and do not necessarily represent the views of their respective organizations or U4SSC members. In line with the U4SSC principles, this report does not promote the adoption and use of Smart City technology. It advocates for policies encouraging responsible use of information and communications technologies (ICTs) that contribute to the economic, environmental and social sustainability as well as the advancement of the 2030 Agenda for Sustainable Development and the Pact for the Future and its Global Digital Compact.

ISBN

978-92-61-43891-3 (electronic version)
978-92-61-44121-0 (EPUB version)



This work is licensed to the public through a Creative Commons Attribution-Non-Commercial-Share Alike 3.0 IGO license (CC BY-NC-SA 3.0 IGO).

For more information, please visit https://creativecommons.org/licenses/by-nc-sa/3.0/igo/

© CBD, ECLAC, FAO, ITU, UNDESA, UNDP, UNECA, UNECE, UNESCO, UNEP, UNEP-FI, UNFCCC, UNFPA, UN-Habitat, UNIDO, UNITAR, UNJSPF, UNOP, UNU-EGOV, UN-Women, WMO and UN Tourism.



Contents

Executive Summary xii

1 Before you begin 1
- 1.1 Who is this Guide for? 1
- 1.2 What does the city want to achieve? 2
- 1.3 How to use and implement this Guide 3
- 1.4 Choosing a pathway 6

2 The people-centred smart city compass 9
- 2.1 What is a people-centred smart city in the AI era? 9
- 2.2 Principles and foundations 11
- 2.3 Desired outcomes 15

3 Using AI Responsibly 17
- 3.1 Why AI, and when not 18
- 3.2 The traffic-light rule: safeguards matched to impact 19
- 3.3 Five AI essentials for every city 20
- 3.4 The first 100 days in the AI era 21
- 3.5 Cities in action 22

4 The eight-step implementation cycle 23
- 4.1 Step 1: Define the urban challenge and the objective 24
- 4.2 Step 2: Understand the starting point and establish a baseline 26
- 4.3 Step 3: Prioritize 27
- 4.4 Step 4: Build the enabling environment 29
- 4.5 Step 5: Design solutions for and with people 31
- 4.6 Step 6: Implement 32
- 4.7 Step 7: Measure progress and impact 34
- 4.8 Step 8: Learn, adapt and scale 35
- 4.9 Cities in action 37

5 Monitoring, evaluation and continuous improvement 38
- 5.1 Building a city-level monitoring framework 39
- 5.2 Core thematic areas and indicators 41
- 5.3 Supplementary indicators for people-centred and responsible AI governance 43
- 5.4 From initiative indicators to city-level KPIs 44
- 5.5 Evaluation and impact assessment 48
- 5.6 Adaptive management and scaling 48
- 5.7 International standards and resources that support cities 49

6 Next steps: a growing Toolbox 50

Annex 1 – The implementation cycle in detail 51

A1.1 The city readiness scan 51
A1.2 Roles of the main actors 53
A1.3 Step 1: Define the urban challenge and the objective 54
A1.4 Step 2: Understand the starting point and establish a baseline 57
A1.5 Step 3: Prioritize 61
A1.6 Step 4: Build the enabling environment 66
A1.7 Step 5: Design solutions for and with people 71
A1.8 Step 6: Implement 76
A.1.9 Step 7: Track and measure progress and impact 80
A1.10 Step 8: Learn, adapt and scale 83

Annex 2 – Responsible AI: regulatory mechanisms and impact assessment methods 87
A2.1 International references and principles 87
A2.2 Why AI, and when not – further detail 87
A2.3 The traffic-light rule – full detail 88
A2.4 Five AI essentials – further detail 91
A2.5 Safeguards in practice 91
A2.6 Putting regulatory requirements into practice 96
A2.7 Methods for impact assessment 97

Annex 3 – Case studies 98

Annex 4 – Monitoring, evaluation and continuous improvement: U4SSC KPIs mapped to principles and desired outcomes 116
A4.1 U4SSC KPIs mapped to principles and desired outcomes 116

Annex 5 – U4SSC City Implementation Guide 119
A5.1 How to use the City Implementation Guide in the AI era 119
A5.2 From the first 100 days to year three: an implementation roadmap 121
A5.3 The eight steps on one page 122
A5.4 Responsible AI tools 124
A5.5 Procurement 126
A5.6 Monitoring in six moves 128
A5.7 Templates 128

Annex 6 – The U4SSC City Toolkit: proposed tools 132
A6.1 Templates and checklists 134
A6.2 Tools 135

Annex 7 – International frameworks and related resources 137
A7.1 International frameworks and what they mean for cities 137
A7.2 Related U4SSC, ITU and UN-Habitat resources 138

Annex 8 – Glossary, acronyms and references 140
A8.1 Glossary 140
A8.2 Acronyms 142

A8.3 References and further reading 144

List of figures, tables

Figures

Figure 1 – The architecture of a people-centred smart city in the AI era (Source: U4SSC) 5
Figure 2 – Choosing an entry point into the implementation cycle (Source: U4SSC) 6
Figure 3 – The principles and outcomes of a people-centred smart city in the AI era (Source: U4SSC) 16
Figure 4 – Quito results across the U4SSC KPI dimensions (Source: ITU/U4SSC, City Snapshot: Quito, Ecuador, 2025) 47
Figure A1.2 – Overview of the implementation cycle steps 54
Figure A1.5 – Step 3 decision tree (Source: U4SSC) 63

Tables

Table 1 – Who should read what 1
Table 2 – Suggested use of the implementation cycle under specific situations 7
Table 3 – The simplified track: six actions for cities with limited capacity 8
Table 4 – The principles of a people-centred smart city in the AI era 12
Table 5 – U4SSC Guiding Principles for AI in Cities in practice 18
Table 6 – The traffic-light rule 19
Table 7 – First 100 days checklist 21
Table 8 – The eight steps of the implementation cycle 23
Table 9 – From principles to impact: the monitoring chain 39
Table 10 – Core thematic areas and indicators by principle (indicative) 42
Table 11 – Proposed supplementary indicators (for piloting) 43
Table 12 – Standards and resources at a glance 49
Table A1.1 – City readiness scan: areas and guiding questions 51
Table A1.2 – Indicative roles and responsibilities of actors in the implementation cycle 53
Table A1.3 – Step 1: how it differs by type of intervention 56
Table A1.4 – Step 2: how it differs by type of intervention 59
Table A1.5 – Step 3: how it differs by type of intervention 65
Table A1.6 – Step 4: how it differs by type of intervention 69
Table A1.7 – Step 5: how it differs by type of intervention 73
Table A1.8.1 – Mechanisms to put regulatory requirements into practice 77
Table A1.8.2 – Step 6: how it differs by type of intervention 78
Table A1.9 – Step 7: how it differs by type of intervention 82
Table A1.10.1 – Where to return in the next cycle 85
Table A1.10.2 – Step 8: how it differs by type of intervention 85
Table A2.3.1 – The traffic-light rule 88
Table A2.3.2 – Levels of human involvement in AI-enabled city systems 89

Table A2.3.3 – Common AI risks and possible mitigations 90
Table A2.5 – Indicative division of responsibilities between levels of government 95
Table A2.6 – Mechanisms to put regulatory requirements into practice 96
Table A3.1 – Overview of the case studies 98
Table A4.1 – U4SSC KPIs mapped to people-centred principles and outcomes 116
Table A5.1 – Questions cities ask 120
Table A5.2.1 – Indicative implementation roadmap 121
Table A5.2.2 – Responsibilities within the city administration 122
Table A5.3 – The implementation cycle on one page 122
Table A5.4.1 – Model staff policy on generative AI (one page) 125
Table A5.4.2 – Checklist for city AI agents 125
Table A5.5 – Core procurement clauses 126
Table A5.7 – Decision and accountability record 129
Table A5.7.1 – Public AI register entry 129
Table A5.7.2 – Problem, needs and public-value statement (Step 1) 130
Table A5.7.3 – Option appraisal (Step 3). 130
Table A5.7.4 – Pilot charter (Step 6) 131
Table A6 – Templates, tools and existing resources according to implementation 133
Table A7.1 – International frameworks and what they mean for cities 137
Table A7.2 – Related U4SSC, ITU and UN-Habitat resources 138
Table A8.2 – Acronyms 142

Executive Summary

AI is already in our cities. The question is who is in charge – and whether it serves people.

Artificial intelligence (AI) has arrived in city halls faster than the rules to govern it. Staff use generative AI tools to draft letters and search documents. Suppliers build AI into the software and services cities buy. Residents ask chatbots about permits, waste collection and benefits. Many cities do not yet know where AI is already at work.

The stakes are high. Cities are home to 45 per cent of the world's 8.2 billion people and about two thirds of population growth to 2050 is expected to take place in cities.[1] An estimated 2.8 billion people are affected by some form of housing inadequacy, and more than 1.1 billion live in informal settlements or slums.[2] Cities must provide housing, basic services, mobility, safety, health, education and jobs for more people, while responding to climate change and widening inequalities.

Data, digital technologies and AI can help – but only if they are guided by equity and by people's needs. Used carelessly, they can exclude those already left behind, lock cities into costly contracts and erode trust in public institutions.

A Guide for every city. This Guide is written first and foremost for cities and local governments of every size, income level and degree of digital maturity. It gives mayors, councils and municipal teams one practical reference for deciding **whether, where and how** to use digital technologies and AI, so that they deliver measurable public value, protect people's rights and leave no one and no place behind. No technical AI expertise is needed to use it.

A single rule underpins the Guide: start from the urban challenge and people's needs, not from the technology. AI is one possible means among several. Deciding not to use it, or to stop using it, is a legitimate result.

1 United Nations Department of Economic and Social Affairs, *World Urbanization Prospects 2025* (2025).
2 UN-Habitat, *Strategic Plan 2026–2029* (2025). https://unhabitat.org/sites/default/files/2025/09/sp_26-29_brochure.pdf

Three messages run through the Guide

1. Decisions stay with people. AI can inform and support public decisions. Responsibility and accountability remain with people and public institutions.

2. Technology complements, but does not replace, meaningful public participation. Digital tools provide additional channels for participation and engagement. They cannot replace the social relationships and institutional mechanisms through which communities shape their city. Organized civil society plays a critical role in ensuring inclusive and meaningful participation.

3. Data do not capture all realities. In many cities, particularly in the Global South, large parts of people's lives and livelihoods are not recorded in formal administrative or digital systems because of informality. Data gaps do not mean that needs are absent. Cities should take proactive steps to understand the people and places that are under-represented in data, and make sure that technology and AI do not make them less visible.

Why this Guide is unique. This Guide is the first release of the **U4SSC Toolbox for People-Centred Smart Cities in the AI Era**, developed by UN-Habitat and the International Telecommunication Union (ITU) through the United for Smart Sustainable Cities (U4SSC) initiative, a United Nations platform supported by 22 United Nations entities. It brings together, in one practical guide, three things that cities usually find in separate places:

- **What** a people-centred smart city aims for: the **International Guidelines on People-Centred Smart Cities**, adopted by the UN-Habitat Assembly in 2023, and the UN-Habitat Technical Guidelines.
- **How** to get there in the AI era: an **eight-step implementation cycle**, from defining the urban challenge to learning, adapting and scaling, with proportionate safeguards for AI and ready-to-use tools.
- **Whether** it is working: the **U4SSC Key Performance Indicators**, an internationally agreed framework based on ITU standards and **aligned with the UN-Habitat Global Urban Monitoring Framework**. The same data can support SDG and New Urban Agenda reporting and Voluntary Local Reviews.

People, housing and basic services first. In line with UN-Habitat's goal of access to adequate housing, land and basic services for all, every initiative starts from an urban challenge – housing, basic services, mobility, climate resilience, jobs – and AI is one option among several. Fifteen case studies from twelve countries show what works: from settlement upgrading in Odisha and AI mapping of informal settlements in eThekwini to AI-assisted services in Buenos Aires and Singapore, public AI registers in Amsterdam and Helsinki, and Rotterdam's decision to stop an AI system when the evidence required it.

Safeguards that match the risk. A simple traffic-light rule matches safeguards to the impact of each AI use. Routine office tools need only light measures. Uses that affect people's rights, safety or access to essential services need stronger ones.

Ready to use. The Guide offers a starting track for every size of city and a plan for the first 100 days. Its **City Implementation Guide** (Annex 5) sets out a roadmap to year three, who does what in the city administration and ready-to-use templates: a staff policy on generative AI, standard contract clauses that protect the city's data and budget, and a public AI register.

What the Guide contains. Chapter 1 helps each city decide what it wants to achieve and where to start. Chapter 2 sets out the people-centred smart city, its principles and outcomes, and the key enablers of the International Guidelines. Chapter 3 explains how to use AI responsibly. Chapter 4 presents the eight-step cycle. Chapter 5 shows how to measure progress with the U4SSC KPIs and points to supporting ITU standards and U4SSC and UN-Habitat resources. Chapter 6 invites cities to pilot the Guide. The annexes provide the full guidance, case studies, KPI mapping and templates.

The Guide builds on the work of the U4SSC initiative, ITU-T Study Group 20 and UN-Habitat's People-Centred Smart Cities Programme. It complements, and does not replace, existing international standards and national law.

The aim is not an "AI city". It is a city where technology, including AI, serves people and where people stay in charge.

Key facts

Who	UN-Habitat and ITU, through the U4SSC initiative supported by 22 United Nations entities; more than 450 experts took part in the Working Group 8 meetings and more than 200 contributed to the Guide
What	The first release of the U4SSC Toolbox for People-Centred Smart Cities in the AI Era
For whom	Mayors, city leaders, urban planners, policymakers and municipal teams in cities of every size and income level
What cities get	4 principles, 3 outcomes, 8 steps, a traffic-light rule for AI, a 100-day plan, a three-year roadmap, ready-to-use templates and basic and advanced sets of U4SSC KPIs and 11 supplementary indicators on responsible AI and participation
Evidence	15 case studies from 12 countries on 4 continents
Measurement	U4SSC KPIs (Recommendation ITU-T Y.4903), aligned with the UN-Habitat Global Urban Monitoring Framework

About this Guide. This Guide has been developed by U4SSC Working Group 8 on People-Centred Smart Cities in the AI Era, co-led by ITU and UN-Habitat under the U4SSC Thematic Group on Digital Transformation for People-Centred Cities. The Working Group meetings have attracted more than 450 experts, and more than 200 experts contributed to this Guide.



1 Before you begin

Digital transformation can help cities address complex urban challenges, improve services, strengthen resilience, widen opportunities and empower residents. Whether a digital or AI-enabled intervention or a city policy really serves people depends on four things: how the challenge is framed; how people's needs are identified; how the solution is adapted to the local context; and whether the city institutional and civic capacity is sufficiently mature to govern, monitor, sustain and continually adapt it, as circumstances change.

This Guide does not prescribe a single model of a smart city or any particular technology or policy. It offers a common framework to help cities identify urban challenges and choose between different types of response, digital or not. It is written mainly for city and local governments. National and regional authorities and other partners will find in it the enabling role they are expected to play.

Before using the Guide, answer two questions:

1. **What does the city want to achieve?** (Section 1.2)
2. **Where is the city starting from?** (Sections 1.3 and 1.4)

The answers will point to the parts of the Guide that matter most and to a pathway that reflects the city's priorities, capacities and digital maturity.

1.1 Who is this Guide for?

The Guide is for everyone involved in shaping, governing and delivering digital and AI-enabled change in cities. No technical or AI expertise is needed. Table 1 suggests where each user can find additional resources pertaining to their area of expertise.

Table 1 – Who should read what

Reader	Examples	Start with
City leaders and decision-makers	Mayors, deputy mayors, councillors, city managers, heads of department	Executive Summary; Chapter 2; the people-centred checks in Chapter 3
Digital and innovation teams	Chief information officers (CIOs), chief digital officers (CDOs), smart city and innovation units	Section 2.3; Chapter 3; Chapter 5
Technical and operational teams	Urban planners, infrastructure and utility managers, service managers	Chapter 4, Steps 1 to 6
Enabling functions	Procurement, finance, legal, data protection, human resources	Section 2.3; Chapter 4 Steps 4 and 6; Annex 5
Monitoring, statistics and planning teams	Monitoring and evaluation (M&E) officers, statistics and strategy units	Chapter 4 Step 7; Chapter 5; Annex 4

Reader	Examples	Start with
Community, inclusion and communication functions	Outreach, inclusion, ethics and stakeholder-engagement officers	Sections 2.2 and 2.3; Chapter 4 Steps 1, 5 and 7
National and regional authorities	Ministries and agencies with an urban, digital or sector mandate	Section 3.4.7; Chapter 4 Step 4, Annex 1, Table A1.2
Partners	Academia, private sector, civil society and community organizations, women's and youth organizations, development partners	Chapter 2; Annex 1, Table A1.2

The Guide supports both strategic decisions and day-to-day implementation. It also stresses the need to strengthen the ability of every resident to engage critically with information and digital technologies.

1.2 What does the city want to achieve?

Cities use this Guide for different purposes. Identifying your main purpose at the outset tells you where to start. Whatever the purpose, the starting question is the same:

> **What urban challenge is the city addressing, who is affected, and what result does the city seek?**

This question helps the city define the challenge before considering responses, digital or not, and decide whether an intervention is needed, what form it should take and whether it upholds the people-centred principles.

Example. A city wants to improve access to public transport. It may find that the real objective is to make transport more affordable, accessible or reliable for specific groups. Depending on the context, the right response could be a digital service, a policy change, a reorganization, or a combination. Starting from the problem keeps technology in its place: one possible means, not the starting point.

The Guide supports three purposes.

Purpose 1 – Develop or update a strategy, policy or regulation. For cities that lack adequate policies, or whose policies are outdated or not coherent, to govern digital urban transformation. Examples include a city-wide smart city, digital transformation or AI strategy; a digital government or digital public infrastructure policy; a data governance policy covering data protection, interoperability and data sharing; a digital skills and media and information literacy policy; local regulations or by-laws; and better coherence of policies across sectors and levels of government.

Purpose 2 – Develop, acquire or improve a project. For cities that want to develop, procure, implement or improve a digital or technology-enabled solution, such as an urban data platform, an AI-enabled tool, a digital public infrastructure component, a digital urban service, a solution that connects existing systems, or a combined digital and in-person channel for residents. The focus is on making sure the technology responds to a clearly identified urban challenge and to people's needs, and that it fits with existing systems, investments, data, governance, procurement, skills and long-term budgets.

The two types are not mutually exclusive: a strategy may include projects, and a project may require a policy change or new institutional capacity. Both follow the same implementation cycle (Chapter 4), but the entry point and the weight of each step differ.

Purpose 3 – Build a city-wide monitoring framework. For cities that want to develop, update or use a framework to track their progress as a people-centred smart city. These cities can read Step 7 (Chapter 4), Chapter 5 and Annex 4.

1.3 How to use and implement this Guide

The Guide connects existing international standards, frameworks and resources with practical decision-making, following a people-centred approach. It has five main chapters:

1. **The people-centred smart city compass (Chapter 2)** sets out the definition, the four principles, the three desired outcomes of a people-centred smart city in the AI era.
2. **Using AI responsibly (Chapter 3)** explains when AI is worth using and how to match safeguards to the impact of each use.
3. **The city implementation cycle (Chapter 4)** applies the principles across eight steps of implementation, from defining the challenge to replicating and scaling a solution.
4. **Monitoring, evaluation and continuous improvement (Chapter 5)** shows how to assess progress at city level using the U4SSC KPIs, ITU standards, U4SSC and UN-Habitat resources.
5. **Next steps (Chapter 6)** explains the expected evolutions of the Toolbox and the role cities can play.

The annexes expand on each chapter and technical readers are encouraged to read them: the implementation cycle in detail (Annex 1), responsible AI (Annex 2), case studies (Annex 3), monitoring, evaluation and the U4SSC KPIs in detail (Annex 4), the U4SSC City Implementation Guide (Annex 5), the proposed Toolbox tools (Annex 6), international frameworks and resources (Annex 7), the glossary, acronyms and references (Annex 8).

The **U4SSC City Implementation Guide** (Annex 5) explains step by step how a city puts this Guide into practice. It contains:

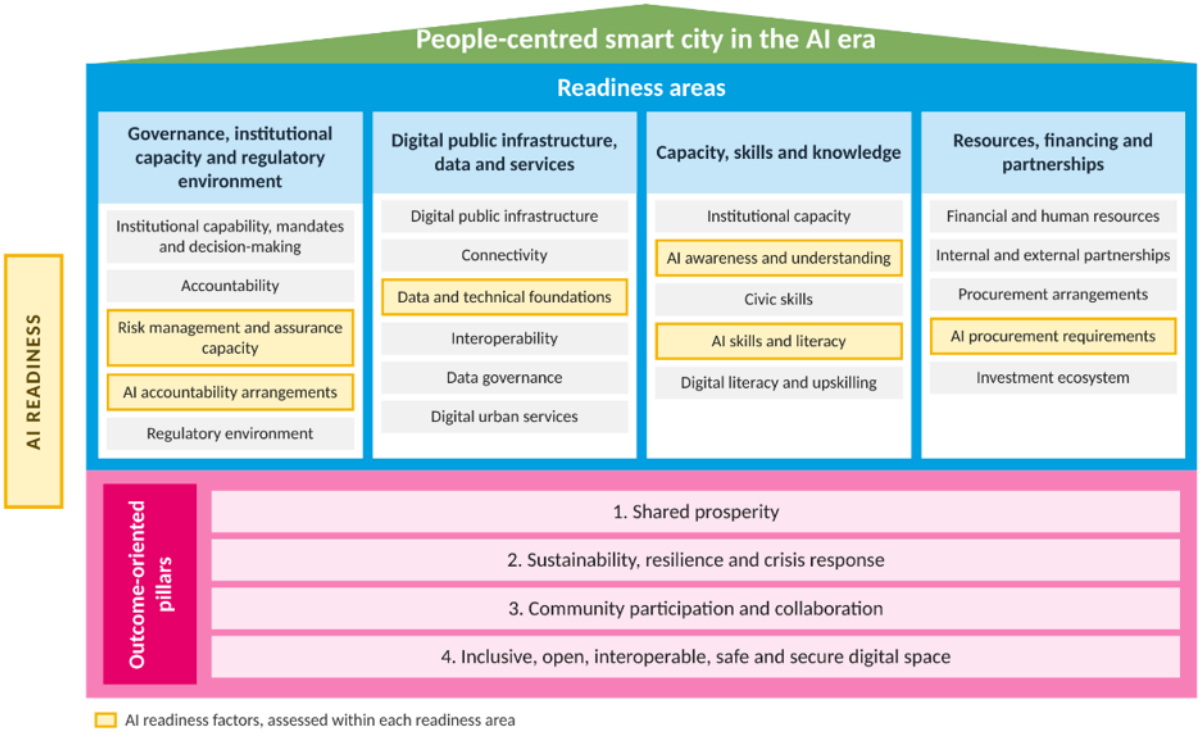
- an **implementation roadmap in the AI era**, from the first 100 days to year three, including key actions and outputs of each phase;
- **who does what** within the city administration, from the mayor and council to service departments and the monitoring unit;
- the **eight steps on one page**, as a working checklist for each initiative;
- **responsible AI and procurement tools,** the model staff policy on generative AI, the AI agent checklist, procurement clauses and a checklist;
- **monitoring in six moves**, using the U4SSC KPIs;
- **ready-to-use templates** for decisions, the public AI register, the problem statement, the option appraisal and the pilot charter.

1.3.1 Assessing the city's readiness

Before choosing an entry point in the implementation cycle, run a quick city readiness scan. It maps the conditions that help or hinder people-centred digital and AI initiatives, so that the city builds on what already exists. It is not a score of how "smart" a city is. The scan is quick and general and helps the city choose where to enter the cycle; the baseline assessment in Step 2 is detailed and specific to one challenge.

The scan covers two kinds of area (Figure 1): four **readiness areas** (enabling conditions): governance, institutional capacity and regulatory environment; digital public infrastructure, data and services; capacity, skills and knowledge; and resources, financing and partnerships, with **AI readiness** being cross-cutting; and the four principles as **outcome-oriented pillars** (Section 2.2).

Figure 1 – The architecture of a people-centred smart city in the AI era (Source: U4SSC)



To run the scan, cities can organize workshops or conduct a short survey, depending on their capacity and size, engaging departments responsible for digital services, planning, finance, procurement, legal affairs and community engagement, as well as, where possible, representatives of residents and civil society organizations. For each area, use a simple rating scheme, such as *yes, partially and no* or *in place*, *partly in place*, *not yet in place,* ensuring evidence is recorded. The purpose is not to generate a score, but to establish a shared understanding of the city's starting point. The city readiness scan guide is in Annex 1 (Table A1.1). The city can then use the scan results to identify the most relevant steps of the cycle (Chapter 4).

For a city starting from scratch, the steps can establish the foundations for people-centred smart city action and establish the mandate to initiate a priority intervention. The roadmap should be adapted to the city's context, existing capabilities and chosen entry point in the implementation cycle.

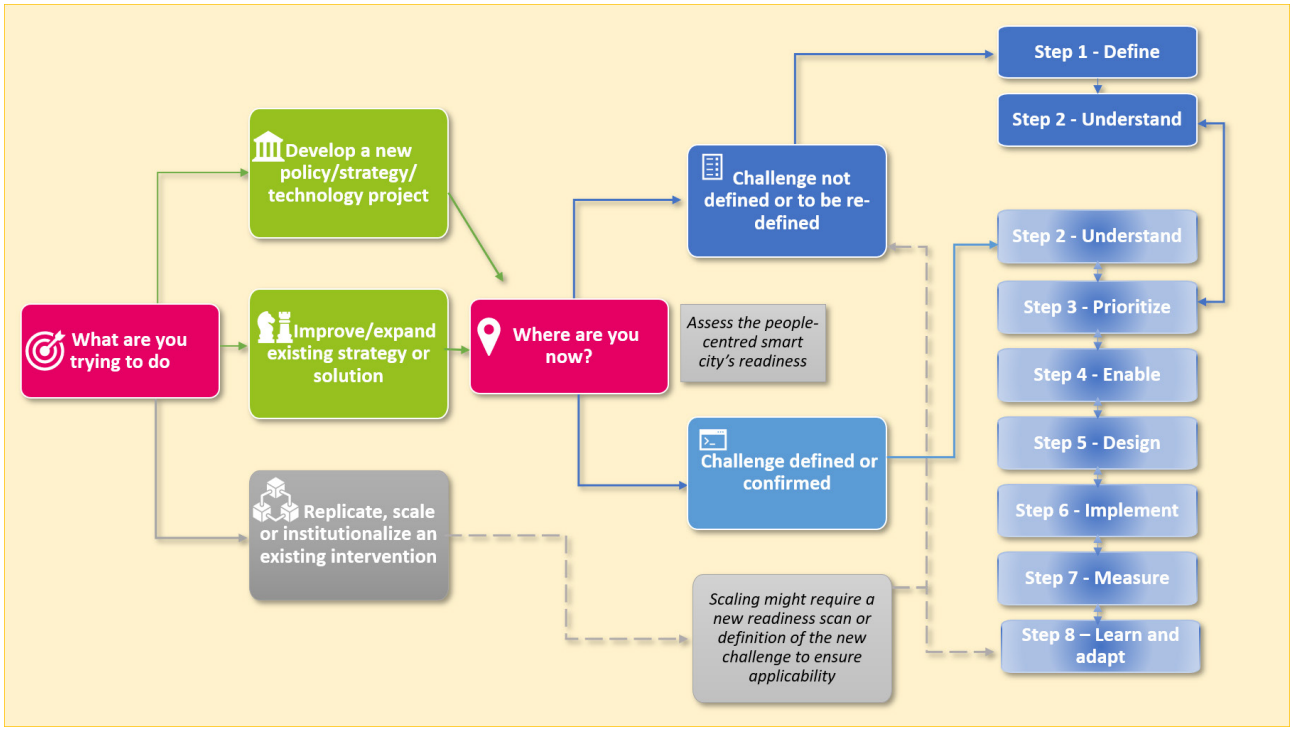
1. **Define the purpose**: clarify what the city wants to achieve and which urban challenges it needs to address (Section 1.2).
2. **Assess readiness**: identify existing capabilities, assets, institutional arrangements and gaps (Section 1.3.1).
3. **Establish the mandate**: formally adopt the four people-centred principles, define the outcomes and identify the governance arrangements and responsibilities needed to apply them.

4. **Select the entry point**: use the readiness assessment and a challenge/people-driven prioritization process to identify the relevant steps of the implementation cycle (Chapter 4).
5. **Apply the principles throughout**: use the outcome-oriented pillars to shape and assess the intervention, whether it involves technology, non-technological measures or policy reform (Section 2.2).

1.4 Choosing a pathway

The right pathway depends on two factors: the type of intervention (Section 1.2) and the city's readiness (Section 1.3). Figure 2 and Table 2 suggest where to enter the cycle and Step 7 (Chapter 4), Chapter 5 and Annex 4.

Figure 2 – Choosing an entry point into the implementation cycle (Source: U4SSC)



To use Table 2 below, the city can find the situation that best matches the urban challenge to be addressed. The recommendations suggest which steps to focus on first, what conditions may need attention, and when it may be useful to return to an earlier step.

Table 2 – Suggested use of the implementation cycle under specific situations

Situation	Suggested entry points and readiness considerations
Develop a strategy or policy	Steps 1–2, then Steps 3–4; Steps 5–8 turn the strategy into implementation, monitoring and adaptation. If institutional or regulatory capacity is limited, give more attention to Step 4 before implementation.
Develop, procure or improve a digital or AI-enabled project	Steps 1–3 to define the challenge and baseline, then Steps 4–6 for enabling conditions, design and implementation. Gaps in data, infrastructure, skills, governance, procurement or legal safeguards may require a return to Step 2 or Step 4.
Improve an existing service or initiative	Step 2 to understand the current situation, then Steps 3–5 to decide what should change and how. If objectives or evidence of public value are unclear, return to Step 1 before redesigning.
Scale, replicate or institutionalize an intervention	Steps 7–8 to examine evidence and conditions for scaling, then Steps 2–6 as needed for the new context. Scaling should trigger a new readiness scan in the receiving context.
Strengthen institutional capacity, residents' skills, participation and collaboration	Steps 2–3, depending on the gap, then Steps 5–8 where a specific initiative is developed. Capacity building may need to come before, or run alongside, other steps.
Assess whether a technology or AI solution is appropriate	Steps 1–3, with particular attention to the challenge, public value, alternatives, feasibility and risks. Limited data, infrastructure, skills or governance may mean the city should first address enabling conditions, choose another solution or not proceed.

The table is indicative, and not prescriptive. Chapter 4, further expanded in Annex 1, gives the detailed guidance for each step. The pathway should show not only where to begin, but also which prerequisites must be addressed first and which steps should be revisited as the intervention develops.

A simplified track for cities with limited capacity. Many cities, in particular small and medium-sized cities, and cities in low-resource settings, do not have a dedicated digital team or sufficient institutional, technical and financial capacity. They can still apply this Guide to strategies, policies, projects and other interventions, whether digital or non-digital, by following the simplified track: check the eight-step implementation cycle (Chapter 4) and the detailed Step Guide (Annex 1) to understand the overall process, then concentrate first on the six actions in Table 3, which provide a manageable set of priorities for putting the Steps Guide into practice; then, if the intervention is AI-related, complete the actions marked (E) in the first 100 days checklist (Table 10). To monitor any intervention type, start with fewer indicators for which reliable and disaggregated data exist, chosen from the basic set of U4SSC KPIs (Table 13), adding more as capacity grows. Cities in this context, should also consider pooling expertise and extra capacities through inter-municipal cooperation, national or regional support programmes, partnerships with academia and city networks.

Table 3 – The simplified track: six actions for cities with limited capacity

#	Action	Where in the Guide
1	Describe the urban challenge, the intended outcome and the people affected. Consult residents and relevant stakeholders to understand their needs and priorities before considering technological solutions. Summarize the result in a one-page problem statement.	Chapter 4 Step 1; Annex 5, Table A5.9
2	Use a simple city readiness scan taking stock of existing policies, services, data, infrastructure, institutional capacities and resources. Identify the most pressing needs and gaps and establish what is already working and what needs to change.	Chapter 4 Steps 2 and 3
3	Compare possible courses of action against agreed criteria, considering expected benefits, costs, risks, inclusion, feasibility and alignment with the desired outcomes. Check whether existing systems, shared services or non-digital approaches could address the problem before selecting a digital or AI-enabled solution. Record and communicate the decision and its rationale	Chapter 4, Step 3; Figure 4; Table 15
4	Identify an accountable lead, clarify responsibilities and document key decisions. Check the relevant governance, legal, data, cybersecurity, procurement and institutional requirements, and identify the resources and safeguards needed to proceed. For technology or AI interventions, record the relevant decision in the AI inventory.	Chapter 4 Step 4; Section 3.3 (for AI-enabled interventions)
5	Develop the selected strategy, service or project with affected communities and relevant stakeholders. Keep a human contact point and a non-digital or assisted channel for every essential service, ensuring accessibility, inclusion and continuity of service, regardless of the technology used, involving residents and communities in co-designing and testing the intervention. Prepare a manageable implementation plan, with available resources, assign responsibilities, and put the intervention into practice.	Chapter 4 Steps 5 and 6; Section 3.3 (for AI-enabled interventions); Annex 5, Table A5.6
6	Track implementation, results and impacts using a small set of relevant indicators for which reliable data are available. Review findings with residents and affected groups, consider who benefits or may be adversely affected, and use the evidence to continue, adapt, scale, replicate, pause or discontinue the intervention	Chapter 4, Steps 7 and 8; Chapter 5 and Table 13

2 The people-centred smart city compass

In brief.

This chapter defines a people-centred smart city in the AI era (Section 2.1), sets out four principles that guide every decision (Section 2.2), and describes the three outcomes the city should seek (Section 2.3). The safeguards needed when AI is used, matched to the potential impact of each use, are set out in Chapter 3.

2.1 What is a people-centred smart city in the AI era?

2.1.1 From technology-driven to people-centred

The smart city concept has evolved. Early approaches focused on computing, modelling and optimizing urban systems. Later, technology-led approaches emphasized connectivity, infrastructure and data, which raised concerns that technology investments were not connected to local priorities and public value. A stronger focus then emerged on participation, public services, open data, digital inclusion and civic engagement. At the same time, the digitalization of cities introduced risks of privacy loss, cyberattacks, surveillance, exclusion and algorithmic discrimination, and the COVID-19 pandemic both accelerated digitalization and exposed persistent digital divides.[1]

The people-centred approach marks a shift from **technology for efficiency** to **technology for people and with people**. It starts from urban challenges, people's needs and desired outcomes, and treats technology as one of several means to achieve them.

This approach builds on more than a decade of United Nations work. In 2016, ITU-T Study Group 20 agreed a definition of a smart sustainable city, reflected in Recommendation ITU-T Y.4900.[2] The **United for Smart Sustainable Cities (U4SSC)** initiative, coordinated by ITU, UNECE and UN-Habitat and supported by 19 other United Nations agencies and programmes,[3] has since translated this concept into practical tools, methodologies and guidelines that help cities pursue the Sustainable Development Goals (SDGs).

UN-Habitat's People-Centred Smart Cities Programme, launched in 2020 and reinforced through the UN-Habitat Strategic Plan 2026–2029, supports governments in using digital technologies to improve people's lives, strengthen inclusion, sustainability, participation and human rights, and improve access to adequate housing, basic services and land management. It recognizes that

1 UN-Habitat, *World Smart Cities Outlook 2024* (2024).
2 Recommendation ITU-T Y.4900, *Overview of key performance indicators in smart sustainable cities*. https://www.itu.int/rec/T-REC-Y.4900
3 United for Smart Sustainable Cities (U4SSC). https://u4ssc.itu.int/

there is no one-size-fits-all model. Following UN-Habitat Assembly resolution 2/1, the UN-Habitat **Technical Guidelines on People-Centred Smart Cities**[4] (2025) set out four interconnected goals for people-centred smart cities: shared prosperity; sustainability, resilience and crisis response; community participation and collaboration; and digital human rights, equity and inclusion. They also recommend actions for all levels of government on the enabling conditions: governance and regulation; people-centred digital infrastructure, data and services; digital literacy and skills development; and budgeting and financing (Section 2.4).[5]

Together, the U4SSC work and the UN-Habitat guidelines provide a coherent basis for digital transformation that is driven by people's needs and by inclusion, equity, sustainability and measurable outcomes, not by technology itself.

2.1.2 Smart cities in the AI era

AI marks a further stage in this evolution. By analysing large volumes of information, identifying patterns, making predictions, supporting decisions and, in some cases, automating actions, AI can support urban planning and management across areas such as mobility, environment, public services, economic development and governance. When applied to geospatial data and analysis, for example, AI can support the modelling of urban change and inform decision-making for land-use, housing, infrastructure, basic service provision, public health, disaster risk reduction and climate resilience. The UN-Habitat GeoAI Toolkit for Urban Planners[6] stresses that such tools must be integrated through participatory processes, incorporate citizen-generated data and support inclusive decision-making. The Global Assessment of Responsible AI in Cities[7] finds growing use of AI in mobility, public services, safety and planning, alongside challenges related to data privacy, implementation costs, skills and regulatory gaps, particularly in cities with limited resources.

AI also raises new governance concerns, as it can influence or automate decisions and actions. These include questions of fairness, transparency, explainability, privacy, accountability, human oversight and data sovereignty. The U4SSC report *Autonomous cities and AI: The next frontier of urban transformation*[8] describes increasingly autonomous urban systems that combine AI, digital twins, the Internet of Things (IoT), robotics and advanced connectivity. To keep such systems under

---

4 UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025), developed following UN-Habitat Assembly resolution 2/1 (2023). See Chapter II for the four goals.

5 The Technical Guidelines established a shared definition of a people-centred smart city as follows: "*a people-centred smart city leverages technology to improve the quality of life of people and the social, economic and environmental sustainability and resilience of cities and human settlements. It ensures that smart city innovations are developed through participatory approaches and collaboration, providing equitable access to digital services, skills and infrastructures especially for persons in vulnerable situations. It promotes and protects human rights and fundamental freedoms, with multi-level governance systems and regulations ensuring that technology supports sustainable development rather than becoming the goal itself*".

6 UN-Habitat, *AI for Spatial Mapping and Analysis: GeoAI Toolkit for Urban Planners* (2025).

7 UN-Habitat, IDRC and UNU-EGOV, *Global Assessment of Responsible AI in Cities* (2024). https://unhabitat.org/sites/default/files/2024/08/global_assessment_of_responsible_ai_in_cities_21082024.pdf

8 U4SSC, *Autonomous cities and AI: The next frontier of urban transformation* (ITU, 2026). https://www.itu.int/epublications/en/publication/autonomous-cities-and-ai-the-next-frontier-of-urban-transformation

human control, it proposes levels of human involvement and an assessment method that takes into account both the degree of system autonomy and the potential consequences of error. This Guide uses them in Chapter 3.

The aim is therefore not an "AI city" or an "autonomous city". It is to integrate AI responsibly into the people-centred smart city. For the purposes of this Guide:

> **Definition**. A people-centred smart city in the AI era seeks to improve quality of life, advance inclusion and equity, promote and protect human rights and fundamental freedoms, and strengthen social, economic and environmental sustainability and resilience. It adopts participatory and collaborative approaches and seeks equitable access to services, skills and infrastructure. Data, digital technologies and AI are means to achieve outcomes defined by the city on the basis of evidence and communicated transparently to the public, rather than ends in themselves. People directly or indirectly affected take part in defining those outcomes, helping ensure that solutions reflect the needs of all population groups.

This definition does not imply that every city should use AI or adopt the same model. Cities may choose an AI-enabled or other digital solutions, institutional or service reforms, physical investments, non-digital interventions, or a combination. Where AI is used, its role in the service or decision, potential impacts and governance requirements should be clearly defined, with safeguards proportionate to the specific use.

Cities seeking further concepts can draw on the *AI-enabled Citiverse: A Strategic Blueprint for Cities in the Age of AI*[9] and on the work of ITU-T Study Group 20, which established the ITU-T Focus Group on AI for Smart Sustainable Cities and Communities (FG-AI4SSC) in May 2026. It provides an open platform for pre-standardization work on how AI can work safely and interoperably with IoT, digital twins and city systems.[10]

2.2 Principles and foundations

2.2.1 International foundations

The principles build on international frameworks that provide a common foundation for inclusive, sustainable and rights-based urban and digital transformation. They include the 2030 Agenda

[9] Global Initiative on AI and Virtual Worlds – Discovering the Citiverse, *AI-enabled Citiverse: A Strategic Blueprint for Cities in the Age of AI* (2026). https://www.itu.int/epublications/en/publication/ai-enabled-citiverse-a-strategic-blueprint-for-cities-in-the-age-of-ai

[10] ITU-T Focus Group on AI for Smart Sustainable Cities and Communities (FG-AI4SSC), established by ITU-T Study Group 20 in May 2026. https://www.itu.int/en/ITU-T/focusgroups/ai4ssc/Pages/default.aspx. Its first meeting was held in Tampere, Finland, on 10–11 September 2026. Cities are invited to contribute their use cases and requirements and to use its deliverables alongside this Guide.

for Sustainable Development, the New Urban Agenda,[11] the Global Digital Compact,[12] the Paris Agreement and the Sendai Framework for Disaster Risk Reduction; ITU Resolution 98 on smart sustainable cities and communities; Human Rights Council resolution 41/11 (2019) on new and emerging digital technologies and human rights; General Assembly resolution 77/211 (2022) on the right to privacy in the digital age; the UNESCO Recommendation on the Ethics of Artificial Intelligence; and UN-Habitat Assembly resolution 2/1 (2023) on international guidelines on people-centred smart cities. Annex 7 outlines the implications of these frameworks for cities. The principles also draw on United Nations evidence, including the World Smart Cities Outlook 2024, the Global Assessment of Responsible AI in Cities and the U4SSC Guiding Principles for Artificial Intelligence in Cities.[13]

2.2.2 The four people-centred smart city principles

The principles result from the extensive consultation undertaken following UN-Habitat Assembly resolution 2/1[14] and under the U4SSC WG8 to be updated to address the opportunities and risks associated with AI. Their people-centred orientation remains unchanged.[15] They apply to all types of intervention.

Table 4 – The principles of a people-centred smart city in the AI era

#	Principle	What it means
1	**Shared prosperity**	Digital transformation contributes to inclusive economic development and the benefits of innovation are widely shared. This includes strengthening local innovation ecosystems, entrepreneurship and employment opportunities derived from digital transformation aiming at reducing social, economic and spatial inequalities, specifically across urban, peri-urban and rural areas; and using innovation and data for land planning and management to improve access to basic services.
2	**Sustainability, resilience and crisis response**	Technologies and data strengthen the long-term environmental sustainability and resilience of cities and human settlements. This includes reducing the environmental footprint of digital technologies and AI, supporting ecosystem protection and restoration, as needed, biodiversity, as well as climate adaptation and disaster risk reduction. Security and functioning of digital systems and essential services is secured including during crises. Existing solutions and investments are assessed before any new one is considered for procurement, to avoid duplication, maximise investments and limit environmental impacts.

[11] United Nations, *New Urban Agenda* (2016). https://habitat3.org/the-new-urban-agenda/

[12] United Nations General Assembly, *Pact for the Future*, annex I: *Global Digital Compact* (A/RES/79/1, 2024).

[13] U4SSC, *Guiding Principles for Artificial Intelligence in Cities* (ITU, 2023). https://www.itu.int/pub/T-TUT-SMARTCITY-2023-15

[14] UN-Habitat Assembly, resolution 2/1, *International guidelines on people-centred smart cities* (2023). https://unhabitat.org/sites/default/files/2023/09/english_9.pdf

[15] See UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025), Chapter II.

#	Principle	What it means
3	**Community participation and collaboration**	People and communities have real opportunities to shape their city and influence decisions: identifying challenges, setting priorities, designing solutions and assessing impacts, with transparency, accessible information and feedback channels. Community-led digital infrastructure and community data stewardship approaches are considered where appropriate and feasible. Digital tools add ways to participate but do not replace the social relationships, institutions and processes through which communities express their voice, so both online and offline channels are needed. Collaboration across government, communities, civil society, academia, the private sector and other cities helps innovation respond to local needs.
4	**Inclusive, open, interoperable, safe and secure digital space**	Everyone can use digital services safely and without discrimination, with particular attention to groups at risk of exclusion. Human rights and fundamental freedoms are upheld online and offline: privacy and data protection, non-discrimination, transparency, accountability, human oversight and access to remedy, together with affordable connectivity, accessible services and digital skills, leaving no one and no place behind. Informality and limited digital access are addressed when data-driven and AI systems are set up. International standards and interoperable systems are promoted, to enable data exchange and portability, avoid fragmentation and vendor lock-in, and support scalable transformation.

AI is reinforcing the importance of all four principles. It can help cities understand complex systems, anticipate needs, optimize resources and improve services. It can also amplify existing inequalities, reproduce bias, create new forms of exclusion, increase dependence on technology providers and produce decisions or recommendations that escape human control. For this reason, responsible AI is a cross-cutting requirement of a people-centred smart city, not a separate technology pillar (Chapter 3). A city considering the use of AI should first assess whether it can improve outcomes for people and the planet while respecting people's rights, agency and participation. It should also consider whether data gaps, which are prevalent in many cities, could leave some population groups out. High levels of informality in work and land tenure create blind spots in population data, so specific groups in vulnerable situations may be missing.

Technology can widen participation, but it cannot replace the social contract. Digital platforms, online consultations and AI-supported analysis of residents' input offer additional ways for people to be heard. They do not replace the relationship of trust, representation and mutual accountability between residents and their government, nor the collective processes through which communities deliberate, negotiate and organize. Organized civil society, including community-based organizations, residents' and tenants' associations, federations of informal settlement dwellers, workers' organizations and women's and youth groups, does much more than respond to consultations: it represents constituencies, co-produces knowledge and services, mediates between communities and institutions, and holds decision-makers to account. Cities should engage and support these organizations as partners throughout the implementation cycle and treat digital participation as a complement to in-person and collective participation, not a replacement.

Equitable access and skills for all. The principles require equitable access to data, digital infrastructure and digital services, and **lifelong education and training for all,** such as digital and media and information literacy for residents of all ages, through schools, libraries, community centres and informal learning, and AI literacy for municipal staff and elected officials. Capacity is assessed in the readiness scan (Section 1.3.1), re-assessed in Chapter 4 Step 2**,** addressed in Step 4 and measured with U4SSC KPIs (Chapter 5).

Cities could formally recognize the people-centred smart city principles through a council resolution, a charter or manifesto, local regulations or by-laws, or their inclusion in the city development plan and procurement policy. In addition to the broader city approach, for each initiative, the city identifies the principles most relevant to the specific challenge and uses them to guide any action of the implementation cycle (Chapter 4).

The four principles provide a common direction for cities, regardless of their level of digital maturity or institutional capacity. Their application, however, needs to reflect local priorities, resources and enabling conditions. As outlined in the city readiness scan (Section 1.3.1), cities can assess existing capacities and constraints to identify an appropriate starting point for implementation. This does not change the principles or the desired outcomes; it helps cities determine how to put them into practice in their own context (Chapter 4).

2.2.3 Putting the principles into practice

The three examples below show how the principles are applied in practice:

- **Connectivity for refugees.** A city with medium-to-high digital maturity wants to improve mobile connectivity for refugees so that they can join existing e-learning programmes. The relevant principles are shared prosperity (access to education and jobs), community participation and collaboration, and an inclusive, open, interoperable, safe and secure digital space (affordable, accessible and secure connectivity). These principles then shape the prioritization criteria (Step 3), the design, the implementation arrangements and the monitoring indicators.
- **Reducing the environmental footprint.** A city that prioritizes sustainability makes reuse and non-duplication a procurement and investment requirement. It maps existing technologies, platforms, data, infrastructure and services before buying anything new, and reuses, adapts, connects or scales them where they are effective. This cuts costs, avoids duplication, limits environmental impacts and delivers benefits sooner.
- **Digital skills and information integrity.** A city wants residents to have the digital and media and information literacy skills to engage critically with information, including information produced by AI. It draws on all four principles and considers both AI and non-AI options, building community participation and rights-based approaches into each step.

2.3 Desired outcomes

Applying the principles should lead to better outcomes for people, communities, cities and the planet. The specific outcomes depend on each city's context, priorities, resources and digital maturity. Figure 3 shows how the four principles contribute to three interconnected outcomes and Chapter 5 shows how to measure them with the U4SSC KPIs, in alignment with UN-Habitat Global Urban Monitoring Framework.

Outcome 1 – Improved quality of life. People experience real improvements in their well-being, opportunities and ability to shape the places where they live. Digital technologies, data and AI address locally identified needs and create public value. This includes:

- **Prosperity and equal access to opportunity:** digital transformation creates and spreads social and economic value through jobs, entrepreneurship, education, lifelong learning and skills, and reinforces social, economic and territorial development, reducing existing inequalities.
- **More participation, inclusion and trust:** residents influence decisions that affect them; institutions are more transparent and accountable and provide opportunities for communities to lead on data and digital infrastructures if possible; people have access to verified information from authentic sources and the digital and media and information literacy to use it; community capacity and trust in public institutions grow.
- **Technology that creates public value:** technologies, including AI, are used where they address a clearly identified need. Cities define success, monitor results, engage with users and affected communities, and improve, adapt, scale or discontinue solutions based on evidence.

Outcome 2 – Better functioning cities. Cities are more accessible, efficient, sustainable and resilient, and respond to people's needs. Digital technologies, data and AI are integrated into urban systems where they add value, without creating unnecessary complexity, cost or exclusion. This includes:

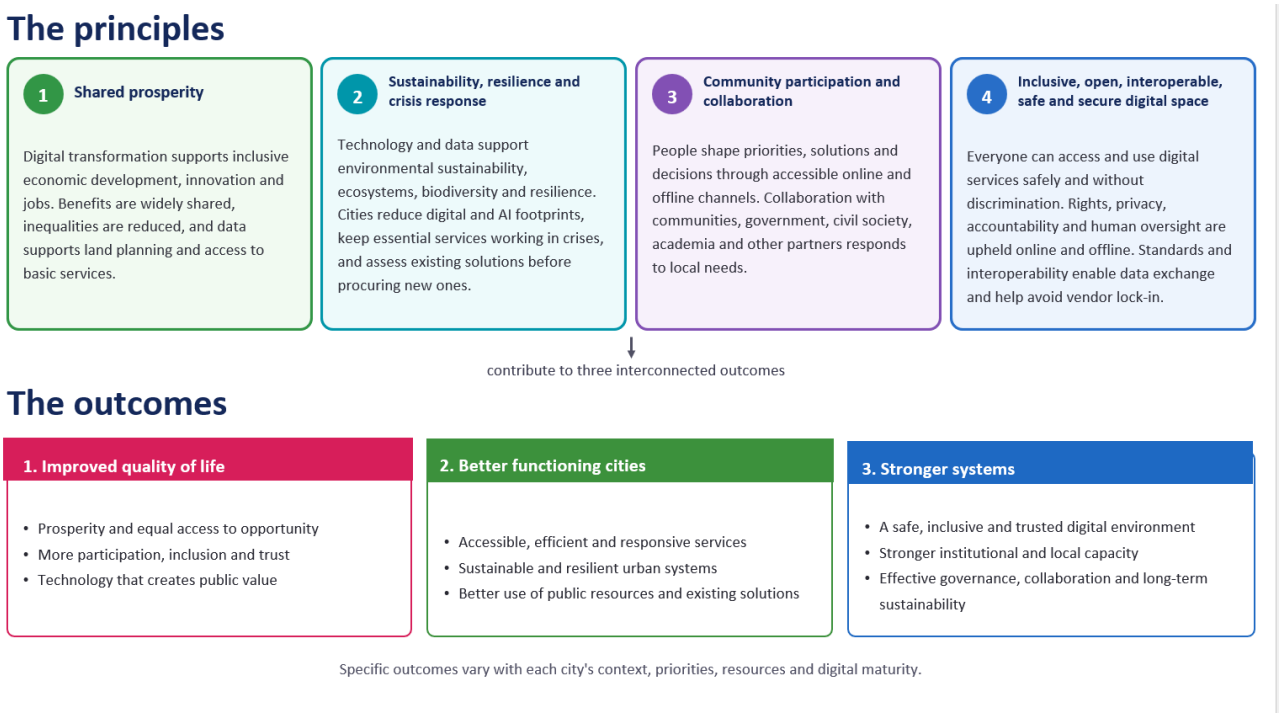
- **Accessible, efficient and responsive services:** housing and urban services become more accessible, affordable, reliable and responsive through innovative solutions, while non-digital alternatives remain available where vulnerable groups and digital divides are present. This includes addressing the needs of people living in informal settlements, particularly in relation to housing, land tenure and access to basic services.
- **Sustainable and resilient urban systems:** data and technology improve resource efficiency, promote biodiversity, ecosystem protection and restoration, climate adaptation and disaster risk reduction, including safety and security of digital systems and essential services during crises and blackouts. Cities monitor the impact and account for the environmental footprint of digital technologies themselves: energy, materials, infrastructure, e-waste and lifecycle.
- **Better use of public resources and existing solutions:** cities make full use of existing investments, infrastructure, data and capabilities before considering new solutions and new procurement processes, hence reusing, adapting, connecting, transferring or scaling existing

solutions where appropriate, so that proven approaches also benefit communities and territories with limited resources.

Outcome 3 – Stronger systems. Cities have the governance arrangements, stakeholder involvement, capabilities, partnerships and digital foundations needed to make informed technology choices and sustain people-centred transformation over time. This includes:

- **A safe, inclusive and trusted digital environment:** people can use digital services without discrimination and with protection of their privacy, data, safety and rights; AI systems are governed transparently and accountably, with human oversight; people can understand, question and challenge decisions and seek review and remedy. In addition, the safety and security of digital systems and essential services are equally preserved, also during a crisis.
- **Stronger institutional and local capacity:** public authorities can assess needs, evaluate solutions and their environmental, economic and social impacts, including on human rights, manage suppliers, procure responsibly, train staff and residents, reduce technological dependence, and limit technology development to when it is needed.
- **Effective governance, collaboration and long-term sustainability:** public authorities, communities, civil society, academia and the private sector work towards shared objectives with clear roles and accountability, backed by comprehensive regulatory frameworks, financing, data governance, infrastructure and adequate capacity, so that solutions outlast individual projects and political and funding cycles.

Figure 3 – The principles and outcomes of a people-centred smart city in the AI era (Source: U4SSC)



3 Using AI Responsibly

In brief.

Responsible AI means designing, buying, using and retiring AI systems so that they minimize harm, respect human rights, support well-being and the environment, and remain under human control. It covers the whole life of a system; it is not a one-off compliance check.

In practice, the city keeps decisions with people; matches safeguards to the potential impact of each use; identifies the people missing from the data; tests systems before and during use; informs people when AI is used and publishes a register; defines how people oversee systems and AI agents; enables people to complain and obtain decisions reviewed; secures systems and controls where data are stored and processed; and establishes which safeguards the city sets and which are set at national level.

AI can help cities spot changing needs and service gaps, compare planning options, forecast demand, plan maintenance, monitor the environment, handle routine enquiries, provide information in more languages and free staff from repetitive tasks. It can also amplify inequalities, reproduce bias, exclude people, increase dependence on suppliers and produce decisions that escape human control.

This chapter sets out the essentials. Annex 2 contains the full guidance, including testing, transparency, oversight, cybersecurity and the division of responsibilities between levels of government.

Guidance and legal obligations. The measures in this chapter are guidance. Where national, regional or supranational law requires a measure, the city applies it. Where the law is silent, the city can adopt it through internal policy, procurement conditions or contract clauses. Annex 2 contains the full guidance.

U4SSC Guiding Principles. This chapter builds on the U4SSC Guiding Principles for Artificial Intelligence in Cities (Table 5), which are consistent with the OECD and UNESCO texts and with the European Commission High-Level Expert Group's requirement that AI be lawful, ethical and robust.

Table 5 – U4SSC Guiding Principles for AI in Cities in practice

Principle	What it means in practice for a city	Where in this Guide
Lawful	Confirm the legal basis and mandate for each AI use; check data protection, procurement, sector and AI-specific rules before design.	Step 4; Section 3.4.7
Privacy-preserving	Collect only the data needed; carry out a data protection impact assessment where personal data are processed; use privacy-enhancing techniques where feasible.	Sections 3.2 and 3.4.6; Step 5
Fair and inclusive	Test performance across groups and areas; keep assisted and non-digital channels; involve affected groups in design and review.	Sections 3.4.1 and 3.4.2; Step 5
Explainable and transparent	Tell people when AI is used and what role it plays; explain outputs in plain language; publish a register entry.	Section 3.4.3
Accountable	Name an accountable official for each system; keep decision records; provide complaint and review routes that reach someone able to act.	Sections 3.1 and 3.4.5; Annex 5
Safe and secure	Build security in from procurement; test under realistic conditions; plan for incidents, safe shutdown and recovery.	Sections 3.4.4 and 3.4.6
High-performing and robust	Set performance thresholds before deployment; validate on local data; monitor for drift and re-test after updates.	Section 3.4.2; Step 7

3.1 Why AI, and when not

Purpose first. Before adopting AI, assess whether it creates genuine public value compared with other options, taking into account not only efficiency gains but also its social, economic and environmental consequences. Faster or more automated processes do not necessarily deliver better collective outcomes if they undermine employment, human relationships, local knowledge or institutional capacity. The benefits of AI also depend on a well-defined problem, suitable local data, trained staff, equitable access and a city able to act on the results (Steps 2 to 4).

Choose a simpler or non-digital option when it would achieve the objective with fewer risks, when the data do not represent the people concerned, or when the city cannot govern the system. Favour systems that can be assessed, updated and replaced, and avoid dependence on a single supplier.

Decisions stay with people. Public decisions, above all those affecting people's rights, access to services, safety or public resources, are taken by identifiable people and institutions who remain responsible for them. AI is never the decision-maker. Officials understand enough of a system's outputs to question them, keep the authority and the time to depart from them, and remain answerable for the result. Approving an output without examining it is not human-led decision-making.

3.2 The traffic-light rule: safeguards matched to impact

Not every AI use needs the same safeguards. A tool that helps staff summarize documents does not carry the same risks as a system that helps decide who receives housing support. The Guide therefore applies **one proportionate rule throughout.**

People are not equally exposed to AI harms: the same system can affect individuals and communities very differently depending on the circumstances. Governance should, therefore, follow the actual role of AI and the likelihood and severity of harm, and be reviewed throughout the system's life.

Step 1 – A light check for every AI use. Before any AI use starts, the accountable official answers five questions and records the answers in the AI inventory:

1. **Purpose:** what is the AI used for, and which service or decision does it support?
2. **People:** who is affected, and could some groups be treated differently or left out?
3. **Role:** does the AI inform, recommend or act, and which person checks its work?
4. **Data:** which data does it use, including personal data, and where are they hosted?
5. **Stop:** can the city correct, override or switch it off, and keep the service running?

Step 2 – Classify the use and apply the matching safeguards (Table 6). If the light check shows that a use may significantly affect people's rights, safety or access to essential services, classify it as high impact. Classification depends on context: the same chatbot is lower impact when it gives opening hours and high impact when it decides eligibility. Record the reasons for each classification and reassess after any material change to the model, data, supplier, hosting, connected tools, permissions, the people affected or the risk profile.

When classifying, consider: whether AI informs, supports or takes action; scale, autonomy and links to other systems; the data used and their limits; effects on people, groups, services and rights; the consequences of errors, misuse or attacks and how easily they can be reversed; and effects on budgets, supplier dependence and the environment.

Table 6 – The traffic-light rule

Impact level	Typical city uses	Minimum safeguards
Lower impact (green)	Internal drafting, summarizing and search; translation of public information checked before publication; meeting transcription	Entry in the AI inventory (and the public register if resident-facing); staff policy on generative AI and basic AI literacy; human review before publication or use; data protection check, especially for generative AI tools

Impact level	Typical city uses	Minimum safeguards
Medium impact (amber)	Chatbots answering residents' enquiries; demand forecasting for service planning; prioritizing inspections or maintenance	All of the above, plus: documented risk assessment, including a screening of effects on people's rights (if the effects may be significant, treat the use as high impact); testing on local data across groups and areas; clear disclosure of AI use and an easy route to a person; public register entry; performance monitoring and periodic review
High impact (red)	Eligibility, prioritization or allocation of benefits, housing or social care; operation of critical infrastructure (energy, water, transport); emergency dispatch prioritization; surveillance or biometric identification in public space	All of the above, plus: digital human rights impact assessment (DHRIA) before deployment, repeated during use whenever conditions change in ways that may affect people's rights (required by law in some jurisdictions);[16] human-in-the-loop or human-on-the-loop oversight; independent review or audit; testing under realistic conditions and staged roll-out; consultation with affected groups and a published summary of the assessment; check whether national law prohibits or restricts the use

A full digital human rights impact assessment (DHRIA) is required only for high-impact uses, or where the law requires it. The minimum safeguards for each level, the levels of human involvement and common risks and mitigations are in Annex 2.

The tools that support each level including the AI inventory and register entry, the staff policy on generative AI, the core procurement clauses and the AI agent checklist are in the City Implementation Guide (Annex 5).

3.3 Five AI essentials for every city

Five measures provide most of the protective value at low cost. Every city, including small ones, can put them in place within the first 100 days.

1. **Know what you use.** Build an internal **inventory** of every AI and algorithmic system in use, including those supplied by contractors and generative AI tools used by staff.
2. **Set rules for staff.** Adopt a one-page **staff policy on generative AI**: which tools are approved, which data must never be entered, who checks outputs, and when residents are told that AI was used (Annex 5, Table A5.4).
3. **Protect the city in contracts.** Include the **core procurement clauses** in every digital and AI contract: ownership of and access to the city's data, export and exit, no use of city data to train supplier models without agreement, audit access, AI documentation, security and accessibility (Annex 5, Table A5.6). Many AI decisions are made at the moment of purchase, often inside a wider service contract (Case study 5, Tampere).

[16] For example, Regulation (EU) 2024/1689 (Artificial Intelligence Act) requires public bodies deploying certain high-risk AI systems to carry out a fundamental rights impact assessment (Article 27). Rules differ, or do not exist, elsewhere. Methods that cities can adapt are listed in Annex 2.

4. **Be transparent.** Tell people when AI is used in a service or decision that affects them, and publish a **public AI register**, starting with resident-facing and higher-impact systems (Annex 5, Table A5.8; Case study 6, Amsterdam and Helsinki).
5. **Keep a person reachable.** Keep a human contact point and a non-digital or assisted channel for every essential service, and make sure that complaints and requests for review reach someone with the authority to act.

3.4 The first 100 days in the AI era

Once the city has identified an urban challenge and is considering interventions that may involve AI, it can use the first 100 days checklist (Table 10) to prepare. The city establishes the governance arrangements that will support subsequent initiatives. The timeframe is indicative; the sequence of actions is the priority. Cities on the Essentials track (Table 3) can complete the actions marked (E) and add the others over time.

Table 7 – First 100 days checklist

Period	Actions	Done
Days 1–30: mandate and ownership	(E) The mayor or council formally adopts the four people-centred principles (council resolution, mayoral decision or digital charter).	☐
	(E) Designate an official or office accountable for smart city and digital matters, reporting to the mayor or city manager.	☐
	Set up a cross-departmental team: digital and IT, legal, procurement, finance, data protection, community engagement and the main service departments.	☐
	Identify the national and regional authorities whose rules apply (data protection, AI regulation, cybersecurity, procurement) and name a focal point in each.	☐
Days 31–60: stock-take and AI quick wins	Run the city readiness scan (Section 1.3.1) in one or two workshops, with residents' and civil society representatives where possible.	☐
	(E) Build an internal inventory of every technology project, including systems in use, including those supplied by contractors and internally deployed.	☐
	(E) Adopt the one-page staff policy on generative AI (Annex 5, Table A5.4).	☐
	List existing platforms, datasets and contracts that could be reused before anything new is bought.	☐

Period	Actions	Done
Days 61–100: first safeguards and first initiative	Classify every system in the inventory with the traffic-light rule (Section 3.2).	☐
	(E) Add the core procurement clauses (Annex 5, Table A5.6) to the city's standard contract terms.	☐
	Publish the first entries of the public AI register, starting with resident-facing and higher-impact systems.	☐
	Choose one or two priority urban challenges and start Step 1 for each.	☐
	(E) Report to the council on what was done, what was found and what comes next.	☐

Expected outputs at day 100: adopted principles; a designated accountable official and team; a completed readiness scan; an inventory of AI systems with impact classifications; a staff policy on generative AI; updated contract terms; first public register entries; and one or two initiatives under way.

3.5 Cities in action

The following examples illustrate how cities are addressing different aspects of responsible AI governance, from setting procurement safeguards and improving transparency to maintaining human oversight and responding to evidence of potential harm. They demonstrate that responsible AI is not defined by the adoption of technology alone, but also by the decisions, safeguards and accountability arrangements that shape its use throughout its lifecycle. Annex 3 provides the full case studies, alongside further examples of AI-enabled urban services and the lessons they offer for other cities.

Tampere, Finland. A model contract annex sets conditions for any AI that suppliers bring into municipal services. Lesson: set the rules before AI arrives (Case study 5).

Amsterdam and Helsinki. Public registers list each algorithmic system, its purpose, data, human oversight and a contact point. Lesson: transparency can start small, at low cost (Case study 6).

Buenos Aires, Argentina. The Boti assistant on WhatsApp answers residents' questions and hands over to a person when needed; generative AI was introduced through pilots. Lesson: build step by step and keep a person reachable (Case study 7).

Rotterdam, Netherlands. After an audit found a risk of biased outcomes in a welfare risk model, the city stopped using it and returned to random selection. Lesson: stopping is a responsible outcome (Case study 8).

4 The eight-step implementation cycle

In brief.

The cycle takes a city from an urban challenge to results it can measure, learn from and, where appropriate, scale. It works for a strategy or policy, a project and an AI project, and it is iterative: the results of each step determine what happens next, whether to proceed to the next step, revise, return to an earlier step, pause or stop. Not every step has the same weight for every initiative. Annex 1 gives the full guidance for each step, how it differs by type of intervention, and the tools and resources to use. Annex 3 presents fifteen case studies that show the steps used in practice.

The eight-step implementation cycle (table 8) provides the operational framework for putting this Guide into practice. It connects the people-centred smart city approach with guiding principles, frameworks and desired outcomes with the decisions and actions cities take to address urban challenges. Its purpose is not to promote technology adoption as an end in itself, but to help cities translate people's needs and priorities into effective, inclusive and accountable interventions, whether through policies, institutional or service improvements, digital technologies, AI or a combination of approaches. In this way, the cycle provides a common framework for turning the Guide's principles into measurable improvements in people's lives and in how cities function.

Table 8 – The eight steps of the implementation cycle

Step	Key question	Main output
1. Define	Which urban challenge needs to be addressed and what is the wished result?	Problem statement and desired outcome
2. Understand	What is the current situation against which the intervention will be designed and measured?	Baseline assessment
3. Prioritize	Which option, if any, helps achieving the outcome?	Option appraisal and decision record
4. Enable	Which conditions must be in place to adopt the intervention?	Enabling-environment gap analysis and action plan
5. Design	What are the intervention requirements and participation mechanisms ex ante and ex post?	Intervention design, safeguards and indicators
6. Implement	What does it take to deliver the intervention well?	Implemented and tested intervention
7. Measure	Is the intervention achieving the expected results?	Monitoring and evaluation evidence
8. Learn and adapt	What should be done next, if anything?	Decision to continue, adapt, institutionalize, scale, pause or stop

Apply three rules at every step:

1. **Record decisions and accountability.** At each step, trace accountable authority, people affected, stakeholders involved, available evidence and remaining uncertainty, safeguards and capabilities required, internal and external communication outreach, documentation inventory. Use the decision and accountability record (Annex 5, Table A5.7).
2. **Start from the people need.** Compare solutions among organizational, administrative and non-digital and digital options against people and communities' needs, not presuming that technology is the answer.
3. **Extend only on evidence.** Move forward (in the steps) or in considering other services, cities or beneficiaries only if justified by evidence and feasibility has been assessed.

Where to start. Implementing a people-centred approach requires vertical and horizontal collaborations, namely across levels of government and with other stakeholders, such as communities, civil society, the private sector and academia. Roles vary according to local mandates and capacities and therefore cannot be prescribed in full. Hence, table A1.2 (in Annex A1.2) provides an indicative starting point.[17] At each step, the city should identify the actors who need[18] to be involved, clarify their roles and establish arrangements for coordination, participation and accountability. This chapter provides a summary overview of the step-by-step implementation cycle, while the whole detailed cycle is explained in detail in Annex 1, with additional information, tools, resources and examples. Project managers and innovation officers are particularly encouraged to read the Annex.

4.1 Step 1: Define the urban challenge and the objective

This step helps cities establish what needs to change, for whom and to what end, before determining how to respond. It may be the starting point for a new strategy, policy or project, or a point of return when an existing initiative no longer reflects local priorities. By defining the challenge and the desired outcome from the perspective of people and communities, cities establish a reference for assessing options, designing interventions and evaluating results. Where objectives are already clear, cities may enter the cycle at another step and revisit this one if new evidence or circumstances call them into question.

Purpose: define the challenge and the change the city wants to achieve, before any solution is discussed.

Output: a one-page problem statement and desired outcome (Annex 5, Table A5.9).

[17] Additional stakeholder-specific recommendations are provided in UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025).

[18] Additional details and stakeholder specific recommendations can be found in the technical guidelines on people centred smart cities, UN-Habitat.

The problem statement should identify the urban areas or community groups that may be underserved or excluded, specify the location or area affected by the challenge, and describe its social, economic and environmental dimensions. It should also explain how the challenge relates to local, regional and national development priorities, while considering future pressures and trends that may influence its evolution, such as demographic change, migration, population density, climate risks, environmental degradation, increasing demand for services, technological change and changing livelihoods.

Why it matters

A clearly defined challenge is the reference point for every later decision. It helps the city:

- focus resources on real needs;
- separate the problem from possible solutions;
- identify the people and places most affected, and who should be involved;
- confirm legal authority, political legitimacy and ownership;
- consider all responses, including non-technological ones;
- set the outcomes against which progress will be measured; and
- stay aligned with the principles and outcomes in Chapter 2.

With AI: The availability of a new technology creates pressure to look for problems it could solve. A request to "deploy AI" or "build a platform" is not a problem statement. Start from the challenge, and only then decide whether technology can help.

What to do

1. **Describe the challenge:** the situation that needs to change, or emerging pressures (such as climate change, displacement, conflict or rapid urbanization) that may create challenges. Consider scale, location, causes and links with wider urban systems.
2. **Identify who is affected and who must be involved:** population groups, communities, service users, workers and institutions; whether impacts differ between neighbourhoods or groups; and who should be involved, and when.
3. **Define the desired outcome:** what should change for people and the urban environment, linked to the relevant principles. These outcomes will guide indicator selection later.
4. **Look at the wider ecosystem:** the social, economic, environmental, institutional, regulatory and technological factors behind the challenge, and the role of actors outside the city administration. Problems that look technical often have institutional, financial or capacity causes.
5. **Set the scope and ambition:** decide whether the challenge needs a strategy, policy or regulation, a programme or project, capacity development, or a combination.

6. **Engage residents to confirm priorities:** learn about their needs, values and experience of technology and city services, and compare it with available data. Include groups that are often overlooked, such as people with disabilities, people with limited digital or literacy skills, women, people experiencing homelessness, people without regular immigration status and minority groups.
7. **Confirm ownership and commitment:** identify who will lead and support the intervention and, if the city decides to proceed, confirm the political, institutional and financial commitment. Anchor the intervention in the city's statutory planning and budgeting instruments.

Check before moving on: Is the challenge framed from people's perspective? Are affected and under-served groups identified? Is the desired outcome clear?

4.2 Step 2: Understand the starting point and establish a baseline

This step establishes a grounded understanding of the current situation, including the experiences of affected communities, existing services and capacities, available evidence and its limitations. Cities may begin here when reviewing an ongoing initiative, investigating service gaps or preparing to improve an existing approach, without first redefining an objective that is already established. The baseline informs the assessment of options, the identification of enabling conditions and the measurement of subsequent change. Where significant gaps or unexpected needs emerge, the findings may also lead cities to reconsider the original challenge or desired outcome.

Purpose: understand the city's current situation in relation to the challenge.

Output: a baseline assessment, used to compare options (Step 3) and measure progress (Step 7).

This step examines the specific challenge, services and people affected in greater depth. Depending on the intervention, assess relevant policies and regulations, services, infrastructure and technologies, data, institutional arrangements, digital maturity, human and financial resources, and ongoing initiatives and investments. Identify existing capacities and constraints.

- **Keep the assessment proportionate**. A city-wide strategy may require a broad review of digital, institutional and governance readiness, while a specific project may focus on the relevant services, workflows, data, infrastructure and organizational capacities.
- **Build on what already exists.** Assess whether existing systems, services, policies or investments can be reused, adapted, connected or updated before creating or procuring something new.

Listen to residents and identify who is missing from the data. Use surveys, town halls, digital platforms and participatory workshops to understand people's experiences, priorities and the areas and groups affected. Consult broadly for strategies and policies, and focus on directly affected groups for projects. Disaggregate data, where possible, by gender, age, population group, location and socio-economic conditions. Existing datasets may overlook people in informal settlements, informal employment or unregistered tenure, particularly in many cities of the Global South.

Complement administrative records with household and street surveys, community-led enumeration and mapping, participatory audits (such as women's safety audits), and earth-observation data verified on the ground (Case study 3). Collect sensitive data only with people's agreement and appropriate safeguards, so that being counted does not expose them to eviction, sanctions or other harm. Document remaining data gaps to ensure that people absent from datasets are not treated as absent from the city.

Why it matters

A baseline helps the city identify strengths, gaps, risks and constraints; build on existing initiatives; assess feasibility, potential impacts and residents' needs; set realistic expectations; and define indicators and data to measure progress and outcomes.

With AI: check whether the city has the conditions to use AI responsibly – representative data, infrastructure, skills, ownership and oversight, and the applicable law.

What to do

1. **Map stakeholders:** identify relevant internal departments and external actors, clarify the purpose of the assessment and explain their expected roles.
2. **Design and conduct the assessment:** select areas proportionate to the intervention, going beyond the readiness scan where needed.
3. **Screen feasibility and risks:** Conduct early pre-feasibility and impact screening, including technological risks and their potential impacts.
4. **Analyse the evidence:** examine qualitative and quantitative data for exclusion patterns, missing groups and inconsistencies; assess whether the evidence is sufficient.
5. **Validate and communicate findings**: consult relevant actors and stakeholders through surveys, interviews or town halls and share results tailored to their roles.
6. **Link findings to outcomes:** Define early indicators and connect them to expected results.

Check before moving on: Do we have an evidence-based picture? Have existing solutions been considered? Who is missing from the data?

4.3 Step 3: Prioritize

This step helps cities decide whether an intervention is needed and which response is most appropriate to the desired outcome. It brings together evidence on needs, feasibility, public value, risks and alternatives, including organizational, policy, non-digital and technological approaches. Cities may enter here when choosing among existing proposals, reconsidering an investment or deciding whether to continue with a proposed solution. The resulting decision can guide the

preparation of enabling conditions and intervention design, or lead the city to gather further evidence, redefine its priorities or decide not to proceed.

Purpose: decide whether to act and which response is most appropriate.

Output: an option appraisal and decision record (Annex 5, Table A5.7 and Table A5.10). Building on Steps 1 and 2, the city works through four questions:

1. **Is action needed?** Reconfirm the diagnosis and desired outcomes with relevant stakeholders, including affected people where possible. Agree on prioritization criteria guided by the people-centred smart city principles and expected outcomes, while considering costs and benefits, feasibility, lifecycle costs, risks, social and environmental impacts, institutional capacity and available resources.
2. **What are the possible options?** Consider service redesign, policy or administrative reform, capacity development, investment in existing systems, new digital solutions and, where relevant, AI. Technology should be chosen only when it adds value and its benefits justify its risks compared with alternative approaches.
3. **Which option, or combination, fits best?** Compare options against the agreed criteria, considering trade-offs, dependencies, sequencing, resources and long-term sustainability to avoid fragmented pilots and unnecessary investments.
4. **Should the city proceed, modify, defer or not proceed?** Make a transparent, evidence-based decision on which option to pursue, which require further assessment and which should not proceed.

Public decisions must remain human-led. Digital technologies and AI may support the analysis and comparison of options, but the responsible public authorities must make and justify decisions, considering the evidence, uncertainties, trade-offs and views of affected communities. Accountability cannot be delegated to technology.

Why it matters

Prioritization turns the diagnosis into an informed decision. It helps cities determine whether action is needed, whether existing solutions can be used, whether digital technology or AI is appropriate, who may benefit or be harmed, whether the necessary conditions are in place, and how options contribute to the desired outcomes and people-centred principles. It also helps assess the consequences of inaction or delay and sequence interdependent interventions. This prevents choices driven primarily by technological availability, supplier pressure, political visibility or short-term opportunities.

With AI: ask what AI adds that a simpler option does not, and whether the benefits justify the risks, costs and governance required. The Step 3 decision tree is in Annex 1 (Figure A1.1).

What to do

1. Reconfirm the priorities and desired outcome from Steps 1 and 2.
2. Identify possible courses of action and agree on prioritization criteria across departments.
3. Compare options against the criteria, assessing trade-offs, dependencies, risks and any need for further assessment.
4. Select the intervention or combination of interventions that best addresses the challenge and desired outcomes.
5. Document the decision, rationale, criteria, evidence, trade-offs and stakeholders consulted, and communicate the outcome to internal and external stakeholders.

Check before moving on: Were alternatives, including not proceeding, considered? Is the choice proportionate? If AI is chosen, is it justified?

4.4 Step 4: Build the enabling environment

This step examines whether the institutional, regulatory, financial, technical and human capacities needed for an intervention are in place, and what must be strengthened before or during implementation. It can serve as an entry point for cities facing governance, procurement, infrastructure or capacity constraints, including those seeking to improve the conditions for initiatives already under way. The assessment helps determine what can be delivered responsibly and sustainably, while identifying gaps that may require adjustments to the chosen approach, its design or its implementation timetable. Enabling conditions may need to be reassessed as circumstances and requirements change.

Purpose: identify and close the gaps that would prevent responsible delivery.

Output: an enabling-environment action plan with owners and dates.

Building on the baseline from Step 2, this step identifies the conditions needed to introduce, govern, maintain and adapt technologies, data and digital services safely and sustainably. The assessment should be proportionate to the intervention, from a specific service improvement to a city-wide strategy, and cover four connected areas:

- **Governance and regulation:** mandates, coordination, accountability, data governance, privacy, cybersecurity, procurement rules and the applicable legal framework.
- **Digital public infrastructure, data and services:** connectivity, infrastructure, interoperability, data availability and openness, platforms and systems.
- **Capacity, skills and knowledge:** technical, legal, data, AI, cybersecurity and media and information literacy skills for institutions and residents.

Partnerships, procurement and financing: partners, funding, procurement arrangements, community engagement and long-term operating resources.

Not every condition must be in place before work begins. Distinguish **critical gaps that must be closed before proceeding**, gaps that can be addressed during implementation, and gaps beyond municipal authority that require coordination across levels of government. Reassess enabling conditions as the intervention evolves, particularly when its scope, technology, suppliers, data requirements or operating model change Annex 1, Section A1.6.

Why it matters

A technically sound solution can still fail if the institutions responsible lack the authority, skills, infrastructure, resources or safeguards to manage it. Assessing these conditions early helps cities clarify accountability, identify constraints, avoid fragmented systems and vendor lock-in, protect data, build institutional capacity, support participation and trust, and sustain value beyond the initial investment.

With AI: confirm that the city can classify, test, oversee and, if needed, switch off the system, and put the core procurement clauses in the contract (Annex 5, Table A5.6).

What to do

1. **Clarify ownership and responsibilities.** Identify who decides, oversees, implements, operates and monitors the intervention; and which departments and levels of government need to coordinate. A task force, steering committee or designated unit can bring departments together with clear decision-making.
2. **Review governance and safeguards.** Assess relevant legal, regulatory and policy requirements, including privacy, data sharing, cybersecurity, accessibility, non-discrimination, procurement and, where relevant, AI governance, human oversight and accountability.
3. **Assess infrastructure and data.** Review connectivity, platforms, data quality, sharing arrangements, interoperability, cybersecurity, continuity and maintenance. Prioritize reusable systems and open standards; assess hosting, supplier access to data, data export and exit arrangements.
4. **Identify capacity and partnership needs.** Compare required skills and resources with the baseline from Step 2. Plan capacity development and consider shared services, inter-municipal cooperation, city networks and support from government, academia, civil society and other partners.
5. **Review procurement, financing and outstanding gaps.** Prepare a budget for the whole lifecycle, including acquisition, operation, maintenance, security, staff capacity, upgrades and eventual replacement or exit. Assess supplier accountability, data ownership, licensing, interoperability, lock-in, sustainability and accessibility requirements. Record gaps in an action

plan, those to close before proceeding, those to close during implementation, and those outside the city's authority. The core procurement clauses in Annex 5 (Table A5.6) are a starting point.

Check before moving on: Is there an accountable authority with a mandate? Are the safeguards in place? Are operating resources secured? Are critical gaps closed or scheduled?

4.5 Step 5: Design solutions for and with people

This step translates a chosen direction into an intervention that can be delivered, used and assessed, with the participation of the people and communities concerned. Cities may enter here when redesigning an existing service, adapting a solution to a new context or improving an intervention whose objectives and feasibility have already been established. Design brings together user needs, operational requirements, safeguards, accessibility, participation arrangements and indicators of success. The process may reveal issues that require revisiting the evidence, the selected option or the enabling conditions before implementation proceeds.

Purpose: turn Steps 1 to 4 into the design of the intervention, with the people affected.

Output: the design, with safeguards, a delivery plan and indicators.

The intervention should be **people-centred by design**, with the needs, experiences, constraints and priorities of affected people shaping its scope, features, delivery model and safeguards.

Digital engagement can widen participation, but it cannot replace the social contract, collective deliberation or sustained relationships between communities and public authorities. Organized civil society has a critical role beyond digital consultations, helping communities shape priorities, influence decisions and participate throughout implementation.

Design should reflect the type of intervention: a policy, digital service and AI system require different approaches.

Why it matters

Design choices shape who benefits, who may be excluded, what data are collected, how decisions are made and how rights are protected. People-centred design helps ensure that interventions are accessible, safe, responsive to people's needs and compatible with existing services and policies, with mechanisms to challenge decisions and improve results.

With AI: apply the traffic-light rule (Section 3.2): classify the use, apply the matching safeguards, carry out the digital human rights impact assessment (DHRIA) before deployment for high-impact uses or where the law requires it, define the level of human involvement and, for AI agents, the mandate and stop mechanisms. Prototype and test with users.

What to do

1. **Define needs with affected people.** Identify users and groups at risk of exclusion, establish priorities and desired outcomes, and confirm whether a digital or AI approach is appropriate.
2. **Co-design the intervention.** Involve residents, communities and relevant stakeholders through accessible methods while design choices can still change. Translate their input into objectives, scope, delivery model, accessibility requirements and safeguards, recording how feedback influenced the design.
3. **Assess impacts and validate the design.** Assess differentiated impacts and risks before finalizing the design. For policies and strategies, assess impacts and invite comments on drafts; for services and technologies, prototype and test with users.
4. **Establish feedback and accountability.** Define how people can provide feedback, challenge outcomes and raise concerns, and how these will trigger review.
5. **Set responsibilities and milestones.** Agree roles, coordination, resources, timelines, deliverables and review points, including coordination with other levels of government where needed.
6. **Define indicators and monitoring.** Align indicators with Step 1 outcomes, add project-specific indicators, and agree monitoring and review frequency (Chapter 5).
7. **Confirm readiness and AI safeguards.** Check that the priority enabling conditions from Step 4 are in place**.**

Check before moving on: Did participation visibly change the design? Can everyone access the service, including offline? Can people give feedback and see it acted on?

4.6 Step 6: Implement

This step turns plans and commitments into action, whether through a strategy, policy, programme, service improvement or specific project. Cities may begin here, for example, when they already have an agreed intervention to deliver, while checking that the necessary responsibilities, resources and safeguards are in place. Implementation involves coordinating delivery, testing arrangements in practice and responding to feedback and emerging risks. What is learned during implementation may require adjustments to the design or enabling conditions, while providing the evidence needed to assess whether the intervention is achieving its intended results.

Purpose: put the designed intervention into action, keeping the people-centred requirements alive in contracts, procedures and operations.

Output: an implemented and tested intervention, with operating procedures and monitoring in place.

Implementation brings together the institutional arrangements, resources, partnerships, procurement, capacity, safeguards and operating processes needed to move from design to delivery. Whether the city is implementing a policy or a technology, it should set clear responsibilities, secure resources, manage risks, keep safeguards working, keep building capacity and use evidence to adjust.

A strategy is not the end point. Its purpose is to set priorities, directions and enabling conditions that are then delivered through a portfolio of concrete actions and projects, technological or not, some of which require investment, procurement, training, partnerships or new infrastructure. For simplicity, this step considers a strategy whose implementation plan includes technology pilot projects and investments; readers can pick the relevant activities using Table A1.8 (Annex 1).

Why it matters

Implementation is where commitments become operational. Participation, accessibility, safeguards, accountability, training of staff and residents, sustainability and attention to differentiated impacts must continue once delivery begins. Implementation should also generate the evidence and feedback that allow the city to spot problems, learn and adapt. For strategies and policies, implementation means translating priorities and commitments into a coordinated portfolio of actions, programmes and projects, which may be technological or non-technological. Each action may require different institutional arrangements, resources, partnerships and implementation timelines. The adoption of a strategy is therefore a starting point for delivery, not its completion.

With AI: validate the system on local data before deployment, re-test after supplier model updates, record the system in the inventory and register, and name the official who manages the supplier.

1. **Set up implementation arrangements.** Define responsibilities for delivery, decisions, coordination and oversight, and secure the necessary institutional, human, technical and financial resources.
2. **Prepare an actionable plan.** Set out sequenced actions, deliverables, milestones, responsibilities and required resources, including procurement, partnerships, capacity building and operating costs. For strategies, develop an implementation roadmap covering priority projects, programmes, institutional reforms and capacity building.
3. **Deliver, test and adapt.** Prefer pilots, prototypes or phased roll-out to test assumptions first. Test technologies for technical performance, usability and safety. Monitor milestones, resources, results and risks, and adjust implementation as needed.
4. **Operationalize safeguards and accountability.** Embed Step 5 safeguards and Step 4 governance requirements in contracts, procedures and oversight arrangements, proportionate to the intervention's risks (Annex 2, Table A2.1). Maintain channels for participation, feedback, complaints and incident reporting. Use regulatory sandboxes, testbeds or living labs where appropriate, with safeguards and clear criteria for wider deployment. Document how

feedback and complaints are addressed and, where appropriate, how they lead to changes in implementation, safeguards or service delivery.

5. **Build operational capacity.** Equip staff, partners and users with the skills, knowledge and support needed to operate the intervention safely, including training, technical support and updated workflows. Engage municipal staff and their representatives early on changes to their work and provide appropriate training, recognizing the continued importance of their professional judgement.

Check before moving on: Are responsibilities clear and resources sufficient? Has the intervention been tested? Are the safeguards working? Can the city sustain it?

4.7 Step 7: Measure progress and impact

This step examines whether an intervention is producing the intended changes for people, communities and the city, including who benefits and who may be left behind. It can be an entry point for cities seeking to assess an existing service, programme or technology, even when the earlier stages of its development were not documented through this cycle. Monitoring combines indicators, available data and feedback from affected communities, while recognizing the limitations of the evidence. The findings can inform immediate improvements, prompt a reassessment of objectives or design, and support decisions about the intervention's future.

Purpose: find out whether the intervention is making the intended difference, and for whom.

Output: monitoring and evaluation evidence for the Step 8 decision.

The city assesses whether the intervention is achieving its intended outcomes and advancing the relevant principles. Measurement distinguishes four levels: **implementation performance, outputs, outcomes and, where feasible, longer-term impacts**. Indicators may cover technical performance, data management, civic engagement, benefits to people and society, equality and rights. Measurement should reflect the intervention's scale, maturity and potential effects; longer-term social and economic impacts of policies may take five to ten years to assess.

Step 7 builds on Step 1 outcomes, the Step 2 baseline, Step 3 criteria and expected value, Step 5 indicators and monitoring frequency, and operational data from Step 6. **Monitoring** tracks performance regularly to enable timely corrections; **evaluation** assesses what changed and why, during or after implementation. Combine quantitative and qualitative evidence, disaggregate results by relevant population groups and places, and look for unintended effects that indicators may not capture.

Why it matters

Measurement helps the city determine whether the intervention delivers its intended outcomes, generates public value and advances people-centred principles. It reveals differences in benefits

and harms across groups and places, identifies unintended effects, and checks whether safeguards work in practice. By combining performance data with people's experiences, the city can strengthen transparency and accountability, understand what needs to change, and make evidence-based decisions about whether to adapt, strengthen, expand or stop the intervention. For digital and AI interventions, this means assessing technical performance alongside social, institutional, environmental and rights-related outcomes.

With AI: monitor accuracy, staff overrides, complaints, incidents, system drift and differences in performance across population groups. For high-impact systems, repeat the DHRIA when changes in conditions may affect people's rights, and re-test after system changes.

What to do

1. **Collect evidence.** Use the agreed measurement framework and existing administrative and operational data wherever possible to limit additional data collection burdens.
2. **Compare and analyse results.** Compare findings with the Step 2 baseline, disaggregate results by relevant population groups and places, and assess intended and unintended effects, including exclusion, privacy, safety, environmental impacts and public trust.
3. **Combine data with people's experiences.** Use surveys, interviews, focus groups, complaints, feedback mechanisms and community engagement. Where useful, partner with universities, research networks, civil society and other organizations to support research and evaluation.
4. **Investigate shortfalls and risks.** Identify whether gaps arise from implementation, the original diagnosis, design, enabling conditions, external circumstances or incorrect assumptions. Check whether safeguards are effective in practice and repeat the DHRIA *ex post* where appropriate.
5. **Document and communicate findings.** Share results, limitations and uncertainties with decision-makers, affected communities and other stakeholders in accessible formats.
6. **Prepare the Step 8 decision.** Determine whether to continue, reassess, institutionalize, expand, replicate, pause or stop the intervention.

Check before moving on: Are results compared with the baseline? Are benefits and harms fairly distributed? Is there enough evidence to decide?

4.8 Step 8: Learn, adapt and scale

This step turns evidence and experience into decisions about what should happen next. Cities may enter here, for example, when reviewing an established intervention, considering its expansion or replication, or deciding whether it should be adapted, institutionalized, paused or discontinued. Learning requires examining results alongside changing needs, risks, resources and local conditions, rather than assuming that an approach should continue simply because it has been implemented. The decision may lead to a new cycle of assessment, design or implementation, particularly when an intervention is transferred to another service, population or urban context.

Purpose: decide the future of the intervention.

Output: a recorded decision to continue, adapt, institutionalize, scale or replicate, pause or stop, and the start of the next cycle.

The city uses the evidence from implementation and measurement to decide the future of the intervention. Decisions should consider public value, contribution to intended outcomes, distribution of benefits and impacts, performance, risks, costs, sustainability and the city's capacity to maintain it. Adaptation may involve operational changes, redesign, stronger safeguards or enabling conditions, or a fundamental rethink. Successful interventions may be integrated into regular policies, services and budgets, or scaled or replicated in other contexts.

Scaling is not simply doing more of the same. Before expanding or replicating an intervention, the city should confirm that the evidence is robust and that the conditions for success exist in the new context. Solutions may need adapting to local needs, capacities and risks. Pausing, redesigning or stopping an intervention that does not deliver is a legitimate and responsible outcome (Case study 8, Rotterdam). Step 8 closes one iteration and starts the next.

Why it matters

Technologies evolve, needs change, new risks emerge and initial assumptions may prove wrong. A people-centred city must be able to learn, adapt and change course while keeping residents informed and involved. Step 8 helps cities use evidence to improve or stop underperforming interventions, strengthen safeguards, institutionalize successful approaches, assess readiness to scale or replicate, share lessons and redirect resources from interventions that no longer justify their costs or risks.

With AI: decide whether the system should be maintained, retrained, redesigned, replaced, expanded or withdrawn. **Pausing, redesigning or stopping is a legitimate and responsible outcome** (Case study 8, Rotterdam).

What to do

1. **Review the evidence and lessons.** Bring together the Step 7 findings, implementation experience from Step 6, feedback from people and communities, and changes in the wider environment.
2. **Re-examine the original assumptions.** Check whether the problem, needs, priorities, technology or context have changed. If the original diagnosis is no longer valid, return to Step 1 or 2.

3. **Decide.** Continue, adapt, pause or stop. Record the evidence and the reasons. If the intervention is to be stopped, prepare a responsible transition or exit plan (Annex 1, Section A1.10).
4. **Adapt and improve.** Where the intervention continues, identify necessary improvements to effectiveness, accessibility, sustainability, safeguards, user experience or performance. Put significant changes through the relevant earlier steps again.
5. **Institutionalize what works.** Embed successful interventions in regular policies, services, institutions, budgets, procedures and capabilities, to avoid isolated or temporary pilots.
6. **Assess readiness to scale or replicate.** Confirm sufficient evidence of value, appropriate enabling conditions, fit with the new context, consideration of affected groups and relevant principles, adequate infrastructure, capacity and financing, and appropriate safeguards and system integration.
7. **Capture and share lessons.** Document what worked, what did not, why and under what conditions, and share lessons across departments, stakeholders and other cities. Cities are encouraged to contribute their use cases and lessons to U4SSC.
8. **Start the next cycle.** Return to the step that best addresses the change needed (Table A1.10).

Check before closing the cycle: Is the intervention delivering sufficient public value? Can it be sustained? Is there enough evidence to scale it, or a responsible exit plan if it stops?

4.9 Cities in action

The following examples illustrate how cities and their partners are applying different aspects of the eight-step implementation cycle to address urban challenges, according to their priorities, capacities and local contexts. They cover the development of a people-centred city strategy, the adaptation and validation of a technology-enabled mapping tool, and an integrated approach combining land rights, infrastructure improvements and community participation. These examples do not represent a fixed sequence or the completion of all eight steps. Annex 3 provides the full case studies and additional examples of how different approaches and combinations of steps can support people-centred urban outcomes.

Windhoek, Namibia. Readiness assessments, a policy review and stakeholder engagement produced the People-Centred Smart City Strategy 2026–2036, starting with the enabling conditions (Case study 2).

eThekwini, South Africa. The Building & Establishment Automated Mapper tool, developed by UNITAC, maps building footprints from aerial imagery, cutting mapping time from months to about 72 hours and informing local housing and other relevant decisions and policies. A main lesson from its replication in other 8 cities in Latin America, Cape Town and Namibia, is that each new city needs local data, skills and validation: assess, adapt, test, validate, then scale (Case study 3).

Lagos, Nigeria. The WIFT Manufacture-to-Market Accelerator combined skills development, entrepreneurship, access to finance and market opportunities to support women in the fashion and garment sector. A pilot involving 50 participants informed subsequent programme expansion, illustrating how people-centred interventions can address economic barriers and adapt through practical experience (Case study 1).

Odisha, India. The Jaga Mission combined land rights, drone mapping, infrastructure and resident participation, with 50 per cent women's participation, upgrading 585 settlements and granting land rights to 175 000 families (Case study 15).

5 Monitoring, evaluation and continuous improvement

In brief.

Chapter 5 helps cities build, update or review a **city-wide** monitoring and evaluation (M&E) framework: the third purpose in Section 1.2. It offers a six-step method (Section 5.1), a starting set of indicators built on the U4SSC Key Performance Indicators (Section 5.2), supplementary indicators on responsible AI and participation (Section 5.3), guidance on linking project results to city results (Section 5.4), and guidance on evaluation (Section 5.5) and adaptive management (Section 5.6). It does not impose a single framework.

Steps 7 and 8 of Chapter 4 monitor and adapt one policy, strategy or project to solve an urban problem. Chapter 5 guides the city on how to measure the smart city as a whole, considering all initiatives, capacity, resources, and so on, together, and assessing whether it is moving towards achieving the desired outcomes in Section 2.3. While there should be alignment in the principles and outcomes selection between the city-level and the single intervention, expecting the latter contributes to city-level goals, the M&E and KPIs are expected to differ. M&E is important also

because results are key to inform priorities, budgets and governance comprehensively, as a good scoring in one initiative does not, on its own, show city-wide progress towards being a people-centred smart city.

The chapter builds on the U4SSC Key Performance Indicators (KPIs) and their alignment with the UN-Habitat Global Urban Monitoring Framework (UMF). Where the two are aligned, data collected for the U4SSC KPIs can also support UMF monitoring, so cities do not need a parallel system. Table 9 shows the chain from principles to impact that the chapter follows.

Table 9 – From principles to impact: the monitoring chain

Link in the chain	Key question	Builds on	Output
1. Principles	What does the city want to uphold?	Section 2.2; readiness scan (Section 1.3.1)	Priority principles
2. Desired outcomes	What change is expected for people, the city and its systems?	Section 2.3; Step 1	Outcome statements
3. Indicators and KPIs	How will progress be measured?	Sections 5.2–5.3; Annex 4 (Table A4.1); Step 5	Core and supplementary indicator set
4. City-level framework	Who measures what, when, and for which decision?	Section 5.1; baseline (Step 2); enabling gaps (Step 4)	Framework with baselines, targets, responsibilities and review calendar
5. Evaluation and adaptation	What results were achieved, who benefited, why, and what next?	Sections 5.4–5.6; Steps 7–8	Evaluation findings and decisions

5.1 Building a city-level monitoring framework

Cities can build their framework in six steps, building on work already undertaken through the implementation cycle.

1. **Confirm purpose, scope and ownership.** Decide which decisions the framework is expected to inform (e.g., strategy review, budget allocation, reporting to the city council or Voluntary Local Reviews of the SDGs) and designate a lead unit to collect data, monitor performance and design action plans as well as follow up.
2. **Select principles and outcomes.** Start from the principles and the outcomes prioritized by the city based on the readiness scan (Section 1.3.1). Cities might need to strengthen certain principles and target one outcome more than another, hence different KPIs would need to be set.
3. **Select indicators.** Start from the core KPIs' set in Section 5.2, using the alignment between the U4SSC KPIs and the UMF, and add supplementary indicators (Section 5.3) where the KPIs do not cover an outcome. Initiative indicators develop in Step 5 should be aligned to city-wide ones and vice versa.

4. **Set baselines and targets.** Use the baseline from Step 2 and the evidence on enabling conditions from Step 4. Where a number is not appropriate, record the expected direction of change.
5. **Organize data, responsibilities and the review cycle.** For each indicator, the city must record: the outcome and decision it informs; definition, unit, baseline and target; data source, quality, limitations and gaps (including missing groups or areas); who provides and verifies the data; and the collection and review schedule. Use the indicator-specification sheet (Annex 6).
6. **Report, review and act.** Publish results in accessible formats, discuss them with residents and stakeholders, and use them in the decisions described in Section 5.6. Align the review calendar with the planning and budget cycle and present results to the city council at least once a year.

Cities with limited data capacity can start with fewer indicators for which reliable data exist and add more as capacity grows, keeping in mind limitation in progress tracking. Keep definitions stable; record any change in definition, source or method and whether it affects comparability.

> **Indicators only show people represented in datasets.** Where informality is widespread, city-level results may overstate progress because people living in informal settlements or working informally are under-represented. For each indicator, state which groups and areas are not covered, work to close the main gaps over time (Step 2), and read results together with qualitative evidence from communities and civil society organizations.

Methodologies cities can use or combine

- U4SSC KPIs for Smart Sustainable Cities: 91 core and advanced indicators across the Economy, Environment, and Society and Culture dimensions, with a collection methodology and SDG references. Suitable for a city-wide baseline and comparison with other cities. Most are aligned with UMF indicators, and they can help cities report progress towards the SDGs.
- U4SSC, Digital Transformation Assessment of People-Centred Cities – Performance and Impact Assessment Guide (2026): a structured assessment of the performance and impact of digital transformation, usable alongside this chapter.
- U4SSC, AI-Driven Urban Key Performance Indicators: guidance on AI-derived indicators.
- UN-Habitat Global Urban Monitoring Framework: for alignment with SDG and New Urban Agenda reporting, including Voluntary Local Reviews.
- National statistical and SDG frameworks: for data that cities cannot collect themselves.

5.2 Core thematic areas and indicators

The city does not need to invent new indicators. This Guide recommends the **U4SSC Key Performance Indicators for Smart Sustainable Cities** as the internationally agreed framework for monitoring a people-centred smart city. Their use is **voluntary, not mandatory**: cities can start small, combine them with national or local indicators, and add more as their capacity grows. The U4SSC KPIs are 91 core and advanced indicators across the Economy, Environment, and Society and Culture dimensions, based on Recommendation ITU-T Y.4903, with an agreed collection methodology and SDG references.[19] They give the city:

- **a recognized baseline** that can be compared over time and with other cities;
- **one data effort for several purposes:** the U4SSC KPIs are aligned with the UN-Habitat Global Urban Monitoring Framework (UMF), so the same data can support SDG and New Urban Agenda reporting and Voluntary Local Reviews, and cities do not need a parallel monitoring system;[20]
- **an optional verification route:** cities can share their KPI results through U4SSC, which publishes city snapshots and case studies, showcasing progress, achievements and good practices. To date, U4SSC has supported over **350 cities worldwide**, including Quito (Ecuador) in 2025 and San Pedro de Macorís (Dominican Republic) in 2026, among others.

The mapping shows where existing KPIs are strong and where gaps remain. The U4SSC KPIs cover connectivity, basic services, environmental performance and resilience well, and, therefore, much of the "better functioning cities" outcome. They include few measures of participation, digital rights, sustainability, responsible AI and institutional capacity, which are central to the "stronger systems" and "improved quality of life" outcomes. The supplementary indicators help address these gaps.

Table 10 proposes, for each principle, core thematic areas and two sets of U4SSC KPIs: a basic set (core KPIs that most cities can produce) and an advanced set (for cities with more data capacity), plus the relevant supplementary indicators from Section 5.3. The full mapping of all U4SSC KPIs is in Annex 4 (Table A4.1).

[19] Recommendation ITU-T Y.4903, *Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals*; U4SSC, *Collection Methodology for Key Performance Indicators for Smart Sustainable Cities*. https://www.itu.int/pub/T-TUT-SMARTCITY-2017-9

[20] UN-Habitat, *Global Urban Monitoring Framework*. https://unhabitat.org/the-global-urban-monitoring-framework

Table 10 – Core thematic areas and indicators by principle (indicative)

Principle and thematic areas	Basic set: U4SSC core KPIs	Advanced set: U4SSC advanced KPIs	Supplementary
1. Shared prosperity – access to opportunities and income; basic services and housing; digital access	Household Internet Access (EC:ICT:ICT:1C); Unemployment Rate (EC:P:EM:1C); Youth Unemployment Rate (EC:P:EM:2C); Gender Income Equity (SC:SH:SI:1C); Gini Coefficient (SC:SH:SI:2C); Poverty (SC:SH:SI:3C); Access to Electricity (EC:I:ES:3C); Basic Water Supply (EC:I:WS:1C); Informal Settlements (SC:SH:HO:1C)	Small and Medium-Sized Enterprises (EC:P:IN:3A); ICT Sector Employment (EC:P:EM:4A); Housing Expenditure (SC:SH:HO:2A); Child Care Availability (SC:SH:SI:5A); Public Transport Network Convenience (EC:I:T:2A)	S4, S6
2. Sustainability, resilience and crisis response – emissions and environmental quality; resource efficiency; ecosystem preservation and adaptation, biodiversity; disaster risk and continuity of services	GHG Emissions (EN:EN:AQ:2C); Air Pollution (EN:EN:AQ:1C); Renewable Energy Consumption (EN:E:E:1C); Water Supply Loss (EC:I:WS:3C); Electricity System Outage Frequency (EC:I:ES:1C); Green Areas (EN:EN:PSN:1C); Natural Disaster Related Deaths (SC:SH:SA:1C); Disaster Related Economic Losses (SC:SH:SA:2C)	Resilience Plans (SC:SH:SA:3A); Population Living in Disaster Prone Areas (SC:SH:SA:4A); Protected Natural Areas (EN:EN:PSN:3A); Green Area Accessibility (EN:EN:PSN:2A); Water Supply ICT Monitoring (EC:ICT:WS:2A); Electricity Supply ICT Monitoring (EC:ICT:ES:2A); Public Building Energy Consumption (EN:E:E:4A)	S8, S11
3. Community participation and collaboration – participation in decisions; open government; collaboration and trust	Voter Participation (SC:SH:SI:4C)	Open Data (EC:ICT:PS:1A); e-Government (EC:ICT:PS:2A); Public Sector e-Procurement (EC:ICT:PS:3A)	S5, S10
4. Inclusive, open, interoperable, safe and secure digital space – connectivity and access; skills; rights, accountability and responsible AI; security	Fixed Broadband Subscriptions (EC:ICT:ICT:2C); Wireless Broadband Subscriptions (EC:ICT:ICT:3C); Wireless Broadband Coverage (EC:ICT:ICT:4C); Student ICT Access (SC:EH:ED:1C); Adult Literacy (SC:EH:ED:4C)	Availability of WIFI in Public Areas (EC:ICT:ICT:5A); Electronic Health Records (SC:EH:H:6A)	S1, S2, S3, S4, S7, S8, S9

Using the basic and advanced sets

- A city wishing to begin measuring its performance in being a people-centred smart city can choose two to four basic-set KPIs per principle, plus supplementary indicators S1 to S5, which come largely from records the city creates when applying Chapter 3 and Chapter 4.
- Cities with more capacity can add advanced-set KPIs, supplementary indicators S6 to S11 and local indicators for their priority sectors.
- Wherever possible, disaggregate results by gender, age, disability, income and area. Where indicators are combined into a dashboard or composite score, explain the calculation and weighting and keep individual indicators visible. Do not use composite results to rank cities without an agreed, transparent methodology.

5.3 Supplementary indicators for people-centred and responsible AI governance

The indicators in Table 11 are proposed to fill the gaps identified in Section 5.2. They are offered for testing by cities; their definitions should be refined through expert review and practical use before being finalized as U4SSC indicators. Most can be produced from records the city already keeps or creates when applying Chapter 3 and Chapter 4, such as the AI register, impact assessments and complaint records, which keeps the extra data burden low.

Table 11 – Proposed supplementary indicators (for piloting)

Indicator	Definition and calculation	Principle	Data source	Set
S1. Share of municipal AI systems listed in a public register	AI systems in use by the municipality and its service providers listed in the public register ÷ AI systems in the internal inventory × 100	P4, P3	AI inventory and public register	Basic
S2. Share of high-impact AI uses with a completed impact assessment	High-impact AI uses (Section 3.2) with a completed ex ante DHRIA whose summary is published ÷ all high-impact AI uses × 100	P4	Impact assessment records; register	Basic
S3. Time to resolve review requests on AI-assisted decisions	Median days between a request for human review and the final response; plus the share resolved within the service standard and the share where the decision was changed	P4, P3	Complaint, review and incident record	Basic
S4. Share of digital public services with an assisted or offline channel	Digital public services also available in person, by telephone or through assisted channels ÷ all digital public services × 100	P4, P1	Municipal service catalogue	Basic

Indicator	Definition and calculation	Principle	Data source	Set
S5. Resident trust in digital public services	Share of residents trusting municipal digital services reliability, fairness and data protection, by gender, age, disability, income and area	P3, P4	Periodic resident survey	Basic
S6. Residents with basic digital skills	Share of adults with basic digital skills, by group (aligned with SDG indicator 4.4.1)	P1, P4	Household survey; national statistics	Advanced
S7. Accessibility of municipal digital services	Share of municipal websites and apps meeting the applicable accessibility standard (for example, WCAG 2.1 level AA)	P4	Accessibility audits	Advanced
S8. Disruptive cybersecurity incidents and time to restore	Number of incidents that disrupted municipal services in the period, and mean time to restore them	P2, P4	Incident records; CSIRT reports	Advanced
S9. Digital and AI contracts with core safeguards	Share of new digital and AI contracts above a set value that include data access and export, audit, security and exit clauses	P4, P2	Procurement records	Advanced
S10. Participation that influences decisions	Share of digital and AI initiatives with documented community engagement and a published response explaining how feedback was used	P3	Initiative and decision records	Advanced
S11. Energy use of municipal data and AI infrastructure	Annual electricity use of municipal data centres and contracted cloud and AI services, where suppliers report it	P2	Facility records; supplier reporting	Advanced

P1 = shared prosperity; P2 = sustainability, resilience and crisis response; P3 = community participation and collaboration; P4 = inclusive, open, interoperable, safe and secure digital space.

Cities may also use AI and non-traditional data to produce more frequent, detailed or predictive indicators. These should complement, not replace, established statistical and administrative sources, be validated against reference data, and document their method, uncertainty, coverage and differences in accuracy between groups and areas.

5.4 From initiative indicators to city-level KPIs

Initiative indicators defined in Step 5 and collected in Step 7 should be aligned hence reinforcing the city-level framework so that evidence builds up across initiatives. The link is one of contribution: an initiative can contribute to a change in a city-level KPI, but is rarely its only cause, because other

policies, national and economic conditions and external events also play a part. In practice, cities can:

- tag each initiative indicator to the wished outcome(s) (Section 2.4) and, where relevant, the city-level KPI or supplementary indicator it is expected to influence;
- describe for each initiative a simple results chain (activities, outputs, outcomes and expected contribution to the city-level outcome) and the assumptions linking them;
- use the same definitions and breakdowns for initiative and city-level indicators wherever possible;
- review city-level progress linking it to initiatives; impact, other policies and external factors, and word contribution claims cautiously ("consistent with", "likely contributed to") unless an evaluation design supports a causal claim;
- use contribution analysis[21] or, for major investments, more rigorous designs such as comparison areas or phased roll-out, where the decision justifies the cost.

Example: from a digital service to city-level results. A city introduces an online permit service with AI-assisted triage of applications. Under Step 7 it tracks average processing time, the share of AI recommendations overridden by staff, the share of applications made through assisted channels, satisfaction and complaints by applicant group, and the time taken to resolve review requests. At city level, these results inform the U4SSC e-Government KPI (EC:ICT:PS:2A) and supplementary indicators S3, S4 and S5. The annual review concludes that the service probably contributed to faster permit decisions and greater use of online services, while noting that a parallel staffing increase and a change in national regulation also played a role, and that applicants over 65 still rely more on assisted channels.

Indicators need to be interpreted together, not in isolation. Increased use of a service does not, in itself, show that it has become more accessible or equitable. Consider four groups of evidence: service performance; people's access, engagement and participation and experience across groups and areas; the effectiveness of safeguards (transparency, human review, complaints and remedy, privacy, cybersecurity) in practice; and the plausible contribution to the intended social, economic and environmental outcomes.

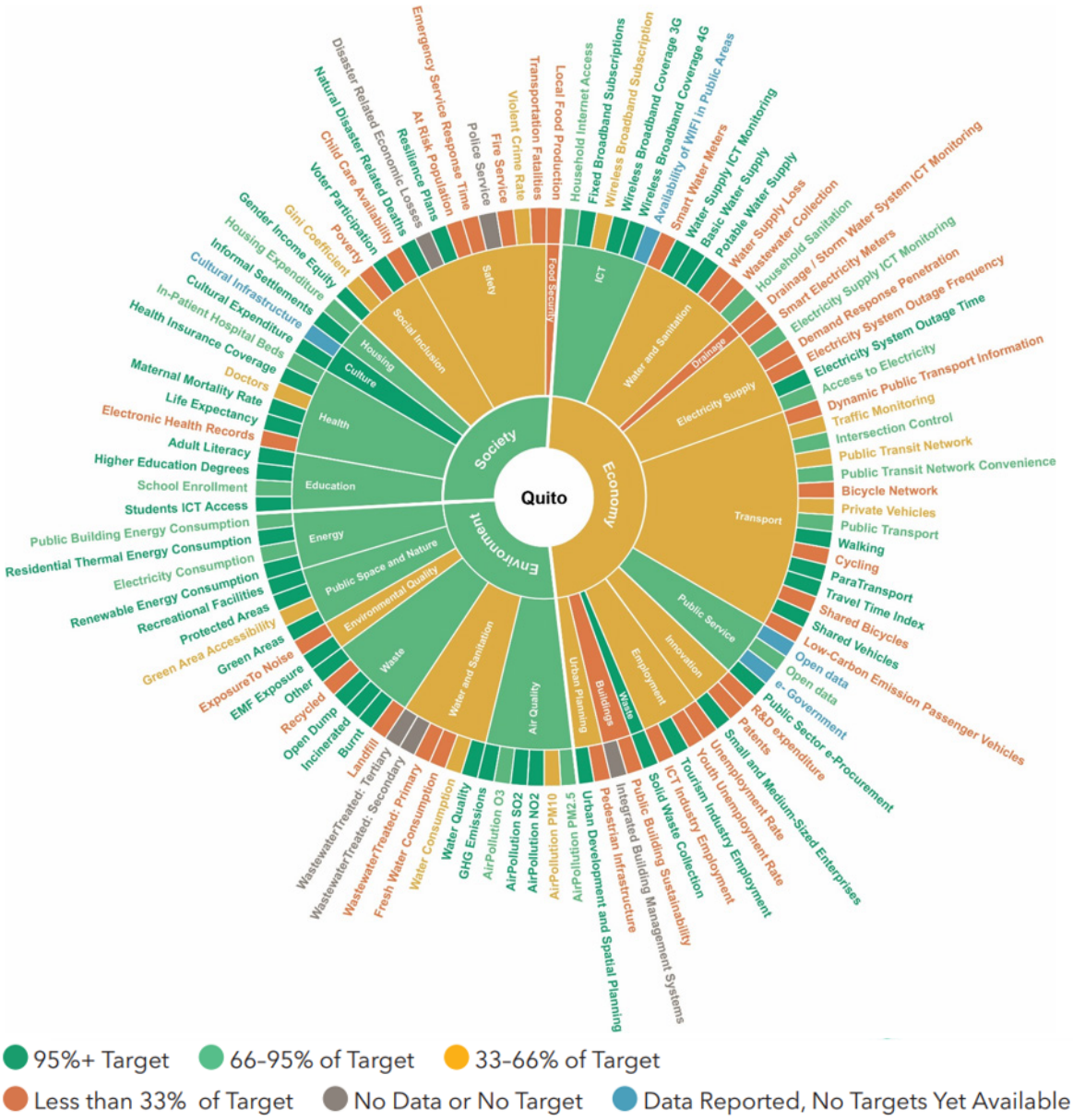
21 See, for example, J. Mayne, "Contribution analysis: Coming of age?", *Evaluation*, vol. 18, No. 3 (2022), pp. 270–280.

Quito, Ecuador – a city-level baseline with the U4SSC KPIs. Quito implemented the U4SSC KPIs in a first phase, and its U4SSC City Snapshot (April 2025) presents the city's performance against benchmarks across the Economy, Environment, and Society and Culture dimensions, including ICT. The snapshot gives the city a common baseline that can be read against its programmes and plans and, because the U4SSC KPIs are aligned with the UN-Habitat Global Urban Monitoring Framework, can also support SDG and New Urban Agenda reporting.[1]

The snapshot shows, for each KPI, how the city performs against the U4SSC benchmark target (95 per cent or more of the target; 66–95 per cent; 33–66 per cent; less than 33 per cent; no data or no target), so that the city can see at a glance where it performs well and where action or better data are needed (Figure 4).

[1] U4SSC, *U4SSC City Snapshot: Quito, Ecuador* (ITU, April 2025). https://u4ssc.itu.int/wp-content/uploads/2025/04/2500528_U4SSC-City-Snapshot-Quito-Ecuador.pdf

Figure 4 – Quito results across the U4SSC KPI dimensions (Source: ITU/U4SSC, City Snapshot: Quito, Ecuador, 2025)



Read results with care. An initiative usually contributes to a city-level change rather than causing it alone, and indicators show only the people represented in the data. Annex 4 explains how to link initiative results to city-level KPIs, evaluate impact and use the evidence for adaptive management.

5.5 Evaluation and impact assessment

Monitoring tracks change in selected indicators. Evaluation and impact assessment look more deeply at what changed, for whom, how a policy or initiative contributed and how the context influenced results. Their depth should match the decision they support: a light review may suffice for a low-risk service improvement, while a city-wide strategy, a large investment or a high-impact AI system calls for a structured evaluation, including an ex post DHRIA or ethical impact assessment where relevant (Chapter 3 and Step 7).

City-level evaluations are usually timed with the strategy cycle, for example at mid-term and at the end. They may combine indicator trends against baselines and targets; a synthesis of initiative evaluations; the views of residents and stakeholders, including groups at risk of exclusion; and a review of the enabling environment identified in Step 4. The U4SSC Digital Transformation Assessment of People-Centred Cities – Performance and Impact Assessment Guide offers a structured method.

Evaluation reports should record the main findings, material limitations, changes against the baseline or target and the matters requiring decision, and be shared with residents in accessible formats.

5.6 Adaptive management and scaling

Monitoring and evaluation results should inform decisions at city level, including project pipelines, investments and programmatic decisions. The responsible authority should set review points when it approves an initiative. Additional reviews may be needed where monitoring shows significant risks, persistent underperformance, large differences between groups or areas, recurring complaints, ineffective safeguards or major changes in the operating environment, as well as insufficient performance in meeting the set outcomes and principles.

At city level, periodic reviews should look collectively at how policies, programmes, projects, investments and services contribute to the outcomes the city is targeting. They should identify unmet needs, groups or areas that have not benefited, duplication, dependencies or conflicts between initiatives, and shared data, infrastructure, capacity or governance issues. The city may then adjust priorities, budgets and investments, governance and coordination arrangements or its portfolio of initiatives.

Evidence from a single pilot does not show that the same results can be achieved at scale or elsewhere. Before scaling or replicating, assess the conditions in the new context, including capacity, data, infrastructure, safeguards, financing and supplier or partner arrangements, and identify the people and places for which the initiative did not work and whether the scaling plan addresses the reasons.

5.7 International standards and resources that support cities

Cities do not have to start from scratch. Table 12 brings together some of the ITU international standards and the U4SSC and UN-Habitat resources that support each part of this Guide. ITU-T Recommendations are international standards approved by 194 ITU Member States; U4SSC and UN-Habitat publications provide practical guidance, methods and examples. All are referenced in Annex 8.

Table 12 – Standards and resources at a glance

What the city needs to do	ITU standards and U4SSC resources	UN-Habitat resources
Measure city performance and report on the SDGs	Recommendation ITU-T Y.4903 and the U4SSC KPIs for Smart Sustainable Cities, with their collection methodology; U4SSC city snapshots and case studies	Global Urban Monitoring Framework; Voluntary Local Reviews
Assess maturity, readiness and impact	Recommendation ITU-T Y.4904 (smart sustainable cities maturity model); Recommendation ITU-T Y.4905 (smart sustainable city impact assessment); Recommendation ITU-T Y.4906 (digital transformation of sectors); U4SSC *Policy benchmarks and Digital Transformation Assessment of People-Centred Cities*	Readiness Assessment Survey in the step-by-step guide for a people-centred smart city strategy
Design a strategy and engage people	U4SSC *A framework for enabling people-centred cities through digital transformation; ITU and United Nations Toolkit on Digital Transformation for People-Oriented Cities and Communities*	*Technical Guidelines on People-Centred Smart Cities; step-by-step guide for a people-centred smart city strategy; co-creation playbook*
Use AI responsibly	U4SSC *Guiding Principles for Artificial Intelligence in Cities; Autonomous cities and AI; Good Practices for City AI Agents; AI-Driven Urban Key Performance Indicators; ITU-T Focus Group on AI for Smart Sustainable Cities and Communities*	*Global Assessment of Responsible AI in Cities; GeoAI Toolkit for Urban Planners*
Build interoperable digital foundations	Recommendation ITU-T Y.4505 (minimal interoperability mechanisms); U4SSC *Building digital public infrastructure for cities and communities*	*Building and securing digital public infrastructure playbook*
Buy and finance well	U4SSC *Procurement guidelines for smart sustainable cities; Guide to next-generation public procurement in cities; Compendium of practices on innovative financing*	People-Centred Smart Cities Programme technical assistance

6 Next steps: a growing Toolbox

This Guide is the first release of the **U4SSC Toolbox for People-Centred Smart Cities in the AI Era**. The Toolbox will progressively bring together templates, checklists, assessment methods, decision-support tools and monitoring resources from U4SSC, ITU, UN-Habitat and other partners.

A living Toolbox, reviewed regularly. Technology, and AI in particular, changes fast. The Working Group will review the Guide and the Toolbox regularly, so that each release captures emerging challenges and opportunities and integrates the lessons learned from cities' practical implementation.

Available today. The **U4SSC City Implementation Guide** (Annex 5) is ready to use. It contains the eight steps on one page and the decision and accountability record, the public AI register entry, the core procurement clauses, the model staff policy on generative AI, the AI agent checklist, the problem statement, the option appraisal, the pilot charter and the procurement checklist.

Standards work on AI for cities. Cities interested in pre-standardization work on how AI can work safely and interoperably with the Internet of Things, digital twins and city systems can contribute their use cases and requirements to the ITU-T Focus Group on AI for Smart Sustainable Cities and Communities (FG-AI4SSC), set up by ITU-T Study Group 20 in May 2026.[22]

[22] ITU-T Focus Group on AI for Smart Sustainable Cities and Communities (FG-AI4SSC). https://www.itu.int/en/ITU-T/focusgroups/ai4ssc/Pages/default.aspx

Annex 1 – The implementation cycle in detail

This annex expands on Chapter 4. It gives the readiness scan, the entry points into the cycle, the roles of the main actors and, for each of the eight steps, what the step achieves, why it matters, what to do, how it differs for a strategy, a project or an AI project, how the principles apply, the tools and resources to use, and the people-centred check to pass before moving on.

A1.1 The city readiness scan

The scan is quick and general and helps the city choose where to enter the cycle. It should not be confused with the **baseline assessment in Step 2**, which is detailed, specific to one challenge and sets the starting point against which progress will be measured.

Table A1.1 – City readiness scan: areas and guiding questions

Area	What to consider	Guiding question
Readiness areas		
Governance, institutional capacity and regulatory environment	Mandates, roles, coordination and decision-making for digital urban development, including any dedicated unit; transparency, oversight and accountability, with specific measures for AI; capacity to identify and manage technology risks; relevant policies, regulations, standards and safeguards.	Are responsibilities, decision-making arrangements and institutional capabilities in place for digital urban development?
Digital public infrastructure, data and services	Shared digital infrastructure and foundational systems; connectivity (coverage, affordability, quality, accessibility, including for people in vulnerable situation); data quality and availability; interoperability; data governance (ownership, access, sharing, protection); existing digital services that can be reused or scaled.	Is the existing infrastructure safe and adequate for the city's challenges?
Capacity, skills and knowledge	Technical, managerial, policy and procurement capabilities in the city and its partners; civic skills that let communities take part; digital literacy and continuous learning.	Does the city have the capabilities it needs, or a plan to access them?
Resources, financing and partnerships	Financial and human resources to start, operate and maintain initiatives; public, private, academic, civil society and community partners; procurement capacity; existing investments and funding options.	Are resources sufficient to start, operate and sustain the intervention?
AI readiness (across all four areas)	Awareness of AI; governance and accountability for AI; data and technical foundations; AI skills and literacy; risk management and assurance; AI procurement requirements; ways to address impacts on rights, equity, safety and inclusion.	Is the city prepared to assess, govern and use AI responsibly where relevant?
Outcome-oriented pillars (the four principles)		

Area	What to consider	Guiding question
Shared prosperity	Existing digital services and innovation initiatives; economic and entrepreneurship ecosystems; access to technology and opportunities for local businesses and communities.	How can digital initiatives contribute to inclusive economic opportunity and better public services?
Sustainability, resilience and crisis response	Digital and physical infrastructure; climate and environmental risks; resource efficiency; resilience requirements; environmental effects of digital interventions.	How do digital solutions support sustainability and the capacity to anticipate, respond to and recover from shocks? How is this measured?
Community participation and collaboration	Participation mechanisms; access to information; community and civil society organizations, academia, private sector and other partners.	How are residents, communities and stakeholders involved in shaping and using digital solutions?
Inclusive, open, interoperable, safe and secure digital space	Connectivity and accessibility; groups at risk of exclusion; privacy; cybersecurity; transparency; safeguards; accountability and participation.	Are digital technologies, data and services accessible, safe and designed to respect people's rights and reduce inequalities?

How to conduct the scan. Organize one or two workshops or conduct a short survey, involving the departments responsible for digital services, planning, finance, procurement, legal affairs and community engagement, as well as, where possible, representatives of residents and civil society organizations. For each area, use a simple three-level rating (*in place*, *partly in place*, *not yet in place*), supported by evidence. The purpose is not to generate a score, but to establish a shared understanding of the city's starting point.

Then follow this sequence:

1. **Define the purpose:** what is the city trying to achieve? (Section 1.2).
2. **Conduct the readiness scan:** identify existing capabilities, assets and gaps.
3. **Select the entry point:** use the scan results to identify the most relevant steps of the cycle (Section 1.4). If in doubt, consult the whole of Chapter 4.
4. **Apply the principles throughout:** use the gaps identified under the outcome-oriented pillars to prioritize and shape the intervention (Section 2.2).
5. **Measure, learn and adapt:** use evidence and feedback to improve the intervention and, where appropriate, scale, replicate or institutionalize effective approaches.

The result is a tailored pathway, rather than a fixed sequence. Cities can enter the cycle at different points and revisit earlier steps as circumstances change. The framework does not prescribe any particular technology. Rather, it provides a shared reference for informed decision-making: identifying gaps, deciding whether technology is an appropriate response, defining requirements, assessing existing solutions, guiding investment and procurement, and evaluating whether interventions deliver the intended outcomes.

A1.2 Roles of the main actors

Implementing a people-centred approach requires collaboration across levels of government and with other stakeholders, such as communities, civil society, the private sector and academia. Roles vary according to local mandates and capacities and therefore cannot be prescribed in full. Table A1.2 provides an indicative starting point.[23] At each stage, the city should identify who needs to be involved, clarify their roles and establish arrangements for coordination, participation and accountability.

Table A1.2 – Indicative roles and responsibilities of actors in the implementation cycle

Actor	Main role	Key responsibilities
Local government	Lead and coordinate	Set priorities and desired outcomes; coordinate stakeholders; ensure participation; establish policies, processes and safeguards within its mandate; allocate resources; oversee implementation; monitor results and accountability.
National or regional government	Enable and regulate	Provide the legal, regulatory and policy framework; clarify mandates across levels of government; provide or enable infrastructure and data access; set standards; provide funding and technical support where needed.
Communities and residents	Participate and give feedback	Identify needs and priorities; contribute local knowledge; take part in design and decisions; test solutions and give feedback; raise concerns and help monitor results.
Private sector and technology providers	Develop and deliver	Provide appropriate technologies, services and expertise; meet agreed requirements on accessibility, privacy, security, interoperability and accountability; share relevant information; maintain and improve solutions.
Civil society and community organizations	Represent and support inclusion	Help under-represented groups in participating; provide independent perspectives; identify risks and unintended impacts; support awareness, engagement and accountability.
Academia, research and technical experts	Provide evidence and expertise	Support assessments and analysis; give technical advice; evaluate solutions and impacts; contribute to capacity building and learning.
Development partners and financial institutions	Support capacity, knowledge and finance	Provide technical assistance and expert knowledge; support project preparation; facilitate partnerships and access to finance; strengthen institutional and financial capacity.

[23] Additional stakeholder-specific recommendations are provided in UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025).

The eight-steps implementation cycle

Figure A1.2 – Overview of the implementation cycle steps



A1.3 Step 1: Define the urban challenge and the objective

At a glance. *Purpose:* define the urban challenge and the change the city wants to achieve, before any solution is discussed. *Output:* a short problem statement and desired outcome. Led by: the authority that owns the challenge, with the departments concerned and the people affected.

What this step achieves

City leaders define the urban challenge or opportunity to be addressed. The starting point is the improvement wanted in people's lives and in the urban environment. Frame the challenge broadly enough to capture its causes and dimensions and, therefore, guide future actions. The problem statement should respond to the below:

- urban areas or community groups that may be underserved or excluded;

- localization/area or section of the challenge;
- social, economic and environmental concerns;
- challenge relation to city, regional and national development priorities;
- pressures or predictions that may influence the problem in the future, such as demographic change, migration, population density, climate risks, environmental degradation, increasing service demand, technological change and changing livelihoods.

The process should not begin with a proposed solution. A consideration to "deploy AI", "build a platform" or "build new infrastructure" does not define a problem, instead, the city should specify the change sought and assess whether it can be truly beneficial for the city and its people. Objectives should describe the wished change, while planning considerations should be addressed at later stages.

Why it matters

Chapter 4 (Section 4.1) explains why a clearly defined urban challenge is essential for guiding subsequent decisions, from identifying needs and possible responses to setting expected outcomes. This section builds on that guidance.

This matters especially for AI. The availability of a new technology creates pressure to look for problems it could solve. A people-centred approach reverses this logic: start from the challenge and the desired outcome, and only then decide whether and how technology or AI can help.

What to do

1. **Describe the challenge:** the situation that needs to change, or emerging pressures (such as climate change, displacement, conflict or rapid urbanization) that may create challenges. Consider scale, location, causes and links with wider urban systems.
2. **Identify who is affected and who must be involved:** population groups, communities, service users, workers and institutions; whether impacts differ between neighbourhoods or groups; and who should be involved, and when.
3. **Define the desired outcome:** what should change for people and the urban environment, linked to the relevant principles. These outcomes will guide indicator selection later.
4. **Look at the wider ecosystem:** the social, economic, environmental, institutional, regulatory and technological factors behind the challenge, and the role of actors outside the city administration. Problems that look technical often have institutional, financial or capacity causes.
5. **Set the scope and ambition:** decide whether the challenge needs a strategy, policy or regulation, a programme or project, capacity development, or a combination (Table A1.3).

6. **Engage residents to confirm priorities:** learn about their needs, values and experience of technology and city services, and compare it with available data. Include groups that are often overlooked, such as people with disabilities, people with limited digital or literacy skills, women, people experiencing homelessness, people without regular immigration status and minority groups. Use engagement methods designed to reach them.
7. **Confirm ownership and commitment:** identify who will lead and support the intervention and, if the city decides to proceed, confirm the political, institutional and financial commitment. Anchor the intervention in the city's statutory planning and budgeting instruments, such as the city development plan, sector plans and the annual and medium-term budget, so that it is resourced and survives changes in leadership.

Table A1.3 – Step 1: how it differs by type of intervention

Intervention	Focus of Step 1
Strategy or policy	Define the wider urban challenge, strategic objectives, target groups and long-term outcomes. Secure political commitment from senior leaders and sustainable funding.
Project	Define a specific urban problem or capability gap, the users or institutions concerned, and the concrete results expected.

Principles in practice

Map the challenge against the four principles. Ask, for example: is the challenge mainly about participation, shared prosperity, sustainability, or an inclusive and safe digital space? Once the challenge, the affected groups and the expected beneficiaries are clear, the city knows what type of intervention it needs and the outcomes and scope of action.

Tools and resources

- *Tools:* SWOT analysis; problem tree; stakeholder mapping; problem-definition and outcome canvases; short internal surveys and interviews; community engagement methods, online and offline; accessible and inclusive communication.
- UN-Habitat (UNITAC), *A step-by-step guide for a people-centred smart city strategy* (strategy making).[24]
- UNDP, *Building Responsible Smart Cities: A Toolkit for Public and Private Sector Actors* (projects).
- UNDP, *A Toolkit for Public Sector Innovators*.
- UNESCO, *Operational Guidelines: Constructing UNESCO Media and Information Literacy Cities*.

[24] UN-Habitat (UNITAC), *A step-by-step guide for a people-centred smart city strategy* (2025). https://unhabitat.org/sites/default/files/2025/12/unitac_a_step_by_step_guide_for_a_people_centred_smart_city_strategy.pdf

- UNESCO, *Artificial intelligence and digital transformation: competencies for civil servants*.[25]

People-centred check – before moving to Step 2

- Is the challenge defined from the perspective of people and the urban environment, not of technology?
- Have the affected groups, including underserved or disproportionately affected groups, been identified?
- Are the desired outcomes clear, and is there a clear reason to act?
- Is the type of intervention suited to the scale and nature of the challenge?
- What would show that the intervention has improved the situation?

Where next? With the challenge and objective clear, the city needs to know where it stands today: Step 2.

A1.4 Step 2: Understand the starting point and establish a baseline

At a glance. *Purpose:* understand "where we are now" in relation to the challenge and desired outcome. *Output:* a baseline assessment used to compare options (Step 3) and measure progress (Step 7). *Led by:* the owning authority, with the departments, data holders and communities concerned.

What this step achieves

Step 2 differs from the readiness scan. The scan (Section 1.3) provides a quick overview to help the city choose where to enter the cycle. Step 2 examines the specific challenge, the services involved and the people affected in greater depth. Depending on the objective, it may cover policies and regulations, services, infrastructure and technologies, data, institutional arrangements, digital maturity, human and financial resources, and ongoing initiatives and investments. It records existing capacities and constraints; planning how to address gaps is covered in Step 4. Engagement at this stage focuses on understanding people's needs and experiences; co-design takes place in Step 5.

[25] UNESCO, *Artificial intelligence and digital transformation: competencies for civil servants* (2022). https://unesdoc.unesco.org/ark:/48223/pf0000383325

Keep the assessment **proportionate**. A city-wide strategy may need a broad review of digital, institutional and governance readiness. A specific project may focus on the services, workflows, data, infrastructure and organizational capacities concerned.

Check what already exists first. Before creating or buying something new, assess whether existing systems, services or policies can be reused, adapted or connected. For a strategy or policy, check whether an existing one can be updated and whether alignment with other policies is needed.

Hear from residents. Use surveys, town halls, digital platforms and participatory workshops to understand who lives in the areas concerned, how they experience the challenge and what their priorities are. Strategies and policies call for broad consultation; projects may focus on the risks and impacts for the people most directly affected. Wherever possible, break information down by gender, age, population group, area and socio-economic conditions.

Count the people the data miss. A baseline built only on existing datasets describes the people and activities that are recorded. Where informal employment, informal settlements and unregistered tenure are widespread, as in many cities of the Global South, large parts of the population appear only partly, or not at all, in administrative records, service data and digital traces. Close the gaps by combining administrative data with household and street surveys, community-led enumeration and mapping with residents' organizations, participatory audits such as women's safety audits, and earth-observation data verified on the ground (Case study 3). Collect data on people in informal or irregular situations only with their agreement and with safeguards, so that being counted does not expose them to eviction, sanctions or other harm. Record remaining gaps as a limitation, so that later decisions, and any AI system that uses the data, do not treat people missing from the data as absent from the city.

Why it matters

A baseline allows the city to:

- identify strengths, weaknesses, gaps and dependencies;
- avoid duplicating existing initiatives or investments;
- see whether the enabling conditions are in place and, if not, what to prioritize;
- estimate benefits, concerns, risks and residents' preferences;
- identify institutional, technical, financial, regulatory or capacity constraints;
- set realistic expectations;
- identify early indicators linked to the desired outcome, and the data to measure them; and
- create the baseline against which progress and impact will be assessed.

There is no single universal baseline. Prioritize the areas most closely linked to the principles the city is pursuing and to people's priorities. The tools below are illustrative and need adapting.

What to do

1. **Map stakeholders:** internal (departments, divisions, units) and external (academia, private sector, civil society organizations and others). Explain to each what the city is doing and what role is expected of them.
2. **Design and run the assessment:** choose the areas to examine according to the intervention and the principles pursued, going deeper than the readiness scan (Section 1.3).
3. **Identify risks** to the intervention, including technological risks and their specific impacts.
4. **Run a pre-feasibility and impact screening** as early as possible, for any type of intervention.
5. **Analyse all qualitative and quantitative data:** break data down to find exclusion patterns, missing data on women or specific groups, and inconsistencies. Decide whether the evidence is good enough for the next steps.
6. **Validate the findings** with key actors and stakeholders, through surveys, interviews or town-hall consultations.
7. **Communicate the results** to key stakeholders, tailored to their role.
8. **Link the results to early indicators** and to the expected outcomes.

Table A1.4 – Step 2: how it differs by type of intervention

Intervention	Focus of the baseline
Strategy or policy	A broad assessment of existing policies, governance, services, infrastructure, digital maturity, human and financial capacity, training programmes, initiatives and priorities.
Project	A focused assessment of the sector, process, institution, capability or technical environment concerned, able to show later whether the project produced the intended improvement and is sustainable. Include an equity and necessity screen: who benefits, who could be excluded, is the technology necessary, and could a simpler institutional or service change solve the problem?
AI project	In addition: whether the city has the conditions to use AI responsibly – data availability and quality; existing digital infrastructure or platforms; AI knowledge and capacity; institutional ownership and oversight; legal and regulatory requirements; privacy, cybersecurity and governance; and existing tools or workflows that could already meet the need.

Step 2 is not a mandatory city-wide assessment for every intervention. Its breadth and depth should match the intervention and its potential impacts.

Principles in practice

When departments build the assessment together, through surveys, interviews or other methods, they should record the starting point: the relevant ecosystem, key gaps and constraints, and a baseline linked to the desired outcomes. If the city is targeting specific principles, for example a digital solution for community engagement and shared prosperity, the assessment should turn those priorities into targeted questions, so that results can be monitored later.

Tools and resources

Tools

- UN-Habitat **Readiness Assessment Survey**: developed and piloted by UN-Habitat, it identifies the capacities and gaps in policy, legislation and stakeholder implementation needed to implement a strategy. Results are usually complemented by interviews and validation exercises.[26]
- U4SSC, *Policy benchmarks for digital transformation of people-centred cities* (2024): benchmarks for assessing and strengthening policies so that digital transformation supports well-being, inclusion and sustainable development.[27]
- U4SSC, *A framework for enabling people-centred cities through digital transformation* (2025): enabling areas that can structure the assessment.
- Recommendation ITU-T Y.4904, *Smart sustainable cities maturity model*: assesses current and target maturity and identifies capabilities and milestones.[28]
- Recommendation ITU-T Y.4906, *Assessment framework for digital transformation of sectors in smart cities*: helps identify priority sectors and select indicators.[29]

Further resources

- ESPON, *LORDI – Local and Regional Digital Indicators Framework* (2024).[30]
- UN-Habitat, *Global Urban Monitoring Framework* (UMF).

[26] UN-Habitat (UNITAC), *A step-by-step guide for a people-centred smart city strategy* (2025), Annex "Readiness Assessment Survey", pp. 33–38.

[27] U4SSC, *Policy benchmarks for digital transformation of people-centred cities* (ITU, 2024). https://www.itu.int/net/epub/TSB/2024-U4SSC-Policy-benchmarks-for-digital-transformation-of-people-centre/index.html

[28] Recommendation ITU-T Y.4904, *Smart sustainable cities maturity model* (2019). https://www.itu.int/rec/T-REC-Y.4904

[29] Recommendation ITU-T Y.4906, *Assessment framework for digital transformation of sectors in smart cities*. https://www.itu.int/rec/T-REC-Y.4906

[30] ESPON, LORDI – Local and Regional Digital Indicators Framework, technical paper (2024). https://www.espon.eu/sites/default/files/projects/files/2024-07/lordi-framework.pdf

People-centred check – before moving to Step 3

- Do we have a clear, evidence-based understanding of the current situation?
- Have existing services, systems, investments and solutions been considered before proposing something new?
- Do we understand the differences between population groups and places, including who is missing from the data?
- Have institutional, regulatory, technical, financial and capacity constraints been identified?
- Is there a baseline against which outcomes can later be measured?
- Are important data gaps known, and is any new data collection justified and proportionate?
- If AI or another technology is being considered, do we understand the conditions and risks of its use?

Where next? The city can now decide what course of action is most appropriate: Step 3. If it lacks key information, for example on ownership, legal authority or resources, it should run a targeted assessment or return to Step 1.

A1.5 Step 3: Prioritize

At a glance. *Purpose:* decide whether to act and which response is most appropriate – non-digital, adapting an existing solution, new digital or AI-enabled. *Output:* an option appraisal and decision record. *Led by:* the authority accountable for the challenge, with the departments concerned and input from affected groups based on transparent selection criteria.

What this step achieves

- Building on Steps 1 and 2, the city works through four questions (Figure A1.1).

1. Is action needed? Re-check the diagnosis and desired outcomes with internal and external stakeholders and, where possible, the people affected. Then agree on **prioritization criteria** before assessing options. Criteria selection should be guided by the key *people-centred smart city principles* at stake, such as reducing territorial development gaps and generating shared prosperity, promoting environmental sustainability across the lifecycle, and so on, and the *expected outcome* such as improved quality of life, stronger systems and so on, along with other considerations

such as cost-benefits, feasibility, lifecycle costs, risks, social and environmental effects, institutional capacity and available resources.

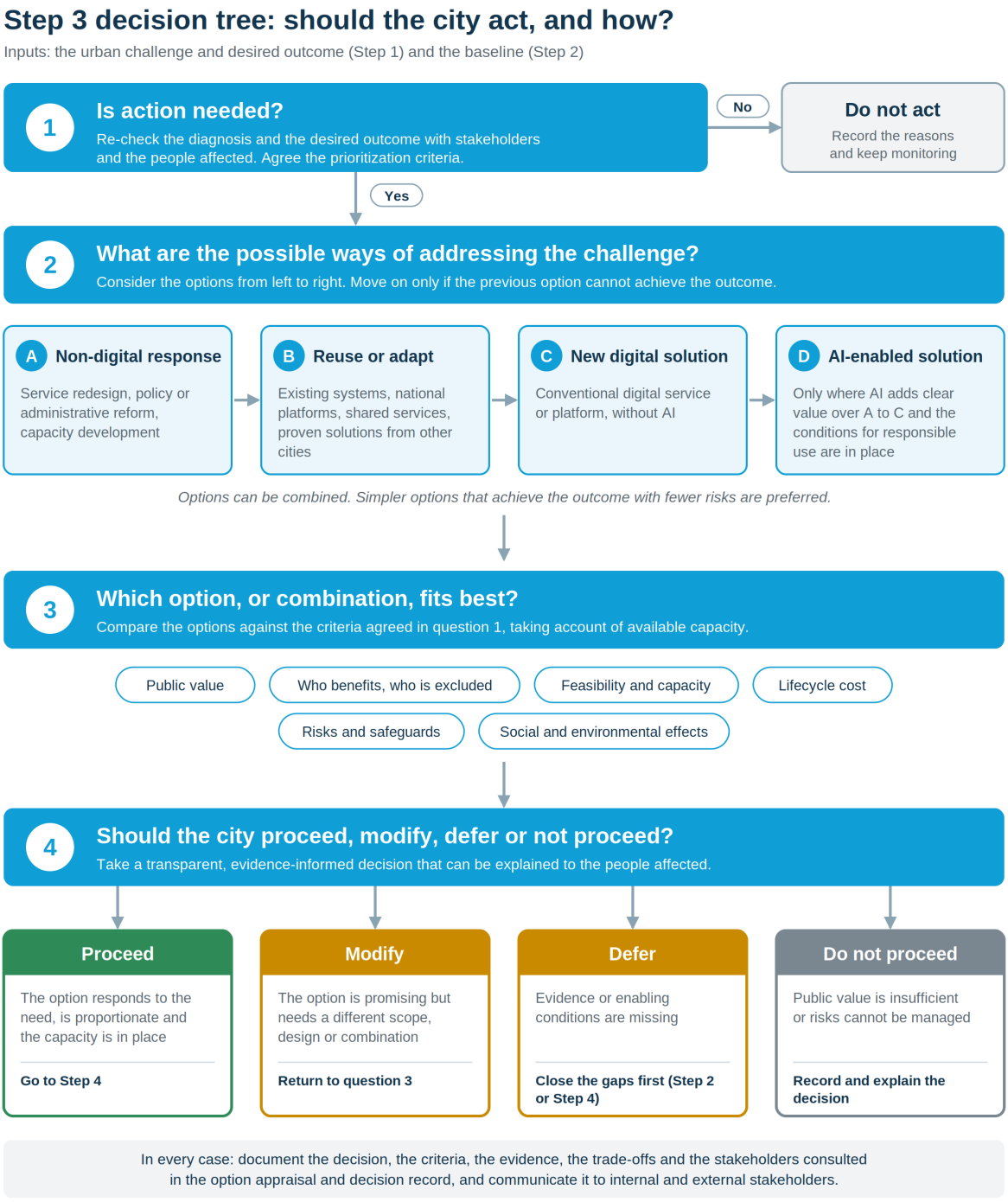
2. What are the possible ways of addressing the challenge? Consider options to solve the problem such as service re-design, administrative or policy reform, capacity development, investment in existing systems, new digital solutions and, where relevant, AI. Technology should not be chosen just because it is available, but rather if it adds value and balances out risks, compared to other solutions.

3. Which option, or combination, fits best? Apply the prioritization criteria to compare the options. Where several interventions are needed, dependencies, sequencing, resources and long-term sustainability need to be treated interdependently, to avoid disconnected or isolated pilots and unnecessary investments.

4. Should the city proceed, modify, defer or not proceed? The result is a transparent, informed and evidence-based decision on which journey to pursue, which options need more assessment, and which should go or not go ahead.

The image below provides an illustration of Step 3 and the four screening questions mentioned above:

Figure A1.5 – Step 3 decision tree (Source: U4SSC)



Why it matters

Prioritization moves the city from understanding a problem to an evidence-based decision. It answers questions such as:

- Is an intervention necessary, and what should it deliver?
- Do solutions already exist?
- Does the problem need a digital or AI solution, or could another response work better?
- Does the technology add enough value to justify its costs, risks and complexity?
- Who benefits, and who could be excluded or harmed?
- Are the institutional, financial, technical and governance conditions in place?
- What are the consequences of not acting, or of delay?
- How does the option contribute to the principles and desired outcomes?
- If several interventions are needed, how should they be sequenced?

This step helps cities avoid choosing solutions because of technological availability, supplier pressure, political visibility or short-term opportunity.

What to do

1. Reconfirm the priorities and desired outcome from Steps 1 and 2.
2. Identify the possible courses of action.
3. Agree prioritization criteria across the city's departments.
4. Compare the options against the criteria.
5. Identify trade-offs, dependencies, risks and any additional assessments needed.
6. Select the intervention, or combination of interventions, that best meets the challenge and desired outcomes.
7. Record the decision and the reasons, the criteria, the evidence, the trade-offs and the stakeholders consulted.
8. Communicate the decision to internal and external stakeholders.

Table A1.5 – Step 3: how it differs by type of intervention

Intervention	Focus of prioritization
Strategy or policy	Which strategic objectives and areas should receive priority, considering long-term outcomes, equity, institutional capacity, policy alignment and resources.
Project	Which intervention or service improvement to pursue, for whom, and whether the proposed solution is proportionate to the problem and feasible in the current environment.
AI project	Whether AI is justified compared with other digital or non-digital options; whether the benefits justify the risks, costs and governance requirements; and whether the conditions for responsible use are in place.

Principles in practice

The principles act as a lens for comparing options on public value, impact, benefits, risks and trade-offs. Ask, for example:

- **Shared prosperity:** who benefits? Does the option reduce spatial, economic and skills inequalities in access to services, opportunities and resources?
- **Sustainability, resilience and crisis response:** does it support environmental sustainability and the city's ability to anticipate and respond to shocks? What are its long-term resource and environmental implications?
- **Community participation and collaboration:** have affected communities had a real chance to shape the priorities? Does the option strengthen participation and collaboration?
- **Inclusive, open, interoperable, safe and secure digital space:** could the option create exclusion, discrimination, surveillance, privacy or safety risks, or improve interoperability, inclusion and security?

Tools and resources

- Toolbox (Annex 6): the option-appraisal and prioritization tool, as well as the lifecycle-costing and financial-sustainability tools. They can draw on established methods, such as multicriteria analysis and cost–benefit or total-cost-of-ownership analysis, to compare AI, other digital and non-digital options on an equal footing.
- UNESCO, *Readiness Assessment Methodology* (RAM): for AI-related options, to reveal wider institutional gaps in AI governance at national level.[31]
- Figure A1.1: Step 3 decision tree.

[31] UNESCO, *Readiness Assessment Methodology* (RAM). https://www.unesco.org/ethics-ai/en/ram

People-centred check – before moving to Step 4

- The intervention responds to a clearly defined need and has a clear rationale.
- The decision rests on sufficient, relevant evidence, including from the baseline assessment in Step 2.
- Reasonable alternatives were considered, including not proceeding.
- Benefits, impacts and risks for different groups and places were considered.
- The intervention is proportionate to the problem, the expected value, costs, risks and capacity.
- Significant gaps, uncertainties, dependencies and conditions are known and transparently recorded.
- Where a digital or AI solution is chosen, its use is justified and no simpler option would achieve the objective with fewer risks.
- The decision can be explained to the people affected and to decision-makers.

Where next? Step 4, to make sure that the conditions for the chosen option are in place. If any of the above cannot be documented, stay on this step or return to Step 2 to gather more evidence.

A1.6 Step 4: Build the enabling environment

At a glance. *Purpose:* identify and close any gap to implement the intervention chosen in Step 3 responsibly and sustainably. *Output:* an enabling-environment action plan listing critical gaps, owners, timelines and the minimum conditions to meet before or during the implementation. *Led by:* the owning authority, with legal, digital, procurement, finance and human resources functions, and other levels of government, as needed.

What this step achieves

A city needs an environment in which technologies, data and digital services can be introduced, governed, maintained and adapted safely, openly and sustainably over time. Step 4 uses the baseline from Step 2 to identify what is required before implementation and what is partially or completely missing. For example, a city-wide strategy needs a wider review than a single service improvement. The review covers four connected areas:

- **Governance and regulation:** mandates, coordination, accountability, data governance, privacy, cybersecurity, procurement rules and the applicable legal framework.

- **Digital public infrastructure, data and services:** connectivity, infrastructure, interoperability, data availability and openness, platforms and systems.
- **Capacity, skills and knowledge:** the technical, legal, data, AI, cybersecurity and media and information literacy competencies the institution needs to govern, procure, implement and oversee the intervention, and the civic skills residents need to understand and use it.
- **Partnerships, procurement and financing:** partners, procurement arrangements, funding, long-term operating resources and ways to engage communities and the private sector.

The city should also confirm ownership and political commitment: who has the mandate to decide, coordinate and remain accountable for results.

This is an iterative process. The city does not need every condition in place before it begins. It should separate:

- **critical gaps** that must be closed before proceeding;
- **gaps that can be closed during implementation**; and
- **gaps outside municipal authority**, such as legislation, sector regulation, or infrastructure and data systems managed nationally or regionally, which may require multilevel or multisector governance.

Enabling conditions should be reviewed as the intervention develops, particularly when its scope, technology, suppliers, data requirements or operating model change.

Why it matters

A technically sound solution can still fail if the institutions responsible lack the authority, skills, infrastructure, resources or safeguards to manage it. A city may buy an AI service without the capacity to check the quality of its data, set contractual safeguards, monitor performance or respond when it produces harmful results. A digital service may exist but remain out of reach for some residents because of connectivity, cost, accessibility or digital skills. Building the enabling environment helps the city to:

- set clear accountability for digital and AI initiatives;
- identify legal, institutional, technical, financial and capacity constraints early;
- avoid fragmented systems and policies, duplication and vendor lock-in;
- keep data and infrastructure secure and interoperable;
- build the capabilities to procure, operate, monitor and adapt technologies;
- create the conditions for meaningful participation and public trust; and
- keep investments delivering value beyond the initial project.

What to do

1. **Map who does what.** Clarify who owns the intervention and monitors outcomes; who decides; who oversees; who implements and operates; who controls the data and infrastructure; which responsibilities sit at national, regional or local level; which departments must coordinate or be consulted; where mandates are unclear or overlap; and who already trains residents and staff in the relevant areas. A task force, steering committee or designated unit can bring the right departments together with clear decision-making.
2. **Review the legal, regulatory and governance framework.** Depending on the intervention, this may cover data protection and privacy; data sharing and ownership; cybersecurity; digital identity; accessibility and non-discrimination; open data; sector regulation; AI governance; procurement and contracting; intellectual property; environmental requirements; and oversight. Where responsibilities sit outside the municipality, identify the competent authorities and agree how coordination or approvals will work. For a strategy or policy, check for duplication or conflict with other policies and consult their owners. For AI, identify or set up the processes for human oversight, transparency, accountability, risk management and monitoring (Section 2.3).
3. **Assess infrastructure, data and interoperability.** This may include networks, municipal platforms, sensors, cloud or hosting, geospatial and other urban data, data quality, data-sharing arrangements, interoperability standards and application programming interfaces (APIs), cybersecurity, backup and continuity, and the capacity to operate and maintain them. Favour open standards, interoperability and reusable digital public goods, and integrate with existing systems rather than creating a parallel platform or data silo. Where cloud services, external AI models or connected devices are used, also review hosting location and jurisdiction, any supplier use of city data, encryption and key management, data export and exit, and the split of security responsibilities with suppliers (Section 3.4.6).
4. **Identify capacity gaps** for the chosen option. Compare the capabilities needed with those found in Step 2: legal and regulatory; digital, data and media and information literacy; AI; cybersecurity; procurement and contract management; financial management; technical systems; project and change management; monitoring and evaluation; and independent assurance. Where important gaps exist, prepare a **capacity-development plan** rather than assuming that external consultants or the technology purchase will fill them. Smaller municipalities can pool capacity through inter-municipal cooperation, shared service centres, city networks and national or regional programmes.
5. **Assess partnerships and stakeholder capacity.** Identify what other levels of government, neighbouring municipalities, universities, education providers, community learning organizations, technology providers, development partners, professional bodies and civil society, especially organizations representing groups at risk of exclusion, can contribute. Identify the learning support staff and communities need, who will provide it, and the time and funding required. Consider peer learning, shared infrastructure and pooled expertise, especially for cities with limited resources.

6. **Review procurement and financing for the full lifecycle.** Consider whether procurement rules allow innovative or outcome-based approaches; data ownership and access; intellectual property and licensing; supplier accountability and performance; exit and transition; lock-in risks; sustainability requirements (energy and resource efficiency, durability, interoperability, maintainability, responsible sourcing and end-of-life) alongside social, accessibility and inclusion requirements; long-term operating budgets; and alternative financing or partnerships. **The purchase price is not the total cost:** operation, maintenance, security, skills, upgrades and replacement must be budgeted. For a strategy, check that the procurement framework will allow the projects in its roadmap. The core procurement clauses in Annex 5, Table A5.6 are a starting point.
7. **Log the gaps and agree how to close them.** Record each gap in an issue log that feeds the enabling-environment action plan, separating **blocking conditions**, to be resolved before proceeding, from conditions that can be strengthened during implementation.

Table A1.6 – Step 4: how it differs by type of intervention

Intervention	Key question
Strategy or policy	Does the city have the mandate, evidence, coordination, stakeholder participation and analytical capacity to develop, implement and monitor the strategy? Are national and local policies aligned?
Project	Are the infrastructure, data, procurement, operational capacity, financing and institutional arrangements needed to deliver and maintain the project in place?
AI project	In addition, can the city assess and manage AI-specific risks, data quality, model performance, transparency, human oversight, cybersecurity, accountability and impacts on different groups?

Requirements should match the nature and risk of the intervention. A city developing a digital strategy does not need the technical infrastructure of a city deploying an AI service. An AI system used in a high-impact public service needs stronger assurance, oversight and technical capacity than a low-risk application.

Principles in practice

Step 4 provides the conditions through which the principles become real. Ask whether the enabling environment allows the intervention to deliver them in practice:

- **Shared prosperity:** can local businesses, communities and workers take part in or benefit from the intervention, and are procurement and financing designed so as not to exclude smaller actors?
- **Sustainability, resilience and crisis response:** can the city operate, maintain and adapt the infrastructure and services over time, including during disruptions?
- **Community participation and collaboration:** are there institutional mechanisms through which communities can contribute to design, implementation and monitoring?

- **Inclusive, open, interoperable, safe and secure digital space:** are privacy, security, accessibility, transparency, interoperability and accountability built into governance, infrastructure, data, skills and procurement?

Look for evidence that these conditions exist, not only for an adopted policy.

Tools and resources

- UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025), "key enablers" section.
- Risk assessment and mitigation approach (Section 3.2) and division of responsibilities between levels of government (Table 9).
- U4SSC, *Compendium of practices on innovative financing for smart sustainable cities projects*.[32]
- U4SSC, *Building* digital *public infrastructure for cities and communities* (2025).[33]
- U4SSC, *Procurement guidelines for smart sustainable cities* (2026)[34] and *Guide to next-generation public procurement in cities* (2023).
- UN-Habitat, *Building and securing digital public infrastructure – A playbook for local and regional governments*.
- Office of the Secretary-General's Envoy on Technology and UNDP, *Universal DPI Safeguards Framework.*
- Recommendation ITU-T Y.4505, *Minimal interoperability mechanisms for smart and sustainable cities and communities* (2024), and the related OASC Minimal Interoperability Mechanisms.
- Recommendations ITU-T Y.4904 and Y.4906 (see Step 2) and U4SSC *Policy benchmarks* (2024).
- UNESCO, *Readiness Assessment Methodology* (RAM), for wider institutional and governance gaps relevant to AI.
- UNESCO, *Operational Guidelines: Constructing UNESCO Media and Information Literacy Cities*; *Media and Information Literate Citizens: Think Critically, Click Wisely*;[35] and *User empowerment through media and information literacy responses to the evolution of generative AI*.[36]

---

32 U4SSC, *Compendium of practices on innovative financing for smart sustainable cities projects* (ITU, 2022). https://www.itu.int/pub/T-TUT-SMARTCITY-2022-16

33 U4SSC, *Building digital public infrastructure for cities and communities* (ITU, 2025). https://www.itu.int/hub/publication/t-tut-smartcity-2025-9/

34 U4SSC, *Procurement guidelines for smart sustainable cities* (2026). https://u4ssc.itu.int/publications/ ; see also U4SSC, *Guide to next-generation public procurement in cities* (2023). https://www.itu.int/hub/2023/06/guide-to-next-generation-public-procurement-in-cities/

35 UNESCO, *Media and Information Literate Citizens: Think Critically, Click Wisely* (curriculum for educators and learners). https://www.unesco.org/mil4teachers/en/curriculum

36 UNESCO, *User empowerment through media and information literacy responses to the evolution of generative artificial intelligence*. https://unesdoc.unesco.org/ark:/48223/pf0000388547

People-centred check – before moving to Step 5

1. **Ownership:** is a public authority clearly accountable for the intervention and its outcomes?
2. **Authority:** do the institutions involved have the mandate to make the decisions required?
3. **Capacity:** does the city have, or have access to, the expertise to understand, procure, operate, oversee and measure the intervention?
4. **Safeguards:** are the necessary legal, privacy, security, accessibility and accountability safeguards in place?
5. **Infrastructure and data:** are the required infrastructure, data and interoperability arrangements available and sustainable?
6. **Participation:** have communities and stakeholders had real participation opportunities throughout the process to identify needs, barriers and impacts?
7. **Sustainability:** are resources and responsibilities in place for operation, maintenance, adaptation and eventual replacement, not only deployment?
8. **Critical gaps:** have the gaps that could prevent responsible implementation been identified, with an owner and a deadline?

If critical conditions are missing, address them, reduce the scope or risk of the intervention, or reconsider the approach before proceeding.

Where next? Move to Step 5, carrying forward: the enabling-environment assessment; the list of critical gaps and risks; the action plan with owners and timelines; and the conditions and safeguards to build into design, procurement, implementation and monitoring. Revisit them whenever the intervention, technologies, suppliers or context change.

A1.7 Step 5: Design solutions for and with people

At a glance. *Purpose:* turn the findings of Steps 1–4 into the design of the intervention – what will be done, for whom and how – with the people affected. *Output:* the intervention design, with safeguards, a delivery plan and indicators. *Led by:* the owning authority, with users, communities, the teams that will operate the intervention and, where relevant, suppliers.

What this step achieves

The design should be **people-centred by design**, not only through consultation. The needs, experiences, constraints and priorities of the people affected should shape the intervention's scope, features, delivery model and safeguards.

Digital engagement tools can widen participation, but they complement, and do not replace, the in-person processes through which communities organize, deliberate and negotiate with public authorities. Organized civil society, such as community-based organizations, residents' associations, federations of informal settlement dwellers and workers' organizations, should take part in design and oversight, including decisions on whether and how technology is used, not only as respondents to consultations. Participation that relies on digital channels alone risks leaving out the least connected residents.

The design process should match the intervention: a policy is designed differently from a digital service or an AI system. Where technology is involved, first confirm the need and expected public value rather than assuming a particular technology is the answer, and consider what risks it may introduce and how it will interact with existing services, infrastructure, policies and institutions. Finally, decide now how the intervention will be assessed once running: indicators, feedback mechanisms and review points.

Why it matters

People-centred design brings people into the discussion before the solution is fixed. Design choices determine who can access a service, what data are collected, how decisions are made and who may be excluded, for policies as much as for technology. The city should, therefore, consider:

- whose needs the intervention addresses, and which groups may experience different benefits, barriers or risks;
- how affected people can contribute to the design in a meaningful way;
- whether the intervention is accessible and usable;
- how privacy, safety, security and other rights will be protected;
- how people can understand, challenge or give feedback on it;
- how it will work with existing policies, services and infrastructure; and
- how evidence and feedback will be used to improve it.

What to do

1. **Define needs with the people concerned:** identify users and affected people, including groups at risk of exclusion, and use evidence and engagement to define their needs, priorities and

desired outcome. For technology-enabled interventions, confirm that a digital or AI approach is appropriate.

2. **Co-design:** involve residents, communities, institutions and other stakeholders at the stages where they can still influence the intervention, using accessible methods. Record the feedback and show how it shaped the design.
3. **Turn findings into requirements:** convert needs and input into the intervention's objectives, scope, requirements, delivery model and safeguards, including accessibility and integration with existing systems and services. For a strategy, turn them into strategic priorities.
4. **Assess impacts and validate the design:** assess the differentiated impacts and risks before finalizing the design and build in safeguards. If it is an AI-related intervention, carry out the light check and impact classification (Section 3.2); for high-impact uses, or where the law requires it, also carry out the ex ante digital human rights impact assessment (DHRIA). Prototype and test with users before wider roll-out. For strategies and policies, assess impacts and invite comments on the draft.
5. **Set up feedback and adaptation mechanisms:** define how people can give feedback, challenge outcomes or raise concerns during implementation, and how this will trigger review.
6. **Set commitments, timeline and milestones:** confirm roles and responsibilities (who does what, when and how), coordination within and across departments and, where needed, with national government. Break a strategy into implementation phases with resources and review dates; break a project into deliverables with resources, timeline and quality review.
7. **Set indicators:** align indicators with the outcomes defined in Step 1, add project indicators, and agree **how often** progress will be monitored and reviewed, using international standards where useful (Chapter 4).
8. **Confirm the enabling conditions:** check that the priority conditions identified in Step 4 are in place.

Table A1.7 – Step 5: how it differs by type of intervention

Intervention	Design approach	Reference methods
Strategy or policy	Design with residents, communities, institutions and stakeholders through a structured strategy-development process, with consultation at key stages, feedback on the draft, revision and continued participation during implementation.	UN-Habitat, A step-by-step guide for a people-centred smart city strategy
Project	Turn needs into the service, infrastructure or operational intervention. Segment the people affected, understand their needs and barriers, co-design key elements, assess social and environmental impacts, and pilot before wider roll-out.	Human-centred and participatory design; UN-Habitat co-creation playbook

Intervention	Design approach	Reference methods
AI project	In addition: confirm that AI is appropriate; identify differentiated impacts; classify the use with the traffic-light rule (Section 3.2) and, for high-impact uses or where the law requires it, carry out the ex ante DHRIA; prototype and test; and set up human oversight and feedback mechanisms. A people-centred AI system supports users' safety preferences and meaningful human supervision.	UNDP, Building Responsible Smart Cities Toolkit; UNESCO, Artificial Intelligence and the Rule of Law[37]

Principles in practice

Step 5 turns the principles into requirements. The city should be able to show how participation influenced the design and how differentiated impacts were addressed. For a smart city strategy, the priorities linked to the principles should appear in the implementation plan through initiatives, funding, governance and capacity. For a technology solution, the development criteria and technical specifications should follow from the principles the intervention aims to advance.

Tools and resources

Strategy and participation

- UN-Habitat, *A step-by-step guide for a people-centred smart city strategy*: inclusive participation, stakeholder engagement, feedback and iteration.
- UN-Habitat, *Shaping co-creation and collaboration in smart cities – A playbook for local and regional governments*, and the UN-Habitat playbooks on digital equity, infrastructure, security and capacity.
- OECD, *Guidelines for Citizen Participation Processes*: to choose the participation method best suited to each stage.[38]
- ITU and 12 other United Nations entities, *Toolkit on Digital Transformation for People-Oriented Cities and Communities*.[39]
- *City Leader's Field Guide: Preparing for the AI-enabled citiverse*, a publication of the Global Initiative on AI and Virtual Worlds – Discovering the Citiverse.[40]

37 UNESCO, *Artificial Intelligence and the Rule of Law*. https://www.unesco.org/en/artificial-intelligence/rule-law

38 OECD, *OECD Guidelines for Citizen Participation Processes* (OECD Publishing, 2022).

39 ITU and 12 United Nations entities, *Toolkit on Digital Transformation for People-Oriented Cities and Communities* (2022). https://toolkit-dt4c.itu.int/

40 Global Initiative on AI and Virtual Worlds – Discovering the Citiverse, *City Leader's Field Guide: Preparing for the AI-enabled citiverse – The Practical Readiness Assessment for Mayors, Ministers, and Senior City Decision-Makers* (ITU, 2026).

Human rights and AI

- UNDP, *Building Responsible Smart Cities: A Toolkit for Public and Private Sector Actors*: identifying and addressing human rights risks in technology-enabled interventions.
- Danish Institute for Human Rights, *Guidance on Human Rights Impact Assessment of Digital Activities* (2020): a step-by-step method (scoping, data collection, impact analysis, mitigation, reporting) that cities can adapt for a DHRIA.
- Council of Europe, *HUDERIA methodology* (2024): risk and impact assessment of AI systems from the point of view of human rights, democracy and the rule of law, for high-impact uses.
- OHCHR, *Guidance for Human Rights Impact Assessment on Digital Platforms*.
- UN-Habitat, *GeoAI Toolkit for Urban Planners* (2025): assessing, designing, validating and integrating GeoAI in planning workflows.
- UNESCO, *Artificial Intelligence and the Rule of Law*; *Operational Guidelines: Constructing UNESCO Media and Information Literacy Cities*.

People-centred check – before moving to Step 6

- **Need:** does the intervention respond to an evidenced need, not a predetermined technology?
- **People:** have the people directly and indirectly affected, including under-represented groups, been identified and consulted?
- **Influence:** did their participation influence the design, and can the city show how?
- **Access and skills:** can intended users access and use the intervention, including where digital access is limited? Do people have the skills to understand new policies and their impact?
- **Impact:** have positive and negative social and environmental impacts been assessed for different groups, with matching safeguards? For high-impact uses, or where the law requires it, has the ex ante DHRIA been carried out?
- **Safeguards:** are human rights, privacy, safety, accessibility and accountability safeguards built into the design?
- **AI and technology:** where applicable, has the responsible AI assessment been completed?
- **Feedback:** can people give feedback, challenge outcomes or raise concerns, and will the city act on it?
- **Measurement:** are there clear indicators to show whether the intervention achieves the intended outcome?

Where next? Move to implementation once a people-centred design has been achieved. If questions or validation remain open, extend the design phase until they are resolved.

A1.8 Step 6: Implement

At a glance. *Purpose:* put the designed intervention into action, keeping the people-centred requirements alive in contracts, procedures and operations. *Output:* an implemented and tested intervention, with operational procedures and monitoring in place. *Led by:* the owning authority and the delivery team, with suppliers and partners.

Chapter 4 (Section 4.6) explains how implementation turns planned interventions into operational actions, bringing together the responsibilities, resources, partnerships and safeguards needed for delivery. This section builds on that guidance.

What to do

1. **Set up implementation arrangements:** confirm who is responsible for delivery, decisions, coordination and oversight; confirm the institutional, human, technical and financial resources; and set up coordination across departments, levels of government and partners.
2. **Prepare an actionable plan:** break the intervention into sequenced actions, deliverables, milestones and responsibilities, with the resources, procurement, partnerships, capacity building and operating requirements needed. For a strategy, this is the **implementation roadmap**: the prioritized actions, programmes and projects (technological, non-technological, institutional reforms and capacity building) that deliver its objectives.
3. **Deliver, test and validate:** implement at an appropriate scale. Prefer pilots, prototypes or phased roll-out to test assumptions first. For a strategy, test priority actions through pilot projects; for a technology, carry out technical, user and safety testing (Section 3.4.2); for an investment, use staged delivery, commissioning and performance testing. Track progress against milestones, resources, deliverables, risks and implementation indicators, and correct course as needed.
4. **Make safeguards, accountability and participation operational:** ensure that the safeguards set in Step 5 appear in contracts, operating procedures and oversight arrangements, in proportion to the nature, scale and risk of the intervention. Keep channels open for participation, feedback, complaints and incident reporting. Turn the regulatory and governance requirements identified in Step 4 into operational requirements and assurance mechanisms (Annex 2, Table A2.1). Where national or regional regulators have created **regulatory sandboxes**, these allow controlled testing; cities can also host testbeds or living labs within existing law, with safeguards, monitoring and clear criteria for wider roll-out.
5. **Build the capacity to operate:** make sure staff, partners and users have the knowledge, skills and resources identified earlier, including an understanding of the risks. This may involve training, changes to workflows and responsibilities, technical support, data management and new institutional arrangements. **Inform and consult municipal staff and their representatives**

early on how digital and AI tools will change their work, and offer training; their professional judgement remains essential to safe operation.

The mechanisms in Table A1.8 below help cities translate regulatory and governance requirements into practical arrangements during implementation. Their relevance depends on the type, scale and risks of the intervention, whether or not it involves the deployment of digital technologies, including AI. For AI-specific requirements and safeguards, please see Table A2.1 in Annex 2, which explains how these mechanisms apply to AI systems.

Table A1.8.1 – Mechanisms to put regulatory requirements into practice

Mechanism	What it is	Where it usually sits, and what a city can do
Certification	Recognized requirements that systems, providers or processes must meet.	Set by national or supranational authorities and standards bodies. Cities can require certified products or services in procurement where schemes exist.
Licensing	Authorization for specific activities where the risk justifies it.	Set by national or sector regulators. Cities apply licensing within their own competences (for example, use of public space) and check that suppliers hold the required licences.
Conformity assessment	Verification that a system, service or process meets legal, technical and governance requirements before deployment or implementation or at set stages.	Defined by law; carried out by providers or designated bodies. Cities can request evidence of conformity and check it before deployment or implementation, where applicable.
Impact assessments	Assessment of impacts on human rights, privacy, equality, safety and the environment before deployment or implementation or major changes.	Required by law in some cases (for example, data protection impact assessments. Elsewhere, cities can adopt proportionate impact assessment procedures for interventions with potentially significant impacts.
Independent audits	External checks of compliance, controls and performance.	Statutory audit by national audit offices or accredited bodies. Cities can commission independent reviews, use internal audit or academic partners, and require audit access in contracts.
Procurement requirements	Technical, data, transparency, accessibility, security and accountability requirements in tenders and contracts.	Largely within the city's control, under national procurement law. Model clauses can be shared through city networks (Annex 5, Table A5.6).
Regulatory sandboxes	Controlled testing of innovative solutions under defined conditions and safeguards.	Usually created by national or regional regulators. Cities can host testbeds or living labs within existing law and partner with regulators.

Mechanism	What it is	Where it usually sits, and what a city can do
Transparency obligations	Documentation and disclosure about interventions, risks and decisions, with ongoing community feedback.	Some set by law (for example, public disclosure and reporting requirements). Cities can go further through public information registers (where applicable).
Incident reporting	What counts as a reportable incident (including incidents raised by residents), who reports it, when and to whom.	External duties (for example, cybersecurity incidents and personal data breaches) are set by national law. Cities define internal reporting and escalation and inform residents.
Accountability records	Evidence of decisions, responsibilities, assessments, controls, approvals, feedback, changes and corrective actions.	Mainly a city responsibility, through the decision and accountability record (Annex 5) and other relevant records, as applicable.
Continuous compliance monitoring	Checking compliance during operation or implementation and triggering corrective action, with stakeholders and residents involved in testing and feedback.	Mainly a city responsibility, supported by supplier obligations in contracts, where applicable.

Table A1.8.2 – Step 6: how it differs by type of intervention

Intervention	Focus	Main outputs
Strategy or policy	Turning priorities into a roadmap; coordination; allocating resources; launching priority actions and pilots; building institutional and civic capacity.	• Action plan with a prioritized project portfolio • Governance arrangements • Pilot projects • Capacity-building plan • Resource mobilization plan • Monitoring and learning framework
Project	Delivering a defined intervention for an urban need; managing scope, resources, stakeholders, risks and delivery; testing and refining.	• Implementation plan • Delivery arrangements • Tested intervention • Operating procedures • Monitoring framework • Evaluation and scale-up decision
AI project	In addition: developing or acquiring, testing, deploying and maintaining the technology; validating performance, usability, interoperability, security and responsible use; integrating it into existing workflows.	• Tested technology or prototype • Technical and functional specifications • Risk and impact assessments • Operating protocols • Deployment and maintenance arrangements • Monitoring and incident-management mechanisms

Example. A digital or access-to-information strategy identifies better access to basic services as a priority. Its implementation could lead to several projects: a non-technological redesign of service delivery; a digital service; an infrastructure investment to support both; and actions to assess and improve access to information. Each follows the same cycle, with different technical, institutional, financial and operational requirements.

Principles in practice

Implementation is where the principles are tested. An inclusive, open, interoperable, safe and secure digital space depends on whether assisted channels, accessibility measures, complaint routes and security controls actually work. Community participation depends on whether feedback received during delivery leads to visible changes. The testing and assurance arrangements in Section 3.4.2 provide the evidence.

Tools and resources

- Section 3.4.2 (testing and assurance) and the testing and assurance plan template (Annex 6).
- U4SSC, *Procurement guidelines for smart sustainable cities* (2026), the core procurement clauses (Annex 5, Table A5.6) and the responsible procurement and supplier-assurance checklist (Annex 6).
- OECD, *A Comprehensive Guide for Regulators to Establish and Manage Regulatory Sandboxes Effectively* (2025).[41]
- NIST, *AI Risk Management Framework* and *Generative AI Profile*; ISO/IEC 42001 and ISO/IEC 23894.[42]
- AI Verify Foundation, *AI Verify testing framework and toolkit*;[43] UNESCO, *Ethical Impact Assessment* (2023).[44]
- UNESCO, *Readiness Assessment Methodology* (RAM), for wider institutional gaps in AI governance.

41 OECD, *Regulatory sandbox toolkit: A comprehensive guide for regulators to establish and manage regulatory sandboxes effectively* (2025). https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/regulatory-sandbox-toolkit_cc8d3e50/de36fa62-en.pdf

42 NIST, *Artificial Intelligence Risk Management Framework (AI RMF 1.0)* (2023) and *Generative AI Profile* (NIST AI 600-1, 2024); ISO/IEC 42001:2023; ISO/IEC 23894:2023.

43 AI Verify Foundation (Singapore), *AI Verify testing framework and toolkit*. https://aiverifyfoundation.sg/

44 UNESCO, *Ethical Impact Assessment: A Tool of the Recommendation on the Ethics of Artificial Intelligence* (2023).

People-centred check – before moving to Step 7

- **Ownership:** are responsibilities and decision-making arrangements clear?
- **Resources:** are human, financial and technical resources sufficient for implementation and ongoing operation?
- **Delivery:** has the intervention been tested and validated, with no unaddressed side effects from AI?
- **Access:** can intended users and affected groups access and benefit from it?
- **Safeguards:** are the safeguards set during design working in practice?
- **Accountability:** can people raise concerns, challenge decisions and get a response?
- **Learning:** is implementation evidence being used to correct and improve the intervention?
- **Sustainability:** can the city maintain and finance the intervention over its intended life?
- **Scale:** is there early evidence to inform institutionalization, expansion or replication?

Where next? Once implementation is under way, move to Step 7. Implementation and monitoring overlap: evidence gathered during delivery is the basis for judging whether the intervention is producing the intended outcomes.

A.1.9 Step 7: Track and measure progress and impact

At a glance. *Purpose:* answer the question "Is the intervention making the intended difference, and for whom?" *Output:* monitoring and evaluation evidence that feeds the decision in Step 8. *Led by:* the owning authority, with the monitoring unit, data holders, users and independent partners where appropriate.

What this step achieves

The city systematically assesses whether the intervention is achieving its intended outcomes and advancing the relevant principles. Measurement should distinguish four levels: **implementation performance, outputs, outcomes and, where feasible, longer-term impacts**. At each level, indicators can cover technical performance, information and data management, civic engagement, multistakeholder involvement, benefits to individuals, groups and society, equality and rights. The level of measurement should match the intervention's scale, maturity and potential effects. Not every intervention can show impact within its life; the long-term social and economic impact of policies is generally assessed over five to ten years.

Step 7 builds on the outcomes from Step 1, the baseline from Step 2, the criteria and expected value from Step 3, and the indicators and **monitoring frequency agreed in Step 5**. Step 6 supplies operational information. Distinguish:

- **monitoring**, which tracks performance regularly and allows timely corrections; and
- **evaluation**, which is usually carried out at the end of a project, or some time after a strategy or policy has run, to judge what changed and why.

Combine quantitative and qualitative evidence: administrative and operational data, user feedback, community perspectives and, where appropriate, independent evaluation. Break results down by population group, gender, age, income, neighbourhood and other relevant characteristics. Look for unintended consequences, such as exclusion, environmental effects, privacy or safety problems and changes in public trust, that no indicator was designed to catch.

Why it matters

A people-centred approach asks first whether the intervention improves people's lives and the urban environment. Measurement allows the city to:

- check whether it delivers its outputs and contributes to the desired outcomes, compared with the baseline;
- see differences in benefits and impacts between groups and places;
- detect unintended or negative effects and correct them;
- check whether safeguards work in practice;
- see whether more people are acquiring digital and media and information literacy skills, and how civic engagement changes;
- understand whether resources are generating public value;
- provide evidence for transparency and accountability; and
- decide what to adapt, strengthen, scale or stop.

For digital and AI interventions, measure technical performance alongside social, institutional, environmental and rights-related outcomes.

What to do

1. **Collect the data** set out in the measurement framework (outputs, outcomes and impact), drawing on existing administrative and operational data to avoid new collection burdens.
2. **Partner for evidence:** work with universities, research networks, think tanks, civil society and the private sector on purposeful research and evaluation.

3. Compare results with the baseline set in Step 2.
4. **Break down results** to see differences between groups and places.
5. **Look for intended and unintended effects**, including on inclusion, equity, privacy, safety, the environment, public trust, institutional capacity and access to services. For high-impact technology projects, repeat the DHRIA ex post whenever conditions change in ways that may affect people's rights.
6. **Hear from people:** combine indicators with surveys, interviews, focus groups, complaint tracking, feedback mechanisms and community engagement.
7. **Find the cause of any shortfall:** is it implementation, the original diagnosis, the design, the enabling environment, external circumstances or wrong assumptions?
8. **Record and communicate the findings**, including limitations and uncertainties, to decision-makers, affected communities and other stakeholders, in accessible formats.
9. **Prepare the Step 8 decision:** continue as is, reassess, institutionalize, expand, replicate, pause or stop.

Table A1.9 – Step 7: how it differs by type of intervention

Intervention	Focus of measurement
Strategy or policy	Progress towards strategic outcomes; delivery of priority actions and pilots; institutional change; progress in digital and media and information literacy; policy uptake; changes in relevant urban conditions.
Project	Delivery against scope, time and budget; service performance; user experience; accessibility; outcomes; unintended effects.
AI project	In addition: technical performance, accuracy and reliability; usability; accessibility; security; bias or differentiated impacts; human oversight; incidents; user trust. Monitoring results and qualitative user information can help improve the AI model.

Principles in practice

Measure whether the intervention contributes to the people-centred outcomes identified in Step 1 and whether benefits and impacts are fairly distributed. The principles help the city judge not only whether an intervention performs, but whether it performs in a way that is inclusive, sustainable, participatory and respectful of rights.

Tools and resources

- Chapter 5 core and supplementary indicators; Annex 4 mapping of the U4SSC KPIs.
- U4SSC, Collection Methodology for Key Performance Indicators for Smart Sustainable Cities.

- Recommendation ITU-T Y.4905, *Smart sustainable city impact assessment*: a framework for assessing the social, economic and environmental impacts of smart city initiatives.
- Complaint, review and incident record; outcome-monitoring and indicator-specification sheet (Annex 6).

People-centred check – before moving to Step 8

- **Results:** is the intervention achieving its outputs and contributing to the desired outcomes?
- **Baseline:** can results be meaningfully compared with the starting situation?
- **Equity:** do benefits and impacts differ between groups or places?
- **Experience:** what are people and communities experiencing in practice?
- **Unintended effects:** have unexpected benefits, harms or exclusions emerged, and for whom?
- **Safeguards:** are the safeguards working?
- **Evidence:** is there enough evidence to explain what works, what does not and why?
- **Transparency:** have findings and limitations been recorded and communicated openly?
- **Decision:** is there enough evidence to decide what happens next?

Where next? The evidence from Step 7 is the basis for Step 8. If results are inconclusive, the city may continue monitoring for a set period or return to an earlier step: the problem definition, the baseline, the enabling conditions or the design.

A1.10 Step 8: Learn, adapt and scale

At a glance. *Purpose:* answer the question "What should we do next?" *Output:* a recorded decision to continue, adapt, institutionalize, scale or replicate, pause or stop, and the start of the next cycle. *Led by:* the owning authority and decision-makers, with residents and stakeholders kept informed and involved.

What this step achieves

The city uses the evidence from implementation and measurement to decide the future of the intervention. The decision should rest on public value, contribution to outcomes, distribution of benefits and impacts, performance, risks, costs, sustainability and the city's capacity to maintain the intervention. Adaptation may mean small operational changes, redesign of components, stronger safeguards or enabling conditions, or a fundamental rethink. Where an intervention has proven its

value, the city may institutionalize it in regular policies, services and budgets, or scale or replicate it in other neighbourhoods, groups or cities.

Scaling is not just more of the same. Before scaling, check that the evidence is robust and that the conditions that made the intervention work exist in the new context. A solution that worked in one place may need adapting elsewhere. Equally, evidence that an intervention is not delivering should be an opportunity to change course: **pausing, redesigning or stopping is a legitimate and responsible outcome** (Case study 8). Step 8 closes one iteration and opens the next.

Why it matters

Technologies evolve, needs change, new risks emerge and design assumptions may prove wrong. A people-centred city must be able not only to implement, but to learn and change course, keeping residents informed and involved. Step 8 helps cities to:

- use evidence to decide what happens next;
- correct or stop interventions that do not deliver;
- strengthen safeguards when new risks emerge;
- institutionalize successful approaches in regular systems and budgets;
- judge whether an intervention is mature enough to expand or replicate;
- share knowledge, lessons and solutions with other departments, neighbourhoods or cities;
- free resources from interventions that no longer justify their costs or risks.

What to do

1. **Review the evidence and lessons:** bring together the Step 7 findings, implementation experience from Step 6, feedback from people and communities, and changes in the wider environment.
2. **Re-examine the original assumptions:** have the problem, needs, priorities, technology or context changed? If so, return to Step 1 or 2 rather than adapting on the basis of an outdated diagnosis.
3. **Decide:** continue, adapt, pause or stop. Record the evidence and the rationale.
4. **Adapt and improve:** where the intervention continues, identify the changes needed to improve effectiveness, accessibility, sustainability, safeguards, user experience or performance. Put significant changes through the relevant earlier steps again.
5. **Institutionalize what works:** embed successful interventions in regular policies, services, institutions, budgets, procedures and capabilities, to avoid isolated or temporary pilots.

6. **Check readiness to scale or replicate:** is there sufficient evidence of value; are the enabling conditions from Step 4 present; is the intervention appropriate to the new context; are new principles at stake; have affected groups been considered; are additional infrastructure, capacity or financing needed; do risks and safeguards need redesign; can the solution work with existing systems?
7. **Capture and share lessons:** document what worked, what did not, why and under what conditions, and share lessons across departments, stakeholders and other cities. Cities are encouraged to contribute their use cases and lessons to U4SSC.
8. **Start the next cycle** at the step that matches the change needed (Table A1.10).

Table A1.10.1 – Where to return in the next cycle

Evidence or decision	Return point
The original problem or desired outcome was wrongly defined	Step 1
The baseline or understanding of the context was incomplete	Step 2
A different course of action appears more appropriate	Step 3
Critical governance, capacity, infrastructure or financing gaps emerged	Step 4
The intervention needs substantial redesign	Step 5
The intervention is right, but implementation needs correcting	Step 6
The intervention works and the evidence supports continuing	Continue or institutionalize
The evidence supports expansion and the new context is suitable	Scale or replicate
Public value is insufficient or risks cannot be managed	Pause or stop

Table A1.10.2 – Step 8: how it differs by type of intervention

Intervention	Focus
Strategy or policy	Review progress towards strategic outcomes; revise priorities; institutionalize successful approaches and methods; update the roadmap; reallocate resources.
Project	Improve, extend, institutionalize, involve more groups, replicate or close the project, based on performance, user experience, outcomes, risks and sustainability.
AI project	Decide whether the system should be maintained, retrained, redesigned, replaced, expanded or withdrawn, considering performance, changing data, risks, safeguards, human oversight and user experience.

Principles in practice

Step 8 keeps the principles relevant throughout the life of the intervention. Use the Step 7 evidence to judge whether benefits, risks and impacts remain consistent with the principles; where they do not, adapt the intervention or reconsider whether it should continue.

Tools and resources

- Evaluation design and review tool; adaptation, scaling, replication, replacement and retirement decision tool (Annex 6, proposed).
- UNESCO, Readiness Assessment Methodology (RAM).
- *City Leader's Field Guide: Preparing for the AI-enabled citiverse* (Global Initiative on AI and Virtual Worlds – Discovering the Citiverse).
- Case studies in Section 3.2, including Case study 8 on stopping an AI system.

People-centred check – before closing the cycle or scaling

- **Value:** is the intervention delivering sufficient public value?
- **Outcomes:** is it contributing to the desired urban outcomes?
- **Equity:** are benefits and impacts acceptable across groups and places?
- **Learning:** do we understand what worked, what did not and why?
- **Adaptation:** what needs to change, based on the evidence?
- **Sustainability:** can it be maintained financially, institutionally, technically and environmentally?
- **Scale:** is there enough evidence and capacity to expand or replicate it?
- **Context:** are conditions in the new context similar enough, or is adaptation needed?
- **Exit:** if the intervention should stop, is there a responsible transition or exit plan?

Annex 2 – Responsible AI: regulatory mechanisms and impact assessment methods

This annex complements Chapter 3, which contains the responsible AI guidance, including the traffic-light rule. It sets out the mechanisms that put regulatory requirements into practice and methods cities can adapt for the digital human rights impact assessment (DHRIA).

A2.1 International references and principles

Responsible AI covers the whole life of a system; it is not a one-off compliance check. The main international references are the OECD Recommendation on AI, the most widely used intergovernmental framework; the UNESCO Recommendation on the Ethics of Artificial Intelligence, which introduced the ethical impact assessment; the Council of Europe Framework Convention on AI, the first legally binding international treaty in this field; and the European Union Artificial Intelligence Act, the first comprehensive AI law applying across a group of countries, which bans certain practices and sets obligations for high-risk uses.[45]

How these principles relate to established responsible AI principles. The four principles presented earlier (Section 2.2) describe what the city wants to achieve. Responsible AI principles describe how any AI system used to get there should behave. This chapter builds on the U4SSC *Guiding Principles for Artificial Intelligence in Cities* (Table 5),[46] which are consistent with the OECD and UNESCO texts and with the European Commission High-Level Expert Group's requirement that AI be lawful, ethical and robust.[47] Academic work also stresses human vulnerability and fairness: the same system can affect people very differently depending on their situation. The Guide reflects this through safeguards matched to impact (Section 3.2) and attention to people missing from the data (Section 3.4.1). Standards such as ISO/IEC 42001, ISO/IEC 23894 and the NIST AI Risk Management Framework are useful practical references.[48] Whether a measure is also a legal duty depends on national, and sometimes regional or supranational law. Where the law requires a measure, cities must apply it. Where the law is silent, cities can still adopt it through internal policy, procurement conditions or contract clauses (Section 2.3.9).

A2.2 Why AI, and when not – further detail

- Faster or more automated processes do not necessarily deliver better collective outcomes if they undermine employment, human relationships, local knowledge or institutional capacity.

---

45 OECD, *Recommendation of the Council on Artificial Intelligence* (2019, revised 2024); UNESCO, *Recommendation on the Ethics of Artificial Intelligence* (2021); Council of Europe, *Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law* (CETS No. 225, 2024); Regulation (EU) 2024/1689 (Artificial Intelligence Act).

46 U4SSC, *Guiding Principles for Artificial Intelligence in Cities* (ITU, 2023).

47 European Commission, High-Level Expert Group on Artificial Intelligence, *Ethics Guidelines for Trustworthy AI* (2019).

48 ISO/IEC 42001:2023, *Artificial intelligence – Management system*; ISO/IEC 23894:2023, *Artificial intelligence – Guidance on risk management*; NIST, *Artificial Intelligence Risk Management Framework (AI RMF 1.0)* (2023) and *Generative AI Profile* (NIST AI 600-1, 2024).

- The benefits of AI also depend on a well-defined problem, suitable local data, trained staff, equitable access and a city able to act on the results (Steps 2 to 4).
- Officials understand enough of a system's outputs to question them, keep the authority and the time to depart from them, and remain answerable for the result.

A2.3 The traffic-light rule – full detail

People are not exposed to AI harms equally: the same system can affect individuals and communities very differently depending on their circumstances. Consequently, governance should follow the actual role of AI and the likelihood and severity of harm and be reviewed throughout the system's life.

Record the reasons for each classification and reassess after any material change to the model, data, supplier, hosting, connected tools, permissions, the people affected or the risk profile.

When classifying, consider: whether AI informs, supports or takes action; scale, autonomy and links to other systems; the data used and their limits; effects on people, groups, services and rights; the consequences of errors, misuse or attacks and how easily they can be reversed; and effects on budgets, supplier dependence and the environment.

Table A2.3.1 – The traffic-light rule

Impact level	Typical city uses	Minimum safeguards
Lower impact (green)	Internal drafting, summarizing and search; translation of public information checked before publication; meeting transcription	Entry in the AI inventory (and the public register if resident-facing); staff policy on generative AI and basic AI literacy; human review before publication or use; data protection check, especially for generative AI tools
Medium impact (amber)	Chatbots answering residents' enquiries; demand forecasting for service planning; prioritizing inspections or maintenance	All of the above, plus: documented risk assessment, including a screening of effects on people's rights (if the effects may be significant, treat the use as high impact); testing on local data across groups and areas; clear disclosure of AI use and an easy route to a person; public register entry; performance monitoring and periodic review
High impact (red)	Eligibility, prioritization or allocation of benefits, housing or social care; operation of critical infrastructure (energy, water, transport); emergency dispatch prioritization; surveillance or biometric identification in public space	All of the above, plus: digital human rights impact assessment (DHRIA) before deployment, repeated during use whenever conditions change in ways that may affect people's rights (required by law in some jurisdictions); human-in-the-loop or human-on-the-loop oversight; independent review or audit; testing under realistic conditions and staged roll-out; consultation with affected groups and a published summary of the assessment; check whether national law prohibits or restricts the use

A full impact assessment only where it is needed. The light check applies to every AI use. A full DHRIA is required only for high-impact uses, or where the law requires it, and is repeated when conditions change in ways that may affect people's rights. Routine tools such as translation, transcription or document search do not need one: the light check, staff rules and human review of outputs are enough. This keeps safeguards proportionate and within reach of every city, including small ones. For high-impact uses, human review is part of the standard process for every decision that affects a person, not only on request.

The tools that support each level, including the AI inventory and register entry, the staff policy on generative AI, the core procurement clauses and the AI agent checklist, are in the City Implementation Guide (Annex 5).

Decide the level of autonomy. For each use, decide how much autonomy the system has and where humans check its work. The U4SSC report Autonomous cities and AI describes four levels (Table A2.2). The right level depends on the consequences of error, whether the action can be reversed and the rights affected. Record it in the decision record, the AI inventory and the public AI register entry (templates in Annex 5, Tables A5.7 and A5.8).

Table A2.3.2 – Levels of human involvement in AI-enabled city systems

Level	Role of AI and of people	Example
Human-in-the-loop	AI advises or recommends; a person reviews, decides and acts.	AI drafts a summary of a planning application; an officer decides.
Human-on-the-loop	AI acts within tight limits while a person monitors in real time and can intervene.	Adaptive traffic-signal timing supervised from a control centre.
Human-in-command	People set the rules and limits and review performance periodically, without intervening in individual actions.	Automated leak detection that opens maintenance tickets within pre-approved rules, reviewed monthly.
Human-out-of-the-loop	AI decides and acts without human monitoring or override.	Listed so that cities can recognize it and set clear limits. It may be considered only for narrow technical functions with no direct effect on people, within pre-set safety limits and with fail-safe mechanisms – for example, automatic protection switching in an electricity or water network. It is not acceptable for public services or decisions affecting people's rights, benefits or safety.

Source: U4SSC, Autonomous cities and AI: The next frontier of urban transformation (2026).[49]

[49] U4SSC, *Autonomous cities and AI: The next frontier of urban transformation* (ITU, 2026), Section 4.1. https://www.itu.int/epublications/en/publication/autonomous-cities-and-ai-the-next-frontier-of-urban-transformation

Identify risks and choose mitigations (Table A2.3). Uses linked to physical or critical infrastructure may also need system-level testing and stronger arrangements for safe shutdown and recovery.

Table A2.3.3 – Common AI risks and possible mitigations

Common risks	Possible mitigations
• Inaccurate or poorly validated outputs • Bias or unequal performance across groups or areas • Exclusion or new barriers to essential services • Misuse or leakage of personal data • Cyberattacks or harmful use of connected tools • Misleading information or poorly communicated uncertainty • Over-reliance on outputs, weak oversight or unclear accountability • Decisions that cannot be explained, contested or reversed • Safety risks from links to physical systems • Vendor lock-in or opaque third-party systems • Underestimated lifecycle costs • Environmental impacts • Loss of public trust	• Narrow the purpose, scope or degree of automation • Improve data quality, representativeness and validation • Keep non-digital or assisted channels • Limit permissions, data access and connections • Require human review, approval gates and the ability to override or suspend • Strengthen security, testing, logging and incident response • Give notice, explanations, complaint and review routes • Set contract terms on interoperability, audit, data export and exit (Annex 5) • Phase deployment and seek independent review • Train staff and inform residents, including on media and information literacy • Pause, redesign or retire the system • Do not deploy where risks cannot be reduced to an acceptable level

Source: U4SSC, Autonomous cities and AI: The next frontier of urban transformation (2026).

Identify risks and choose mitigations. Uses linked to physical or critical infrastructure may also need system-level testing and stronger arrangements for safe shutdown and recovery.

Common AI risks

- Inaccurate or poorly validated outputs
- Bias or unequal performance across groups or areas
- Exclusion or new barriers to essential services
- Misuse or leakage of personal data
- Cyberattacks or harmful use of connected tools
- Misleading information or poorly communicated uncertainty
- Over-reliance on outputs, weak oversight or unclear accountability
- Decisions that cannot be explained, contested or reversed

- Safety risks from links to physical systems
- Vendor lock-in or opaque third-party systems
- Underestimated lifecycle costs
- Environmental impacts
- Loss of public trust

Possible mitigations

- Narrow the purpose, scope or degree of automation
- Improve data quality, representativeness and validation
- Keep non-digital or assisted channels
- Limit permissions, data access and connections
- Require human review, approval gates and the ability to override or suspend
- Strengthen security, testing, logging and incident response
- Give notice, explanations, complaint and review routes
- Set contract terms on interoperability, audit, data export and exit (Annex 5)
- Phase deployment and seek independent review
- Train staff and inform residents, including on media and information literacy
- Pause, redesign or retire the system
- Do not deploy where risks cannot be reduced to an acceptable level

A2.4 Five AI essentials – further detail

Many AI decisions are made at the moment of purchase, often inside a wider service contract (Case study 5, Tampere). For transparency, see Case study 6, Amsterdam and Helsinki.

A2.5 Safeguards in practice

People missing from the data

AI systems can only reflect what has been recorded. In many cities, particularly in the Global South, informal work and housing, unregistered businesses and people without civil registration or a formal address are poorly represented in administrative records. Systems relying on such data may overlook entire population groups and lead to biased decisions on services and investment. This is a core risk of bias and exclusion: assess who is missing before relying on any dataset or model (Step 2).

Testing before and during use

Supplier claims and benchmarks are not sufficient, because performance often differs on local data. **Verification** checks that a system works as specified; **validation** checks that it is fit for purpose in the city's context; **assurance** is the evidence, built over time, that justifies confidence in it. Before deployment, and in proportion to the impact level:

- set acceptance criteria before procurement, covering the errors that matter (such as wrongly refused applications), differences across groups and areas, and accessibility;
- validate on local, representative data and break results down by group and area;
- test robustness and security; for generative AI and chatbots, use structured adversarial testing ("red teaming") for harmful outputs, prompt injection and data leaks;
- test usability and accessibility with intended users, including people with disabilities and limited digital skills;
- pilot in a limited scope with success and exit criteria agreed in advance; and
- keep the supplier's documentation (intended use, data sources, known limitations, test results), the city's own test reports and the accountable official's sign-off.

During operation, monitor performance and drift, re-test after changes (including supplier model updates), keep logs and incident records, and arrange periodic independent review for high-impact uses. Smaller administrations may require suppliers to provide evidence and audit access, use joint procurement or shared assurance services, and partner with universities. Where national certification or conformity assessment schemes exist, cities may make compliance with them a procurement requirement.[50]

Transparency and public AI registers

When AI is used in a public service or decision, the responsible authority should explain, in a form suited to the people affected: the purpose of the AI use and the authority responsible; the role AI plays; how to ask questions, complain or request human review; and any uncertainty that may affect the outcome. Outputs used for public information or important decisions should be reviewed before use, and staff need appropriate AI literacy to understand what a system can and cannot do.

Public AI registers. A public register of the city's AI and algorithmic systems is a practical, low-cost way to support transparency. Amsterdam and Helsinki published the first city registers in 2020 (Case study 6).[51] Where the law requires registration of certain systems (for example, high-risk uses in the

[50] Practical references include UNESCO, *Ethical Impact Assessment: A Tool of the Recommendation on the Ethics of Artificial Intelligence* (2023); ISO/IEC TR 29119-11:2020, *Guidelines on the testing of AI-based systems*; the AI Verify testing framework and toolkit (AI Verify Foundation, Singapore); and the OWASP *Top 10 for Large Language Model Applications*.

[51] Cities Today, "Helsinki launches AI register to detail city systems" (2020). https://cities-today.com/helsinki-launches-ai-register-to-detail-city-systems/ ; Eurocities, *Algorithmic Transparency Standard*.

EU database), a municipal register complements that duty. **Start with an internal inventory** of all AI uses, including staff use of generative AI tools, and publish entries step by step, beginning with resident-facing and higher-impact uses (template in Annex 5, Table A5.8). A **short staff policy on generative AI**, stating which tools are approved, which data must not be entered into these tools and who checks outputs, is a useful first safeguard that can be adopted quickly.

Human oversight and AI agents

Oversight must work in real operation. Before deployment, define the conditions that trigger human review; who reviews, with what information and authority; who may pause, override or stop the system; how errors are corrected and the system restored to a safe state; which records are kept; and what must be checked before normal operation resumes.

AI agents can plan multistep tasks, use tools and carry out actions. For these, also define the agent's mandate and autonomy level, which actions need prior human approval, which data and tools it may use, how it is monitored and when human intervention is required. High-impact systems should verify that consequential instructions come from an authorized person. Where agents cooperate across organizations, governance should also cover cross-organizational authority, data minimization and semantic interoperability. See the U4SSC report *Good Practices for City AI Agents*.[52] Start with agents that assist staff, move to supervised workflows, and allow conditional autonomy only in tightly bounded areas once governance, data and oversight have proven reliable. The checklist in Annex 5 (Table A5.5) gives the details.

Review, complaints and lifecycle management

Where AI may materially affect a person, their access to a service or their rights, people must be able to request a review, and complaints must reach a person with the authority to investigate and remedy the issue. Recurring problems should trigger a review of the underlying service or system, not only of individual cases. Plan from the start for suspension, replacement and retirement, with alternative channels and human support.

Cybersecurity, cloud and data sovereignty

Cybersecurity is essential to maintaining trust. Local governments are frequent targets of ransomware, smart city systems increasingly link office IT with the technology that controls physical

[52] U4SSC, *Good Practices for City AI Agents* (2026). https://u4ssc.itu.int/publications/

infrastructure, and AI adds new weak points such as manipulated data, prompt injection and leaks through AI tools. Using recognized frameworks,[53] cities should:

- assign clear responsibility for information security (or use a shared service) and work with the national CERT/CSIRT;
- require secure configuration, vulnerability management, a defined patching period and incident notification from suppliers;
- separate operational technology networks and keep manual fallbacks for essential services;
- give AI tools only the permissions and data they need, test for prompt injection and data leakage, and log activity;
- keep tested incident-response plans and backups, report incidents where required and inform residents; and
- train staff regularly, including on the safe use of generative AI.

Cloud and hosting. Before adopting a hosted AI service, establish where data are stored and processed and which country's laws apply; whether the provider may use city data to train its models; who controls encryption keys; how data can be exported; what the exit plan is; and how usage-based costs will evolve.

Data sovereignty is the ability of public authorities and communities to decide, within the law, how data about them and their territory are collected, used, shared and kept. Secure data ownership and access rights in contracts, use open standards and data-sharing agreements, avoid exclusive rights over public data, and respect community and Indigenous data rights.[54]

Roles of cities and other levels of government

Many safeguards depend on laws established above the municipal level. Table A2.5 provides an indicative overview of responsibilities generally assigned to national, regional or supranational authorities and of the measures cities can take within their mandates. Where a safeguard falls outside the city's mandate, the city should work with the competent authority (Step 4) and raise the issue through city networks.

[53] For example, ISO/IEC 27001:2022, *Information security management systems*; NIST *Cybersecurity Framework 2.0* (2024); and, in the European Union, Directive (EU) 2022/2555 (NIS2), which covers certain public administration entities and allows Member States to extend it to local government. See also UN-Habitat, *Building and securing digital public infrastructure – A playbook for local and regional governments*.

[54] Global Indigenous Data Alliance, *CARE Principles for Indigenous Data Governance* (2019).

Table A2.5 – Indicative division of responsibilities between levels of government

Area	Usually set at national, regional or supranational level	What cities can usually do
Data protection and privacy	Data protection law; supervisory authority; rules on impact assessments and data transfers	Appoint a data protection officer where required; carry out data protection impact assessments; minimize data; include data clauses in contracts
AI regulation, certification and conformity assessment	AI law; risk classes and prohibited uses; accredited bodies; certification schemes	Adopt an internal AI policy and register; require evidence of conformity; decline or restrict uses; set procurement conditions
Human rights impact assessment	Legal requirement where it exists; guidance from human rights institutions	Apply the DHRIA where required by law; otherwise, consider adopting it as an internal standard operating procedure for high-impact uses (Section 3.2) and publish summaries of DHRIA results
Cybersecurity	National strategy; national CERT/CSIRT; incident-reporting duties; critical infrastructure designation	Run a municipal security programme; prepare incident and continuity plans; set supplier requirements; use shared services
Telecommunications and connectivity	Licensing; spectrum; universal service obligations	Manage rights of way and municipal assets; provide public Wi-Fi and digital inclusion programmes
Public procurement	Procurement law and thresholds	Use model clauses covering data, transparency, accessibility, security, audit and exit; consider joint and outcome-based procurement
Standards and interoperability	Standards bodies; national digital public infrastructure	Adopt open and international standards; reuse national DPI; take part in standards work, including FG-AI4SSC and ITU-T Study Group 20
Oversight and remedy	Courts; ombudsperson; national audit office; regulators	Provide complaint and review channels; internal audit; local advisory or ethics boards

A2.6 Putting regulatory requirements into practice

Table A2.6 – Mechanisms to put regulatory requirements into practice

Mechanism	What it is	Where it usually sits, and what a city can do
Certification	Recognized requirements that AI systems, providers or processes must meet.	Set by national or supranational authorities and standards bodies. Cities can require certified AI products or services in procurement where relevant schemes exist.
Licensing	Authorization for specific AI-related activities where the risk justifies it.	Set by national or sector regulators. Cities apply licensing within their own competences (for example, use of public space) and check that suppliers hold the required licences where applicable to the AI-related activity.
Conformity assessment	Verification that an AI system meets legal, technical and governance requirements before deployment or at set stages.	Defined by law; carried out by providers or designated bodies. Cities can request evidence of conformity and check it before deployment, where applicable.
Impact assessments	Assessment of impacts of AI systems on human rights, privacy, equality, safety and the environment before deployment or major changes.	Required by law in some cases (for example, data protection impact assessments, or fundamental rights impact assessments for certain high-risk AI uses in the EU). Elsewhere, cities can consider adopting the DHRIA as an internal standard operating procedure for high-impact AI uses.
Independent audits	External checks of compliance, controls and performance of AI systems, including relevant risks and safeguards.	Statutory audit by national audit offices or accredited bodies. Cities can commission independent reviews, use internal audit or academic partners, and require audit access to relevant AI systems, documentation and evidence in contracts.
Procurement requirements	Technical, data, transparency, accessibility, security and accountability requirements for AI systems and services in tenders and contracts.	Largely within the city's control, under national procurement law. Model clauses can be shared through city networks (Annex 5, Table A5.6). Cities can also specify AI-related requirements for testing, documentation, human oversight, monitoring and incident reporting, as appropriate.
Regulatory sandboxes	Controlled testing of innovative AI solutions under defined conditions and safeguards.	Usually created by national or regional regulators. Cities can host testbeds or living labs within existing law and partner with regulators, without treating local testing as an exemption from applicable legal requirements.

Mechanism	What it is	Where it usually sits, and what a city can do
Transparency obligations	Documentation and disclosure about AI systems, risks and decisions, with ongoing community feedback.	Some set by law (for example, registration of certain high-risk AI uses). Cities can go further through public AI registers and disclosure policies (Section 3.4.3), including information for residents about where and how AI is used in municipal services.
Incident reporting	What counts as a reportable AI incident (including incidents raised by residents), who reports it, when and to whom.	External duties (for example, cybersecurity incidents and personal data breaches) are set by national law. Cities define internal reporting and escalation and inform residents, including procedures for identifying and responding to harmful or unexpected AI outcomes.
Accountability records	Evidence of decisions, responsibilities, assessments, controls, approvals, feedback, changes and corrective actions throughout the AI system lifecycle.	Mainly a city responsibility, through the decision and accountability record (Annex 5, Table A5.7) and the public AI register.
Continuous compliance monitoring	Checking compliance and AI system performance during operation and triggering corrective action, with stakeholders and residents involved in testing and feedback.	Mainly a city responsibility, supported by supplier obligations in contracts. Monitoring should also consider changes in AI system behaviour, performance and impacts over time.

The mechanisms presented in Table A2.6 build on the general regulatory and governance guidance provided in Annex 1 (Step 6), which applies to all types of interventions. In the context of AI, their application should take into account the specific legal requirements, risks and safeguards relevant to the systems being developed, procured or deployed.

A2.7 Methods for impact assessment

For high-impact uses, or where the law requires it, cities can adapt the following methods for the digital human rights impact assessment (DHRIA): the Danish Institute for Human Rights, *Guidance on Human Rights Impact Assessment of Digital Activities* (2020); the Council of Europe *HUDERIA* methodology (2024); the OHCHR *Guidance for Human Rights Impact Assessment on Digital Platforms*; the UNESCO *Ethical Impact Assessment* (2023); and the UNDP *Building Responsible Smart Cities* toolkit. Smaller administrations can use shared services, joint procurement or university partnerships to carry out assessments.

Annex 3 – Case studies

These fifteen case studies show how cities and their partners have applied the implementation cycle with a focus on the people-centred principles. They cover policy and governance interventions, AI-enabled systems and mainly non-technological interventions, in different regions and city sizes. Each case uses the same format and ends with lessons for other cities. Table A3.1 starts from the urban challenge each case addresses, then shows the solution implemented, so that cities can find the cases most relevant to their own challenges.

Table A3.1 – Overview of the case studies

#	Case	Where	Challenge addressed	Steps best illustrated
1	Putting women at the centre: WIFT Manufacture-to-Market Accelerator	Lagos, Nigeria	Limited access to economic opportunities for women	1, 3, 6, 8
2	A people-centred smart city strategy	Windhoek, Namibia	Fragmented digital initiatives and lack of an integrated, people-centred urban development strategy	2, 3, 4
3	Mapping of informal settlements: BEAM	Africa and Latin America (multiple cities)	Lack of timely and reliable spatial data on informal settlements to support urban planning and service provision	2, 4, 5, 8
4	Citizen-generated data and machine learning for connectivity	India	Gaps between reported connectivity coverage and people's actual access to reliable digital connectivity	2, 6, 7
5	Procurement conditions for AI	Tampere, Finland	Insufficient safeguards and oversight for AI systems introduced through procurement and outsourcing	4, 6
6	Public AI registers	Amsterdam, Netherlands, and Helsinki, Finland	Limited transparency about the use and accountability of AI systems in public services	3, 4, 8
7	AI-assisted resident service: Boti	Buenos Aires, Argentina	Fragmented public service and inefficient access to government information and procedures	1, 5, 6, 8
8	Discontinuing an AI system when the evidence requires it	Rotterdam, Netherlands	Addressing the risk of discriminatory outcomes in the selection of welfare recipients for further investigation	7, 8
9	Using technology to enable adaptive traffic management	Dubai, United Arab Emirates	Traffic congestion and delays at signalized intersections	3, 6, 7, 8

#	Case	Where	Challenge addressed	Steps best illustrated
10	Urban maintenance inspections	Abu Dhabi, United Arab Emirates	Slow identification of infrastructure defects and public-realm maintenance needs	1, 5, 7
11	Building-permit processes	Qatar	Lengthy and inconsistent building-permit processing	1, 3, 6, 7
12	AI-assisted municipal reporting: OneService	Singapore	Difficulties for residents in reporting neighbourhood problems and navigating fragmented agency responsibilities	5, 6, 7
13	Municipal administration and resident services	Seoul, Republic of Korea	Repetitive administrative workloads, alongside the need to protect sensitive public data	3, 4, 6
14	Coordinating AI governance across city departments	Bogotá, Colombia	The lack of common governance rules and consistent oversight for AI use across public entities	4, 7, 8
15	Combining land rights, community participation and geospatial mapping to upgrade informal settlements	Odisha, India	Expansion of informal settlements with inadequate infrastructure, poor sanitation and insecure housing and tenure rights	1, 2, 7

Case study 1: Putting women at the centre of a people-centred smart city intervention

WIFT Manufacture-to-Market (M2M) Accelerator | Lagos, Nigeria

The challenge and the response. The Association of Women in Fashion Tech (WIFT) created the M2M Accelerator to close the gap between technical skills and lasting economic opportunity for women in the fashion and garment sector. Participants could produce, but faced linked barriers in scaling, business management, finance, digitalization, quality assurance and market access. Women typically have less access to finance, factory ownership, senior production roles and investor, buyer and export networks. WIFT therefore put women's economic empowerment, not technology or training alone, at the centre, combining production, entrepreneurship, investment readiness, digitalization and market access. The Lagos pilot, delivered with Union Bank and SMEDAN Lagos, graduated 50 participants. Lessons informed the programme's expansion: in 2026 there were 330 applicants and 184 participants in training, including 21 from other African regions.

Applying the implementation cycle (Steps 1–7)

- *Define:* the challenge was framed as a skills-to-opportunity gap affecting women's economic participation and enterprise growth.

- *Understand:* participants' needs, enterprise maturity and barriers informed profiling and orientation.
- *Prioritize:* four linked areas were selected: mass production; entrepreneurship and leadership; investment readiness; and digitalization and export readiness.
- *Enable:* a physical hub, partnerships, trainers, mentors and delivery arrangements made implementation possible.
- *Design:* group learning was combined with practical, digital and tailored support, including circular production (reuse, repair, recycling and remanufacturing).
- *Implement:* the Lagos pilot served as a real-world test, with lessons shaping onboarding, blended delivery, individual support and mentor matching.
- *Measure:* participants reported increases in production capacity, women's employment and use of digital marketing, which informed adaptation.

Principles in practice. Shared prosperity: skills and digital capabilities were linked to economic and market opportunities, with follow-up against individual baselines. Sustainability and resilience: circular production was built into the manufacturing track, including turning textile waste into production assets. Community participation and collaboration: partnerships, mentoring, peer learning and participant feedback shaped delivery. Inclusive, open, interoperable, safe and secure digital space: blended learning through the Women in Digital Business learning platform, online videos and offline handouts lowered barriers to participation.

AI considerations. Digital technologies here serve defined business and learning needs. Future AI applications could support learning, skills assessment, mentor matching, production planning, quality management, market intelligence and export readiness, provided they stay aligned with participants' needs and safeguards.

Lessons for your city. A sector-specific programme can contribute to wider urban economic goals by linking women's empowerment, skills, enterprise, digital participation, trade readiness and resilience. Piloting, learning and adapting before scaling can help ensure that the programme responds to local needs**.**

Case study 2: Developing a people-centred smart city strategy

Windhoek People-Centred Smart City Strategy 2026–2036 | Windhoek, Namibia

The challenge and the response. Windhoek had undertaken several digital initiatives and wanted a more integrated, people-centred framework linking digital transformation with wider urban priorities and institutional capacity. The UN-Habitat step-by-step methodology for a people-centred smart city strategy was used to develop the Windhoek People-Centred Smart City Strategy 2026–2036. The process combined a policy and digital landscape review, three smart city readiness assessments, stakeholder engagement, visioning and validation. Municipal departments and

external stakeholders took part in examining institutional capacity, existing systems, priorities and gaps. The strategy positions digital transformation as a tool to improve quality of life and municipal services, promote social inclusion, strengthen resilience and build trust.

Applying the implementation cycle (Steps 1–7)

- *Define:* the process established the need for a shared direction linking digital transformation with inclusive and sustainable urban development.
- *Understand:* the readiness assessments examined existing initiatives, capabilities, systems, priorities and constraints.
- *Prioritize:* findings and engagement produced a shared vision and priorities, including housing, land management, informal-settlement upgrading, basic services, digital inclusion and institutional strengthening.
- *Enable:* uneven readiness showed the need to reinforce digital literacy, organizational capability, procurement and an inclusive, open, safe and secure digital space before and alongside implementation.
- *Design:* findings became a strategy with priorities, implementation mechanisms, governance and monitoring.
- *Implement:* the first phases focus on strengthening the enabling conditions.
- *Measure:* monitoring and governance mechanisms track implementation and allow priorities to be adapted.

Principles in practice. Shared prosperity: priorities connect digital transformation with access to housing, land, basic services and economic opportunity. Sustainability and resilience: the strategy links digital transformation with sustainable development and the city's capacity to respond to urban pressures. Community participation and collaboration: the assessment and strategy were co-created with departments and external stakeholders, with validation workshops. Inclusive, open, interoperable, safe and secure digital space: equity and inclusion were priority principles, and digital literacy and a safe digital environment were built into the enabling conditions.

AI considerations. AI and other technologies should be considered within a wider city strategy, not as ends in themselves. The readiness assessment shows where digital or AI solutions could create value and whether the institutional, technical, skills and governance conditions exist to use them responsibly.

Lessons for your city. Understand your starting point before designing a strategy. Strategy development and implementation are iterative: diagnose, prioritize, enable, implement and adapt, strengthening the enabling environment alongside delivery.

Case study 3: Using AI to improve mapping of informal settlements

Building and Establishment Automated Mapper (BEAM) | eThekwini, South Africa, and other cities

The challenge and the response. Many cities lack up-to-date spatial information on fast-growing and informal settlements, which makes it hard to plan infrastructure, housing and services. Conventional mapping and ground surveys take time and resources and can leave large areas unrecorded. BEAM was developed by UNITAC Hamburg and local partners as an AI tool that detects building footprints automatically from satellite or aerial imagery. In eThekwini, it cut mapping time from months or years to about 72 hours and produced more than 1.5 million building footprints. It has since been adapted for other cities and countries.

Applying the implementation cycle (Steps 1–7)

- *Define:* cities needed more timely and complete information on buildings and settlements, especially informal ones.
- *Understand:* existing mapping workflows and constraints were examined, including time and resources, imagery quality, technical infrastructure and municipal capacity.
- *Prioritize:* AI was focused on building-footprint detection, where automation adds clear value, not on replacing wider planning processes.
- *Enable:* deployment required high-resolution imagery, GPU computing, GIS and AI skills, local training data and collaboration with municipal partners.
- *Design:* BEAM was adapted with locally labelled imagery, and outputs were designed to feed GIS and city databases.
- *Implement:* it was tested and deployed in eThekwini, then adapted for Cape Town, Namibia (with UNOSAT) and eight Central American cities.
- *Measure:* machine-learning metrics and manual validation were combined with practical measures such as mapping time, coverage and number of structures detected.

Principles in practice. Shared prosperity: timely spatial data support housing, infrastructure and service investment. Sustainability and resilience: better understanding of settlement growth strengthens planning evidence. Community participation and collaboration: municipal partners took part in data preparation, validation and use. Inclusive, open, interoperable, safe and secure digital space: BEAM uses non-personal imagery of building footprints and can make under-mapped areas visible in planning, subject to safeguards on the use of spatial data.

AI considerations. Assess the existing workflow before introducing AI. The GeoAI Toolkit[55] likewise recommends examining technical, institutional, legal, financial and human-capacity conditions first. Each BEAM deployment needs suitable imagery, local training data, computing, skills and municipal

[55] UN-Habitat, *AI for Spatial Mapping and Analysis: GeoAI Toolkit for Urban Planners* (2025).

validation; where these are absent, the city may need to strengthen the enabling environment or choose another approach.

Lessons for your city. Scaling AI involves more than transferring a technology: local data, workflows, infrastructure, skills and partnerships must be considered each time. Assess, adapt, test, validate, then scale.

Case study 4: Citizen-generated data and machine learning to improve digital connectivity

National Telecom Volunteers (NTV) | India

The challenge and the response. Reliable connectivity is essential for education, health, finance and other services, but conventional coverage assessments say little about people's actual experience. NTV was developed within the Department of Telecommunications of the Government of India as a research initiative to complement official data with voluntary, ground-level measurements by citizens. Through a mobile app, volunteers share network technology, location, signal strength and other parameters. These are combined with mobile-tower, terrain and weather data, and a machine-learning model estimates coverage where no measurements exist. Because the NTV pilot had not yet produced enough data, the study added other datasets, including TRAI MySpeed and Kushal Sanchar.

Applying the implementation cycle

- *Define:* identify where existing data do not reflect real connectivity on the ground.
- *Understand:* the combined dataset covered 711 of India's 766 districts.
- *Prioritize:* rather than relying only on drive tests or operator data, the approach combined crowdsourced, infrastructure and environmental data with machine learning.
- *Enable:* a government-owned system with the app, cloud data infrastructure and geospatial analysis; volunteers could control data collection and see their contributions.
- *Implement:* the app collected data in the background; results were shown on a geospatial dashboard and machine learning predicted coverage in unmeasured areas.
- *Measure:* the system can track connectivity over time and flag areas needing action.
- *Scale:* not yet scaled, but the method was integrated into a government mobile platform with about 50 million users, offering a route to wider participation.

Principles in practice. Shared prosperity: identifying gaps guides infrastructure investment and widens access to digital services and opportunities. Community participation and collaboration: citizens contribute to the evidence on public infrastructure. Sustainability, resilience and crisis response: targeted identification of gaps focuses field checks and upgrades, and reliable connectivity supports service continuity and emergency communications. Inclusive, open, interoperable, safe

and secure digital space: the method reveals spatial disparities, but crowdsourced data may cluster along main routes and under-represent remote communities.

AI considerations. Machine learning was used to support decisions, not to replace measured evidence or engineering judgement. Outputs were validated against independent measurements, data coverage was documented, uncertainty acknowledged and human review kept for infrastructure and regulatory decisions. Efforts were made to collect data from remote and under-represented communities. The study also notes the need for controls against fake measurements at scale.

Lessons for your city. Use citizen-generated data to complement authoritative and engineering data, verify AI estimates before they inform decisions, and design outreach to ensure that places most at risk of exclusion are not also the least represented in the data.

Case study 5: Building the enabling environment through procurement conditions

Conditions for the use of artificial intelligence, a model contract annex | City of Tampere, Finland

The challenge and the response. As more of Tampere's digital services and automation are supplied by external providers, AI can enter municipal operations through procurement and outsourcing without an explicit decision by the city, and standard contract terms set no conditions for its use. Tampere therefore developed a model contract annex, "Conditions for the use of artificial intelligence", for outsourcing and procurement contracts. It was first used in a competitive tender for robotic process automation and comes with an application table showing when the annex should be used. It is part of a wider set of instruments: an AI governance model, an AI adoption checklist, data protection and information-security checklists, and assessments required by information-management law. Supplier questions cover, for example, the use of customer data to train models and the handling of erroneous, discriminatory, unexplainable or "hallucinated" outputs.

Applying the implementation cycle

- *Define:* create the conditions for responsible use of digital and AI systems over time.
- *Understand:* consider how existing and proposed systems handle and give access to information.
- *Prioritize and enable:* translate strategic AI and data considerations into concrete supplier questions and contract conditions, as part of the city's enabling environment.
- *Implement:* the annex and supporting instruments are used in real procurements and can be reused.
- *Measure:* the requirements provide criteria for checking whether proposed systems meet the city's conditions.
- *Learn and adapt:* the instruments are refined as experience grows.

Principles in practice. Shared prosperity: interoperability and responsible AI requirements help public investment create long-term value. Sustainability and resilience: data access, interoperability and information management requirements help the city adapt its digital infrastructure. Community participation and collaboration: the approach structures dialogue between the city and suppliers on how systems will operate and be governed. Inclusive, open, interoperable, safe and secure digital space: the instruments address discriminatory and unexplainable outputs and data protection.

Lessons for your city. The enabling environment should be established before an AI use case is introduced. Procurement can set practical conditions for data access, interoperability, automation, accountability and responsible AI. Instruments such as the model annex and its application table could be shared with other cities through the Toolbox, with the agreement of the City of Tampere.

Case study 6: Improving transparency on the use of AI in public services through AI registers

Public AI registers | Amsterdam, Netherlands (and Helsinki, Finland

The challenge and the response. Both cities already used algorithms and AI in services such as chatbots, parking control and the handling of residents' reports, but residents had no simple way of knowing where AI was used, for what purpose and under whose responsibility. In 2020, the two cities launched public AI registers: websites that list, for each system, its purpose, the data it uses, how it works, the human oversight in place, the risks identified and a contact point for questions and feedback.

Applying the implementation cycle

- *Define:* the challenge was framed as a gap in transparency and public trust, not a technology need.
- *Understand:* each city took stock of the algorithmic systems used across departments.
- *Prioritize:* a register was chosen as a low-cost measure requiring no new AI.
- *Enable:* a common description format was agreed and each entry assigned to a responsible department.
- *Design and implement:* entries were written in plain language, with a feedback channel, and published progressively, starting with a few systems.
- *Learn and scale:* with other European cities, through Eurocities, the format became a common Algorithmic Transparency Standard that other cities can reuse.

Principles in practice. Community participation and collaboration: residents and civil society can see which systems are in use and ask questions or give feedback. Inclusive, open, interoperable, safe and secure digital space: the register makes transparency, accountability and contestability concrete, and a shared format allows comparison between cities.

AI considerations. A register is only as good as the internal inventory behind it. Entries must be updated when systems or suppliers change. A register complements, but does not replace, impact assessment, testing and human oversight (Section 2.3).

Lessons for your city. Municipal AI transparency can be introduced at low cost and without new technology. A common format can also support the adoption of the practice by other cities. This case underpins the public AI register recommended in Section 3.4.3 (template in Annex 5, Table A5.8) and supplementary indicator S1.

Additional sources: Cities Today (2020); Eurocities, Algorithmic Transparency Standard (Annex 8).

Case study 7: An AI-assisted resident service at scale

Boti conversational assistant | Autonomous City of Buenos Aires, Argentina

The challenge and the response. The city government ran many separate service channels and wanted to answer residents better and faster. In February 2019, the Secretariat of Innovation and Digital Transformation launched Boti, a conversational assistant on WhatsApp, the most widely used messaging application in the country. Boti answers questions on city services, procedures and events, connects to government systems for some transactions and hands conversations over to human operators when needed. It handles several million conversations each month. The city has since tested generative AI to answer questions on more than 1 300 government procedures, with guardrails that filter harmful or out-of-scope requests.

Applying the implementation cycle

- *Define:* the objective was easier access to information and procedures, not a chatbot as such.
- *Understand:* the city chose the channel residents already used.
- *Design:* the assistant was integrated with human service teams, so that a person remains reachable.
- *Implement:* functions were added in phases, and use grew strongly during the COVID-19 pandemic.
- *Measure:* the city tracks conversation volumes and the share resolved without human intervention.
- *Learn and adapt:* generative AI functions were piloted with safeguards before wider use.

Principles in practice. Shared prosperity: residents get information and complete procedures more quickly. Inclusive, open, interoperable, safe and secure digital space: a widely used channel lowers barriers, but residents without a smartphone or data plan still need assisted and non-digital channels. Community participation and collaboration: independent civil society researchers have examined the service, showing the public scrutiny that large resident-facing AI services attract and should welcome.

AI considerations. A resident-facing assistant is a medium-impact use (Section 3.2). It needs clear disclosure that AI is used, an easy route to a person, testing for incorrect or harmful answers before and after each model change, and attention to data protection when the service runs on third-party platforms.

Lessons for your city. Build an AI-assisted service step by step around a channel residents already use, keep people reachable, and introduce generative AI through controlled pilots.

Additional sources: OECD Observatory of Public Sector Innovation, "Boti, the City's WhatsApp!"; Derechos Digitales (2024), study on the Boti chatbot; public information from the Government of the City of Buenos Aires (Annex 8).

Case study 8: Discontinuing an AI system when the evidence requires it

Risk model for the re-examination of welfare benefits | City of Rotterdam, Netherlands (about 0.65 million inhabitants)

The challenge and the response. From 2017, the city's income department used a machine-learning model to give risk scores to about 30 000 recipients of welfare benefits and to help select those whose entitlement would be re-examined. Staff took the final decisions. In 2021, the Rotterdam Court of Audit reviewed the city's use of algorithms and found a risk of biased outcomes in this model because of the data used. The city stopped using the model in 2021 and returned to random selection. It later introduced an algorithm register and additional safeguards for developing algorithms. Material released by the city allowed journalists and researchers to analyse the model; they showed that characteristics such as gender, parenthood and language skills influenced the scores.

Applying the implementation cycle

- *Measure (Step 7):* an independent audit body examined the system and its effects on different groups.
- *Learn and adapt (Step 8):* the city discontinued the system instead of defending it and went back to an earlier step to reconsider how recipients should be selected.
- *Enable (Step 4):* the experience led to new governance arrangements, including a register.

Principles in practice. Inclusive, open, interoperable, safe and secure digital space: non-discrimination was treated as a condition for continuing, not a secondary consideration. Community participation and collaboration: the city council, the audit body, journalists and researchers all took part in scrutiny, and the city chose to disclose information about the model.

AI considerations. Selecting people for benefit investigations is a high-impact use (Section 3.2). Keeping a person in the loop was not enough on its own: variables that look neutral can act

as proxies for protected characteristics. Testing across groups, independent review and public documentation are needed before and during use.

Lessons for your city. Discontinuing a system is a legitimate and responsible outcome of the cycle. Cities that set review points, give independent bodies access and keep a fallback procedure, such as random selection, can stop a system without interrupting the service.

Additional sources: Rekenkamer Rotterdam (Rotterdam Court of Audit), report on algorithms (2021); Algorithm Audit, *Risk Profiling for Social Welfare Re-examination* (2023); published journalistic investigations (2023) (Annex 8).

Case study 9: Using technology to enable adaptive traffic management

Traffic signal control system | Dubai, United Arab Emirates

The challenge and the response. Dubai wanted to improve traffic flow and cut delays at signalized intersections for all road users. The Roads and Transport Authority (RTA) began upgrading its central traffic-signal control system with AI, predictive analytics and digital-twin technology. The system analyses traffic conditions, predicts movements and adjusts signal timings dynamically; digital-twin functions allow scenarios and signal changes to be simulated before they are applied on the street. In September 2025, RTA reported that Phase 1 increased traffic flow by 16–37 per cent at upgraded intersections and improved overall travel times by 10–20 per cent.

Applying the implementation cycle

- https://www.unesco.org/ethics-ai/en/ram*Define:* the objective was better mobility and less congestion, not AI as an end in itself.
- *Understand:* traffic conditions and intersection performance gave the operational baseline.
- *Prioritize:* AI and digital twins were chosen where predictive control and simulation add value.
- *Implement:* the system was introduced in phases across selected corridors.
- *Measure:* RTA compared traffic flow and travel times after the upgrades.
- *Learn and scale:* Phase 1 results are informing deployment across about 300 intersections.

Principles in practice. Sustainability, resilience and crisis response: more responsive traffic management can reduce delays and improve network efficiency. Community participation and collaboration: the system serves several groups of road users, including public transport passengers, pedestrians and cyclists. Inclusive, open, interoperable, safe and secure digital space: future links with connected vehicles make interoperability and cybersecurity important design considerations.

AI considerations. AI-generated signal changes affect a physical urban system (human-on-the-loop, Table 7). They should be validated under realistic conditions, monitored continuously and kept within safe operating limits under human oversight. Simulations strengthen assurance before

deployment, but cities should still verify real-world outcomes and watch for unintended effects across transport modes and locations.

Lessons for your city. Start from a defined mobility problem, test changes before deployment and measure results afterwards.

Additional source: Dubai Roads and Transport Authority, "37% Improvement in Intersection Flow Through the Traffic Signal System" (4 September 2025) and "Launching Traffic Signal Control System Upgrade Using AI and Digital Twin Technology" (24 February 2025). Available at: https://www.rta.ae/

Case study 10: AI-enabled urban inspection and maintenance

AI inspection vehicles | Abu Dhabi, United Arab Emirates

The challenge and the response. Abu Dhabi wanted to identify maintenance, cleanliness and public-realm defects more quickly across a large urban area. The Department of Municipalities and Transport (DMT) deployed inspection vehicles fitted with 360-degree cameras and computer-vision models that detect issues such as road cracks, waste and litter and generate reports for follow-up. DMT's sustainability reporting records 40 AI inspection vehicles and a reduction in defect-detection time from about ten minutes to under one minute.

Applying the implementation cycle

- *Define:* faster detection of urban defects and faster municipal response.
- *Understand:* the city identified inspection tasks suitable for automation and the information maintenance teams need.
- *Design and implement:* the vehicles collect visual evidence and classify defects during routine operations.
- *Measure:* detection time and operational coverage provide indicators.
- *Learn and adapt:* the approach can be expanded or refined as performance evidence builds up.

Principles in practice. Sustainability, resilience and crisis response: earlier detection supports preventive maintenance and cleaner public spaces. Shared prosperity: better-maintained infrastructure improves quality of life across neighbourhoods. Inclusive, open, interoperable, safe and secure digital space: cameras in public space require clear data governance, privacy, security and retention rules.

AI considerations. Validate computer-vision performance across locations, lighting and weather. Define which detections need human confirmation, record false positives and missed defects, and

check that inspection coverage does not systematically favour some neighbourhoods. Collect and keep visual data only for clearly defined municipal purposes.

Lessons for your city. System performance should be assessed by whether municipal teams respond more quickly and maintain public space more effectively, not by the number of detections alone.

Additional source: Abu Dhabi Department of Municipalities and Transport, "AI Inspection Vehicles" case study, Abu Dhabi Sustainability Report; DMT, "Department of Municipalities and Transport Unveils Smart Inspection Vehicle at GITEX Global 2023". https://www.dmt.gov.ae/

Case study 11: Streamlining building-permit processes

AI-powered building-permit system | Qatar

The challenge and the response. The Ministry of Municipality wanted to shorten and standardize a complex building-permit process. In October 2025, it launched an AI-powered system that reads engineering plans and checks them against approved technical standards. The Government Communications Office reported that the system is intended to cut permit issuance from up to 30 days to 120 minutes and to allow up to 70 per cent of engineering plans to be processed electronically in the first phase.

Applying the implementation cycle

- *Define:* faster, more consistent processing of building permits.
- *Understand:* the intervention focused on the parts of plan review that can be checked electronically against defined requirements.
- *Prioritize:* AI was applied to document and plan checks within a wider digital transformation programme.
- *Implement:* the system was launched in phases, starting with a defined share of plans.
- *Measure:* processing time, accuracy, the share of plans processed electronically and the need for human intervention can be tracked over time.

Principles in practice. Shared prosperity: faster permits reduce the administrative burden on residents, designers and businesses. Sustainability, resilience and crisis response: reliable building control supports safe, well-managed urban development. Inclusive, open, interoperable, safe and secure digital space: applicants need accessible channels, transparent requirements and a clear route to review when an automated check flags a problem.

AI considerations. Building permits have significant legal, financial and safety consequences, so this is a high-impact use (Section 3.2). Automated checks should be validated against authoritative building requirements, with clear accountability. Applicants should know where AI is used, be able

to obtain human review and have a route to challenge or correct an error. Changes to technical rules or models should trigger re-testing.

Lessons for your city. AI can reduce delays in a well-defined administrative process. Automating regulatory checks, however, requires robust validation, human review and transparent accountability.

Additional source: Government Communications Office of Qatar, "Prime Minister attends launch of AI-Powered Building Permits System" (26 October 2025). https://www.gco.gov.qa/en/media-centre/top-news/prime-minister-attends-launch-of-ai-powered-building-permits-system/

Case study 12: AI-assisted municipal reporting through OneService

OneService Chatbot | Singapore

The challenge and the response. Residents reporting neighbourhood problems may not know which public agency is responsible for addressing them. Singapore's OneService Chatbot, available through widely used messaging channels, uses AI to extract case details, predict the appropriate category and route each report to the relevant agency. According to the Government Technology Agency (GovTech), the chatbot handles more than 30 000 cases per month, saves about 2 000 staff hours and reduces resolution times by up to two working days.

Applying the implementation cycle

- *Define:* make municipal reporting easier and route cases more efficiently.
- *Understand:* the service was designed around how residents report problems and how agency responsibilities are divided.
- *Design:* AI extracts and classifies information so that residents do not need to understand the administrative structure.
- *Implement:* the chatbot runs on accessible messaging channels.
- *Measure:* case volumes, staff time and resolution times provide operational evidence.
- *Learn and adapt:* performance data and user feedback inform further improvements.

Principles in practice. Community participation and collaboration: residents actively help identify neighbourhood problems. Shared prosperity: simpler access reduces the burden of requesting services. Inclusive, open, interoperable, safe and secure digital space: alternative channels remain important for people who cannot or do not want to use messaging services.

AI considerations. This is a medium-impact use (Section 3.2). Classification and routing errors should be monitored, as they may delay service delivery. Residents should be able to correct information and access human assistance. Where generative AI is introduced, responses should be grounded in authoritative sources, tested for inaccurate or harmful outputs and clearly identified as AI-generated.

Lessons for your city. An effective AI service should reduce the administrative complexity residents face while preserving access to human assistance.

Additional source: GovTech Singapore, "AI Applications in Government: Use Cases & Public Services". https://www.tech.gov.sg/technews/how-govtech-uses-ai-to-enhance-digital-public-services/

Case study 13: Municipal administration and resident services

Chatbot 2.0 and in-house large language model | Seoul, Republic of Korea

The challenge and the response. The Seoul Metropolitan Government sought to improve the efficiency of municipal administration and access to public information for residents. Staff need to retrieve documents, check regulations and draft reports, while residents need timely and accessible responses to their enquiries. To address these needs, the city is introducing generative AI to support administrative tasks and testing it in its resident-facing Seoul Talk chatbot

The Chatbot 2.0 project uses Seoul's own large language model within the city's internal network and is being introduced progressively, starting with pilot departments. Seoul states that the internal infrastructure is meant to allow sensitive public data to be handled more securely.

Applying the implementation cycle

- *Define:* the city identified repetitive administrative tasks and unanswered resident enquiries as specific use cases.
- *Understand:* existing rule-based chatbots and administrative workflows were the starting point.
- *Prioritize:* generative AI was chosen for tasks that need more context-aware answers.
- *Enable:* the city is building internal infrastructure and connecting the model to administrative systems step by step.
- *Implement:* pilots come before wider deployment.
- *Learn and scale:* expansion is planned after experience from the first phase.

Principles in practice. Shared prosperity: staff time can move from repetitive work to tasks that need professional judgement and human contact. Community participation and collaboration: resident-facing AI can improve access to information when feedback and escalation routes exist. Inclusive, open, interoperable, safe and secure digital space: the internal deployment model shows the importance of information security and control over sensitive public data (Section 3.4.6).

AI considerations. Generative AI can produce plausible but wrong answers. Municipal use therefore needs authoritative source material, human checks on consequential outputs, clear rules on confidential and personal information, logging and monitoring, and re-testing when models or connected sources change. A pilot-first approach lets the city test usefulness and risks before wider integration.

Lessons for your city. Introduce generative AI step by step, distinguish internal from public-facing uses, and address infrastructure, security and staff skills as part of the enabling environment.

Additional source: Seoul Metropolitan Government, "Seoul Adopts LLM for Administrative Affairs to Become a Global AI City" (August 2025). https://english.seoul.go.kr/seoul-adopts-llm-for-administrative-affairs-to-become-a-global-ai-city/

Case study 14: Coordinating AI governance across city departments

Agreement 003 of 2025 | Bogotá, Colombia

The challenge and the response. As the use of AI expanded across Bogotá's district entities, the city faced the challenge of ensuring consistent approaches to transparency, accountability, oversight and risk management. Agreement 003 of 2025 established standards that frame AI governance as a continuous, auditable and transparent process. The framework covers uses such as administrative automation, data analysis, recommendation systems, chatbots, image and text recognition, and generative AI. In 2026, the city's Bogotá Te Escucha service introduced a retrieval-augmented generation approach to answer frequently asked questions using official sources.

Applying the implementation cycle

- *Define:* the city identified the need for consistent governance as AI use expanded across district entities.
- *Understand:* the framework was developed through coordinated work across district bodies with external technical support.
- *Enable:* common standards establish expectations for the development, deployment and oversight of AI systems.
- *Implement:* the framework applies to a range of AI applications across district entities.
- *Measure and learn:* continuous supervision, auditability and improvement allow governance arrangements to evolve as systems and their uses change.

Principles in practice. *Community participation and collaboration:* the city opened public discussion of real AI use cases through its "IA Sin Filtro" initiative. *Inclusive, open, interoperable, safe and secure digital space:* transparency, auditability and continuous oversight are requirements, not options. *Shared prosperity:* common rules help different entities use AI with consistent safeguards for residents.

AI considerations. A city-wide framework should still be applied in proportion to the risks and potential impacts of each use case: high-impact systems require more rigorous assessment, testing, oversight and review than low-impact administrative tools. Registers, documentation, complaint mechanisms and periodic reassessment turn principles into practice and provide evidence of compliance.

Lessons for your city. Responsible AI governance extends beyond individual systems. Common city-wide standards can promote consistency and accountability across departments while allowing requirements to be tailored to the risks and potential impacts of each application.

Additional sources: Alcaldía Mayor de Bogotá, "Bogotá define cómo se debe usar la Inteligencia Artificial en entidades públicas", 14 February 2026; "IA Sin Filtro: Alcaldía de Bogotá abrió debate sobre inteligencia artificial en lo público", 29 April 2026. https://bogota.gov.co/

Case study 15: Combining land rights, community participation and geospatial mapping to upgrade informal settlements

Odisha Liveable Habitat Mission (Jaga Mission) | Odisha, India

The challenge and the response. Rapid urbanization across Odisha contributed to the expansion of informal settlements with inadequate infrastructure, poor sanitation and insecure housing conditions. The Odisha Liveable Habitat Mission, known as Jaga Mission, was established under the Odisha Land Rights to Slum Dwellers Act of 2017 to improve living conditions through settlement upgrading and land rights. The programme combined infrastructure improvements and access to basic services with resident participation, employment opportunities and capacity building for local authorities. Residents were involved throughout the process, with a requirement for the 50 per cent participation of women. Drones and other technologies were used to conduct aerial surveys of settlements, supporting the identification and upgrading process. The programme also partnered with MUKTA, an urban employment initiative, to create jobs linked to civil infrastructure improvements.

Applying the implementation cycle

- *Define:* the challenge was framed around inadequate living conditions and infrastructure in informal settlements, alongside residents' need for land rights and greater participation in urban development.
- *Understand:* aerial surveys and other mapping technologies supported settlement assessment, while resident involvement helped connect upgrading activities with community needs.
- *Prioritize:* the programme focused on land rights and improvements to essential infrastructure and services, including paved streets, drainage, water, toilets, street lighting and community facilities.
- *Enable:* the state government, urban local authorities, communities and the MUKTA employment programme contributed to implementation. A mentorship initiative helped build the capacity of city officials to replicate the settlement-upgrading approach.
- *Design:* the model linked tenure security, infrastructure upgrading, employment and community participation, rather than treating these as separate interventions.

- *Implement:* the programme expanded across Odisha, using technology-supported surveys and local implementation arrangements to upgrade settlements and improve access to services.
- *Measure:* through the project, 585 informal settlements across 30 cities were upgraded; 175 000 families across 1 725 settlements were granted land rights; 14 073 households gained piped-water access; and 11 589 household toilets were provided to improve public sanitation. Public infrastructures were improved, including paved streets, drainage, community centres and streetlights. Land rights were given to 175 000 families across 1 725 informal settlements, enabling them to use housing finance grants to improve their communities. The programme trained 62 mentors from 28 pilot cities, who subsequently supported 83 cities. Resident engagement, especially women, with city officials increased along with their power to influence decision-making.

Principles in practice. Shared prosperity: land rights, improved infrastructure and employment opportunities strengthened Odisha residents' ability to improve their homes and create opportunities for their communities. Sustainability and resilience: better drainage, sanitation, water access and public infrastructure have supported healthier and more liveable settlements. Community participation and collaboration: resident involvement throughout the process, the target of the 50per cent participation by women and the reported strengthening of their roles in decision-making have placed community agency at the centre of the model. Inclusive, open, interoperable, safe and secure digital space: drone-based aerial surveys and other geospatial technologies were used safeguards for privacy, data security and residents' rights, ultimately supporting settlement assessment and upgrading.

AI considerations. Jaga Mission demonstrates the value of geospatial technology in supporting inclusive and participatory settlement upgrading, without using AI.

Lessons for your city. Settlement upgrading connects housing and land rights with infrastructure, livelihoods, gender equality and community participation. Digital mapping can support implementation at scale, but its value depends on how well it is integrated with local institutions and well perceived by residents'. Jaga Mission also illustrates the importance of investing in building the capacity of local authorities to amplify results and replicate the approach across other cities.

Annex 4 – Monitoring, evaluation and continuous improvement: U4SSC KPIs mapped to principles and desired outcomes

This annex supports the city-wide monitoring and evaluation framework presented in Chapter 5 by mapping each U4SSC KPI to the people-centred principles and desired outcomes they help measure. Cities can use this mapping to select relevant indicators and assess progress towards their intended outcomes. For guidance on developing the monitoring framework, selecting basic and advanced KPIs and using supplementary indicators, see Chapter 5.

A4.1 U4SSC KPIs mapped to principles and desired outcomes

The mapping is indicative and can be adapted. Many KPIs inform more than one principle; the main one is listed first. Core KPIs form the basic set and advanced KPIs the advanced set in Section 5.2. KPI codes follow the U4SSC Collection Methodology. *Principles:* P1 shared prosperity; P2 sustainability, resilience and crisis response; P3 community participation and collaboration; P4 inclusive, open, interoperable, safe and secure digital space. *Outcomes:* QoL improved quality of life; BFC better functioning cities; SS stronger systems. The same mapping, with the supplementary indicators, is planned as a filterable spreadsheet in the Toolbox.

Table A4.1 – U4SSC KPIs mapped to people-centred principles and outcomes

KPI code	KPI	Type	Principle	Outcome
EC:ICT:ICT:1C	Household Internet Access	Core	P4, P1	QoL
EC:ICT:ICT:2C	Fixed Broadband Subscriptions	Core	P4, P1	BFC
EC:ICT:ICT:3C	Wireless Broadband Subscriptions	Core	P4, P1	BFC
EC:ICT:ICT:4C	Wireless Broadband Coverage	Core	P4, P1	BFC
EC:ICT:ICT:5A	Availability of WIFI in Public Areas	Advanced	P4, P1	QoL
EC:ICT:WS:1C	Smart Water Meters	Core	P2	BFC
EC:ICT:WS:2A	Water Supply ICT Monitoring	Advanced	P2	BFC
EC:ICT:D:1A	Drainage / Storm Water System ICT Monitoring	Advanced	P2	BFC
EC:ICT:ES:1C	Smart Electricity Meters	Core	P2	BFC
EC:ICT:ES:2A	Electricity Supply ICT Monitoring	Advanced	P2	BFC
EC:ICT:ES:3A	Demand Response Penetration	Advanced	P2	BFC
EC:ICT:T:1C	Dynamic Public Transport Information	Core	P1, P4	BFC
EC:ICT:T:2C	Traffic Monitoring	Core	P2	BFC
EC:ICT:T:3A	Intersection Control	Advanced	P2	BFC
EC:ICT:PS:1A	Open Data	Advanced	P3, P1	SS
EC:ICT:PS:2A	e-Government	Advanced	P3, P4	BFC
EC:ICT:PS:3A	Public Sector e-Procurement	Advanced	P3	SS
EC:P:IN:1C	R&D Expenditure	Core	P1	SS

KPI code	KPI	Type	Principle	Outcome
EC:P:IN:2C	Patents	Core	P1	SS
EC:P:IN:3A	Small and Medium-Sized Enterprises	Advanced	P1	QoL
EC:P:EM:1C	Unemployment Rate	Core	P1	QoL
EC:P:EM:2C	Youth Unemployment Rate	Core	P1	QoL
EC:P:EM:3A	Tourism Sector Employment	Advanced	P1	QoL
EC:P:EM:4A	ICT Sector Employment	Advanced	P1	QoL
EC:I:WS:1C	Basic Water Supply	Core	P1, P2	QoL
EC:I:WS:2C	Potable Water Supply	Core	P1, P2	QoL
EC:I:WS:3C	Water Supply Loss	Core	P2	BFC
EC:I:WS:4C	Wastewater Collection	Core	P2, P1	BFC
EC:I:WS:5C	Household Sanitation	Core	P1, P2	QoL
EC:I:WA:1C	Solid Waste Collection	Core	P2, P1	BFC
EC:I:ES:1C	Electricity System Outage Frequency	Core	P2	BFC
EC:I:ES:2C	Electricity System Outage Time	Core	P2	BFC
EC:I:ES:3C	Access to Electricity	Core	P1	QoL
EC:I:T:1C	Public Transport Network	Core	P1, P2	BFC
EC:I:T:2A	Public Transport Network Convenience	Advanced	P1	QoL
EC:I:T:3C	Bicycle Network	Core	P2	BFC
EC:I:T:4A	Transportation Mode Share	Advanced	P2	BFC
EC:I:T:5A	Travel Time Index	Advanced	P2, P1	BFC
EC:I:T:6A	Shared Bicycles	Advanced	P2	BFC
EC:I:T:7A	Shared Vehicles	Advanced	P2	BFC
EC:I:T:8A	Low-Carbon Emission Passenger Vehicles	Advanced	P2	BFC
EC:I:B:1A	Public Building Sustainability	Advanced	P2	BFC
EC:I:B:2A	Integrated Building Management Systems in Public Buildings	Advanced	P2	BFC
EC:I:UP:1A	Pedestrian Infrastructure	Advanced	P1, P2	QoL
EC:I:UP:2A	Urban Development and Spatial Planning	Advanced	P2, P3	SS
EN:EN:AQ:1C	Air Pollution	Core	P2	QoL
EN:EN:AQ:2C	GHG Emissions	Core	P2	BFC
EN:EN:WS:1C	Drinking Water Quality	Core	P2, P1	QoL
EN:EN:WS:2C	Water Consumption	Core	P2	BFC
EN:EN:WS:3C	Freshwater Consumption	Core	P2	BFC
EN:EN:WS:4C	Wastewater Treatment	Core	P2	BFC
EN:EN:WA:1C	Solid Waste Treatment	Core	P2	BFC
EN:EN:EQ:1C	EMF Exposure	Core	P2, P4	QoL
EN:EN:EQ:2A	Noise Exposure	Advanced	P2	QoL
EN:EN:PSN:1C	Green Areas	Core	P2	QoL

KPI code	KPI	Type	Principle	Outcome
EN:EN:PSN:2A	Green Area Accessibility	Advanced	P2, P1	QoL
EN:EN:PSN:3A	Protected Natural Areas	Advanced	P2	BFC
EN:EN:PSN:4A	Recreational Facilities	Advanced	P1	QoL
EN:E:E:1C	Renewable Energy Consumption	Core	P2	BFC
EN:E:E:2C	Electricity Consumption	Core	P2	BFC
EN:E:E:3C	Residential Thermal Energy Consumption	Core	P2	BFC
EN:E:E:4A	Public Building Energy Consumption	Advanced	P2	BFC
SC:EH:ED:1C	Student ICT Access	Core	P4, P1	QoL
SC:EH:ED:2C	School Enrolment	Core	P1	QoL
SC:EH:ED:3C	Higher Education Degrees	Core	P1	QoL
SC:EH:ED:4C	Adult Literacy	Core	P1, P4	QoL
SC:EH:H:1C	Life Expectancy	Core	P1	QoL
SC:EH:H:2C	Maternal Mortality Rate	Core	P1	QoL
SC:EH:H:3C	Physicians	Core	P1	BFC
SC:EH:H:4A	In-Patient Hospital Beds	Advanced	P1	BFC
SC:EH:H:5A	Health Insurance / Public Health Coverage	Advanced	P1	QoL
SC:EH:H:6A	Electronic Health Records	Advanced	P4	BFC
SC:EH:C:1C	Cultural Expenditure	Core	P3, P1	SS
SC:EH:C:2A	Cultural Infrastructure	Advanced	P3	QoL
SC:SH:HO:1C	Informal Settlements	Core	P1	QoL
SC:SH:HO:2A	Housing Expenditure	Advanced	P1	QoL
SC:SH:SI:1C	Gender Income Equity	Core	P1, P4	QoL
SC:SH:SI:2C	Gini Coefficient	Core	P1	QoL
SC:SH:SI:3C	Poverty	Core	P1	QoL
SC:SH:SI:4C	Voter Participation	Core	P3	SS
SC:SH:SI:5A	Child Care Availability	Advanced	P1	QoL
SC:SH:SA:1C	Natural Disaster Related Deaths	Core	P2	QoL
SC:SH:SA:2C	Disaster Related Economic Losses	Core	P2	BFC
SC:SH:SA:3A	Resilience Plans	Advanced	P2	SS
SC:SH:SA:4A	Population Living in Disaster Prone Areas	Advanced	P2	QoL
SC:SH:SA:5A	Emergency Services Response Time	Advanced	P2	BFC
SC:SH:SA:6C	Police Service	Core	P2	BFC
SC:SH:SA:7C	Fire Service	Core	P2	BFC
SC:SH:SA:8C	Violent Crime Rate	Core	P1, P2	QoL
SC:SH:SA:9C	Traffic Fatalities	Core	P2, P1	QoL
SC:SH:FS:1A	Local Food Production	Advanced	P2, P1	BFC

Annex 5 – U4SSC City Implementation Guide

U4SSC is developing a dynamic **Toolbox for People-Centred Smart Cities in the AI Era** to provide cities and communities with practical tools, methodologies and resources to support the implementation of a people-centred approach to digital and AI-enabled urban transformation. **This Guide is the first document to be included in the Toolbox** and provides the overarching framework and guidance upon which the other components of the Toolbox will build. The Toolbox will progressively bring together a **suite of practical tools and useful resources** that cities can use or adapt according to their local context, needs and level of digital maturity. These may include, *inter alia*, templates, checklists, assessment methods, implementation and decision-support tools, monitoring and evaluation resources, and relevant guidance developed by U4SSC, ITU, UN-Habitat and other partners. **Some of the existing tools and resources that are expected to support the Toolbox have already been identified and referenced in this Guide**, including those mapped in Annex 7

The City Implementation Guide is the practical companion to this Guide and part of the **U4SSC Toolbox for People-Centred Smart Cities in the AI Era**. It turns the Guide into actions, checklists and templates that a city team can start using straight away: what to do, in what order and what to produce. It provides practical implementation resources for applying the Guide's principles and implementation cycle, with particular emphasis on the governance and safeguards needed for digital and AI-related interventions. Annex 6 complements these resources by identifying additional existing tools and methodologies that may support the broader application of the Guide, as well as proposed tools for future development. The main Guide explains why and how; where a checklist summarizes the guidance, the main Guide remains the reference. Fillable versions of the templates will be made available online through the U4SSC Toolbox.

Who uses it. The mayor's office and the senior official accountable for digital and AI matters; heads of the departments that deliver services; digital, legal, procurement, finance and data protection teams; monitoring teams; and the community engagement team. No technical AI expertise is needed.

A5.1 How to use the City Implementation Guide in the AI era

1. **Set up governance once and plan the roadmap (Section A5.2).** In the first 100 days, the city adopts the principles, designates an accountable official, takes stock of the AI it already uses and puts the first safeguards in place. Every later initiative builds on this.
2. **Choose a track and an entry point.** Use the Essentials track and the entry points in Chapter 1 (Section 1.4, Tables 2 and 3) and the readiness scan (Section 1.3.1) to decide where to start.
3. **Run each initiative through the eight steps (Section A5.3).** Complete the actions, produce the output and pass the check before moving on. If a check fails, revise, go back, pause or stop, and record why in the decision and accountability record (Table A5.7).

4. **Apply safeguards throughout the lifecycle (Section A5.4).** Assess the potential impact of every AI use with the traffic-light rule (Chapter 3, Table 6), including effects on human rights, safety, access to services and affected groups. Carry out a digital human rights impact assessment (DHRIA) before deployment and repeat it during use, if needed, whenever an AI use may significantly affect people's rights (high impact). Match additional safeguards to the nature and severity of potential impacts and review them when circumstances change.
5. **Use risk-based procurement and monitoring tools (Sections A5.5 and A5.6),** considering potential consequences for people and public services, not contract value alone. Apply all relevant legal obligations and proportionate safeguards regardless of purchase cost.
6. **Record decisions with the templates (Section A5.7)** so that they can be explained to the council, auditors and residents.

Questions cities ask. The table below links the questions that city leaders most often ask to the part of the Guide and the tool that helps.

Table A5.1 – Questions cities ask

Question	Short answer	Tool
Should we use AI for this problem at all?	Only if it adds value compared with simpler options, and the city can govern it.	Step 3 option appraisal (Annex 5, Table A5.10)
How do we buy AI safely?	Describe the outcome you need, not a product, and put the core clauses in every contract.	Core procurement clauses (Annex 5, Table A5.6) and procurement checklist (Annex 5, Section A5.5)
What do we tell staff about generative AI tools?	Use approved tools only, never enter personal or confidential data, check every output.	Model staff policy (Annex 5, Table A5.4)
How much control do we need over an AI system?	It depends on its impact on people: use the traffic-light rule.	Section 3.2; levels of human involvement (Table 7)
How do we keep control of our data?	Own or have full access to the data, be able to export it, and know where it is hosted.	Section 3.4; core procurement clauses
How do we show residents what we use?	Publish a public AI register, starting with resident-facing systems.	Register entry template (Annex 5, Table A5.8)
How do we govern AI agents?	Give each agent a written mandate, a named owner, limited permissions and a way to stop it.	AI agent checklist (Annex 5, Table A5.5)
How do we know whether it is working?	Measure against a baseline, with U4SSC KPIs at city level and initiative indicators for each project.	Chapter 5; Annex 4
What if it is not working?	Pausing, redesigning or stopping is a legitimate and responsible outcome.	Step 8; Case study 8 (Annex 3)

Four rules apply throughout: start from the urban problem and people's needs, never from a technology; decisions stay with identifiable people, and AI may inform them but never makes them; safeguards are matched to the impact on people's rights, safety and access to services; and not proceeding, pausing or stopping is a legitimate outcome at every step.

A5.2 From the first 100 days to year three: an implementation roadmap

Implementing the Guide is a gradual process. Table A5.1 sets out an indicative roadmap. The timing is indicative and depends on the city's track (Chapter 1, Section 1.4, Table 3); what matters is the sequence. The first 100 days checklist is in Chapter 3 (Section 3.5, Table 10).

Table A5.2.1 – Indicative implementation roadmap

Phase	Timing	Key actions	Outputs
1. Set up	Days 1–100	Adopt the principles; designate the accountable official and team; run the readiness scan; build the AI inventory; adopt the staff policy on generative AI; add the core procurement clauses to standard contracts; choose one or two priority challenges	Council resolution or mayoral decision; AI inventory with impact classes; staff policy; updated contract terms; first register entries; report to the council
2. First initiatives	Months 4–12	Run one or two priority initiatives through Steps 1 to 6; publish the public AI register; establish the baseline with two to four basic-set U4SSC KPIs per principle (Chapter 5, Table 13); train staff in AI literacy	Problem statements, option appraisals and decision records; pilots under way; KPI baseline; first annual report to the council
3. Embed	Year 2	Integrate the principles into the city development plan, budget and procurement policy (and, where relevant, by-laws or regulations); extend the traffic-light classification and register to all systems; collect the full basic set of U4SSC KPIs and supplementary indicators S1 to S5; launch digital skills and lifelong learning programmes for residents and staff	Updated plans and policies; complete register; KPI report aligned with the UN-Habitat Global Urban Monitoring Framework and usable for Voluntary Local Reviews
4. Scale and review	Year 3 onwards	Evaluate the first initiatives (Steps 7 and 8); scale, adapt or stop them on the evidence; review the portfolio of initiatives every year; consider U4SSC KPI verification; share lessons through U4SSC and city networks	Evaluation reports; portfolio review; updated strategy; lessons and case studies shared

Who does what in the city. Table A5.2 summarizes the main responsibilities within the city administration. Smaller cities can combine roles; what matters is that each responsibility has a named owner.

Table A5.2.2 – Responsibilities within the city administration

Who	Main responsibilities
Mayor and council	Adopt the principles; approve priorities and budgets; receive the annual report on results and the AI register; take decisions to scale, pause or stop
Accountable official for digital and AI matters	Lead implementation; keep the AI inventory and register; approve impact classifications; chair the cross-departmental team; report to the mayor and council
Cross-departmental team	Run the readiness scan; coordinate initiatives through the cycle; share data, infrastructure and lessons across departments
Service departments	Own the urban challenges and initiatives; apply the cycle; involve users and affected groups; keep a human contact point and non-digital channel
Procurement, legal and data protection	Apply the core clauses and procurement checklist; check legal obligations; carry out data protection and, for high-impact uses, human rights impact assessments
Monitoring, statistics and planning unit	Collect the U4SSC KPIs and supplementary indicators; coordinate with national statistical offices; prepare the annual report and Voluntary Local Reviews
Community engagement and inclusion team	Organize participation online and in person; work with organized civil society; make sure that feedback changes decisions
Residents, civil society, academia and private partners	Contribute needs and local knowledge; co-design and test solutions; provide independent scrutiny, evidence and expertise

A5.3 The eight steps on one page

Use Table A5.3 as a working checklist. The full guidance for each step is in Annex 1.

Table A5.3 – The implementation cycle on one page

Step	Essential actions	Output	Check before moving on
1 Define	Describe the challenge in one page without naming a technology; identify who is affected, including groups often left out; write the outcome as a change in people's lives; confirm ownership and link to the plan and budget; confirm priorities with residents, online and in person	Problem, needs and public-value statement (Table A5.9)	Is the challenge framed from people's perspective? Are affected and under-served groups identified? Is the outcome clear?

Step	Essential actions	Output	Check before moving on
2 Understand	Map what already exists and whether it can be reused; assess capacities in proportion to the initiative; for AI options, check data, infrastructure, skills, oversight and law; collect baseline data by group and area, including relevant U4SSC KPIs; find out who is missing from the data	Baseline assessment with early indicators	Do we have an evidence-based picture? Have existing solutions been considered? Do we know where the data gaps are?
3 Prioritize	Agree criteria, reflecting the principles and outcomes, before comparing options; list all options equally, including doing nothing; compare them (Table A5.10) and ask what AI adds that a simpler option does not; decide: proceed, modify, defer or do not proceed	Option appraisal and decision record	Were alternatives, including not proceeding, considered? Is the choice proportionate? If AI, is it justified?
4 Enable	Map who owns, decides, oversees, operates and controls the data; review the legal framework; check infrastructure, data, interoperability and hosting; plan skills; budget for the full lifecycle; sort gaps into close now, close during implementation, and outside city authority	Enabling-environment action plan with owners and dates	Is there an accountable authority with a mandate? Are safeguards in place? Are operating resources secured?
5 Design	Involve residents and organized civil society while the design can still change; turn needs into requirements and show how input was used; classify each AI use with the traffic-light rule and apply the matching safeguards, including the DHRIA before deployment for high-impact uses or where the law requires it; keep an assisted or non-digital channel; for AI agents, define mandate, autonomy, approvals and stop mechanisms; set indicators and a review schedule	Design specification (or draft strategy), safeguards, indicators, timeline	Did participation visibly change the design? Can everyone access it, including offline? Can people give feedback and see it acted on?

Step	Essential actions	Output	Check before moving on
6 Implement	Confirm resources for operation, not only launch; procure with the core clauses and checklist (Section A5.5); pilot or phase the roll-out with success and exit criteria (Table A5.11); validate AI on local data; train and inform staff early; keep feedback and complaint channels open	Implementation plan, pilot charter, testing record, operating procedures	Are responsibilities clear and resources sufficient? Has it been tested? Are safeguards working? Can the city sustain it?
7 Measure	Collect the indicators set in Step 5; compare with the baseline, by group and area; look for unintended effects; combine numbers with people's views; for AI, track accuracy, staff overrides, incidents, drift and differences across groups, and repeat the DHRIA for high-impact systems whenever conditions change in ways that may affect people's rights; publish findings	Monitoring and review report	Are results compared with the baseline? Are benefits and harms fairly distributed? Is there enough evidence to decide?
8 Learn and adapt	Review evidence and feedback; re-test assumptions; decide: continue, adapt, institutionalize, scale, pause or stop; before scaling, check the new context; if stopping, keep a fallback so that the service continues; share lessons, including failures	Decision record and lessons note	Is there enough value and evidence to continue or scale, or a responsible exit plan if it stops?

A5.4 Responsible AI tools

Apply these tools for every AI system the city uses or procures, together with the traffic-light rule (Chapter 3, Table 6) and the levels of human involvement (Table 7). Where a measure is required by law, the city must comply. Where it is silent, the city may adopt the measure through internal policy or contract provisions (Section 3.4.7).

Tool 1 – Classify the impact of each AI use with the traffic-light rule (Section 3.2, Table 6). Classify by context, not technology, record the reason and reassess when the use changes.

Tool 2 – Set the level of human involvement with Table 7. Before launch, define what triggers human review; who reviews, with what information and authority; who can pause, override or switch off the system; how errors are corrected; and which records are kept.

Tool 3 – Publish a register entry with Table A5.8 (Section A5.7).

Tool 4 – Adopt a one-page staff policy on generative AI (Table A5.4).

Tool 5 – Govern AI agents with the checklist in Table A5.5.

Before deployment, test every medium-and high-impact system as set out in Section 3.4.2.

Table A5.4.1 – Model staff policy on generative AI (one page)

Rule	What it means
1. Approved tools	Staff may use only the tools listed by the accountable official.
2. Never enter	Personal data of residents or staff, confidential or security information, or unpublished decisions, unless the tool is approved for that data.
3. Check every output	The person using an output is responsible for its accuracy. Facts, figures and legal statements must be verified.
4. Disclose	Tell residents when AI has drafted or materially shaped a communication or decision that affects them.
5. No automated decisions	Generative AI must not decide on rights, benefits, permits or sanctions.
6. Report problems	Report incorrect, biased or harmful outputs and suspected data leaks to the accountable official.
7. Train	All staff using AI complete basic AI literacy training.

Table A5.4.2 – Checklist for city AI agents

Item	For every city AI agent	Done
Purpose	The agent serves a defined public need, not only what is technically possible.	☐
Mandate	A written mandate: what it may do alone, what needs human approval, what it may only recommend and what it must never do.	☐
Autonomy and risk	An autonomy level and a risk tier (low, moderate, high or critical), recorded in a city-wide agent registry. This agent risk tier is a separate operational classification; also record the use's lower, medium or high impact level under Table 7 and apply the relevant safeguards.	☐
Owners	Named business, technical, data and risk owners. If nobody is accountable, the agent does not launch.	☐
Least privilege	Only the data, tools and system access the task requires, with time-limited credentials.	☐
Real oversight	Reviewers with the information, time and authority to say no; ways to pause, roll back and stop; a fallback that keeps the service running.	☐
Logs	Instructions, data access, tool calls, outputs, approvals and incidents are logged, enough to reconstruct what happened.	☐
Testing	Tested before launch for accuracy, bias, prompt injection, unauthorized actions and escalation behaviour.	☐
Residents	Told when they deal with an agent, able to reach a person and to challenge an outcome.	☐

Item	For every city AI agent	Done
Change	Revalidated when the model, data, integrations or scope change; retirement criteria defined.	☐
Several agencies	Federate rather than centralize: each agency retains control of its agent, data and legal responsibilities. A federation agreement should set shared rules, data-protection roles, liability and audit-trail retention. Agents should have verified identities and published mandates, and should be able to refuse requests that breach those mandates. The federation should provide a shared vocabulary based on open standards, end-to-end traceability, one "no wrong door" contact point for residents, and human authority over decisions affecting rights and safety.	☐

Start small: begin with agents that assist staff, move to supervised workflows, and allow conditional autonomy only in tightly bounded areas once governance, data and oversight have proven reliable. See the U4SSC publications *Good Practices for City AI Agents* and *An urban federated agentic AI framework* (2026).

A5.5 Procurement

Many decisions about AI are made at the moment of purchase, often inside a wider service contract (Case study 5, Tampere).

These are the minimum conditions to include in contracts for digital and AI systems, drawn from Sections 3.4.2 and 3.4.6 and Steps 4 and 6. Adapt them to national procurement law. The procurement checklist below extends them.

Table A5.5 – Core procurement clauses

Area	Minimum clause	Done
Data ownership and access	The city owns the data, or has full access rights to, its data and the data generated by the system.	☐
Data export and exit	Data can be exported in a usable, open format at any time; an exit and transition plan is agreed, with support from the supplier.	☐
Use of city data	The supplier may not use city data to train or improve its models without the city's explicit agreement.	☐
Hosting and jurisdiction	Where data are stored and processed, which laws apply, and who controls encryption keys, are stated.	☐
Interoperability	Open or international standards and documented interfaces are used; no exclusive rights over public data.	☐
Audit access	The city, or an independent body it appoints, can audit the system, its documentation and its logs.	☐
AI documentation	The supplier provides the intended use, data sources, known limitations and evaluation results, and notifies the city of model updates.	☐

Area	Minimum clause	Done
Performance and testing	Acceptance criteria are set before deployment, including performance across groups and areas; the system is re-tested after material changes.	☐
Erroneous or harmful outputs	The supplier's obligations for handling erroneous, discriminatory or unexplainable outputs are defined.	☐
Security	Secure configuration, vulnerability management, a defined patching and support period, and incident notification by the supplier.	☐
Accessibility	The system meets the applicable accessibility standard.	☐
Lifecycle costs and environment	Operating, maintenance and usage-based costs over the full life are stated; energy use is reported where possible (indicator S11).	☐

Procurement checklist

Many decisions about AI are made during procurement, often as part of a wider service contract (see Case study 5, Tampere). Use this checklist for every digital or AI contract above the threshold set by the city, in accordance with national procurement law.

Before tendering

- ☐ The problem statement and option appraisal (Steps 1–3) are complete; the tender describes the outcome needed, not a predetermined product.
- ☐ Lifecycle cost is estimated: operation, maintenance, data, security, training, supplier transition and retirement.
- ☐ Joint procurement with other cities or national frameworks has been considered.

For every contract: include the core clauses in Annex 5, Table A5.6, together with safeguards proportionate to the risks to people and public services:

- ☐ **Human oversight:** the city can review, override, pause and switch off the system.
- ☐ **AI disclosure:** the supplier discloses any AI it uses to deliver the service, including through subcontractors.
- ☐ **Intellectual property:** warranties and indemnities for claims arising from training data and outputs; clarity on who owns prompts, fine-tuned models and outputs made with city data.
- ☐ **Conformity:** evidence of certification or conformity where national or supranational schemes exist.

After award

- ☐ Record the contract in the AI inventory and, where relevant, the public register.
- ☐ Name the city official who manages the supplier and monitors performance.
- ☐ Review the contract when the supplier changes its model, terms or subcontractors.

A5.6 Monitoring in six moves

1. Decide which decisions the framework will inform (strategy review, budget, council reporting, Voluntary Local Reviews) and name a lead unit.
2. Start from the principles and outcomes prioritized by the city based on the readiness scan (Section 1.3.1).
3. Choose two to four U4SSC core KPIs per principle (Chapter 5, Table 13) and supplementary indicators S1 to S5 (Table 14). S1 to S5 come largely from records the city creates anyway when following this Annex. Because the U4SSC KPIs are aligned with the UN-Habitat Global Urban Monitoring Framework, the same data can also support SDG and New Urban Agenda reporting and Voluntary Local Reviews.
4. Set baselines from Step 2, and targets or the expected direction of change.
5. For each indicator, record its definition, data source, owner, frequency, and the groups or areas the data do not cover.
6. Publish results, discuss them with residents and present them to the council at least once a year, in time for the budget.

Read results with care: an initiative usually contributes to a city-level change rather than causing it alone (Section 5.4).

A5.7 Templates

Copy these tables into the city's own document system and fill in the right-hand column(s).

Decision and accountability record

This template supports the recommendation to record decisions and accountability at every step of the implementation cycle (Chapter 4). Open one record for each intervention, update it at each step and keep it with the city's official records, so that decisions can be explained to the council, auditors and residents. In Step 3, it serves as the option-appraisal and decision record.

Table A5.7 – Decision and accountability record

Field	What to record
Public purpose and decision	The urban problem, the decision under review and the result sought for people.
Authority and accountability	The body with legal authority, the accountable official and the approval or escalation route.
Affected people and participation	Who may benefit, who may bear burdens, and how their knowledge influenced the decision.
Evidence and uncertainty	The evidence used, its limitations, remaining uncertainty and any assumption that must be tested.
Options considered (Step 3)	The options compared, the criteria used, the trade-offs and the stakeholders consulted.
Capability and safeguards	Confirmation that the city can govern the intervention and that matching safeguards, continuity arrangements and remedy are available.
Decision and explanation	Whether to proceed, revise, return to an earlier step, pause or stop, with reasons suitable for public communication.
Records and review date	The documents to keep and where they are stored, the official responsible for follow-up, and the next review date.

Source: adapted from a template by Edinburgh Napier University.

Public AI register entry

Use one entry per AI or algorithmic system (Section 3.4.3). Start with resident-facing and higher-impact systems.

Table A5.7.1 – Public AI register entry

Field	What to record
Name and purpose	Name of the system, what it is used for and the service it supports.
Responsible department and contact	The department accountable for the system and a contact point for questions.
Role of AI and human involvement	What the system does (informs, recommends, acts) and the level of human involvement (Table 7).
Data	The main data sources, including whether personal data are used.
Supplier and hosting	The supplier or developer and where the system is hosted.
Impact level and assessment	Lower, medium or high impact (Table 6), and a summary of the impact assessment (DHRIA where applicable) and testing results.
Safeguards	The main safeguards in place, such as human review, monitoring and non-digital alternatives.
How to ask, complain or request review	How residents can ask questions, request human review of a decision or make a complaint.
Dates and status	Date of deployment, date of the last review, next review and current status (pilot, in use, suspended, retired).

Copy these tables into the city's own document system and fill in the right-hand column(s). The decision and accountability record, register entry and procurement clauses are in Annex 5.

Table A5.7.2 – Problem, needs and public-value statement (Step 1)

Field	Entry
Urban challenge, in one paragraph, without naming a technology	
Where it occurs and how large it is	
Who is affected; groups that may be under-served or missing from data	
Underlying causes and wider factors	
Desired outcome for people or the urban environment	
Link to the city development plan, budget and principles	
Accountable authority and official	
Who will be involved, and how (online and in person)	
What happens if the city does nothing	

Table A5.7.3 – Option appraisal (Step 3).

Score each option against criteria agreed in advance (for example 1 = poor, 3 = good) and explain the scores in the notes

Criterion	1 No action	2 Non-digital change	3 Reuse existing system	4 New digital	5 AI-enabled
Contribution to the desired outcome					
Who benefits, who may be excluded					
Lifecycle cost					
Risks to rights, safety and privacy					
Feasibility with current capacity					
Environmental effects					
Notes and evidence					

Table A5.7.4 – Pilot charter (Step 6)

Field	Entry
Public purpose and link to the Step 1 outcome	
Scope: area, service, population, duration	
Accountable official and delivery team	
Impact level and safeguards in place	
Success criteria, set before the pilot starts	
Exit criteria: what would make the city stop	
How participants are informed and can give feedback or opt out	
Data collected, retention and who can access it	
Review date and who decides next steps	

Annex 6 – The U4SSC City Toolkit: proposed tools

Complementing the practical implementation resources provided in Annex 5, this annex takes a broader view of the tools and resources that may support cities in applying the Guide across different types of interventions, including policy, institutional, service-related, digital and AI-enabled initiatives.

It brings together the existing resources referenced throughout this publication and identifies indicative templates, checklists, assessment methods and decision-support resources that may be used, adapted or further developed to support the implementation of Chapters 3 and 4. In particular, these resources support the responsible AI considerations set out in Section 2.3, the implementation cycle described in Annex 1, and the city-level monitoring and evaluation process presented in Annex 4. While Annex 5 provides practical implementation guidance, checklists and templates, this annex identifies complementary resources and proposed tools that may support cities in applying the Guide, including those that could be developed or made available through future releases of the U4SSC Toolbox.

This Annex **does not establish a separate methodology**, nor should the resources identified here be understood as constituting the Toolbox in its entirety. Rather, it provides an initial bridge between the framework set out in this Guide and the practical resources that will progressively form part of the U4SSC Toolbox. Where an official title, source, implementation or access route is provided, the relevant existing resource is referenced accordingly. Otherwise, the terminology used describes **indicative functions or types of tools and resources that may be developed further**, and should not be interpreted as implying that a specific tool has already been formally developed, endorsed or issued.

U4SSC, ITU and UN-Habitat resources are mapped separately in Annex 7 (Section A7.2).

Priority should be given to using, or transparently adapting, existing U4SSC, ITU, UN-Habitat and other relevant resources, to avoid duplicating established methods. For each resource, it should be stated:

- its purpose and intended user;
- the problem it addresses and the step at which it is used;
- its usual inputs and expected outputs;
- the time and capacity required;
- the conditions for use and any limitations; and
- its status (available, in development or proposed) and how to access it.

The table below shows, for each step of the implementation cycle and for Annexes 4 and 5, the templates and tools proposed in this Guide and the existing resources that cities can use or adapt.

Table A6 – Templates, tools and existing resources according to implementation

Implementation point	Templates and tools proposed in this Guide	Existing resources to use or adapt
Step 1: Define the urban challenge and the objective, and plan people's engagement	Problem, needs and public-value template; stakeholder, affected-groups and accountability map	SWOT analysis; problem tree; community-engagement methods; UNITAC step-by-step guide for a people-centred smart city strategy
Step 2: Understand the starting point and establish a baseline	City or institutional readiness assessment; outcome-monitoring and indicator-specification sheet	UN-Habitat Readiness Assessment Survey; U4SSC KPIs and Collection Methodology; U4SSC framework for enabling people-centred cities through digital transformation
Step 3: Prioritise	Option-appraisal and decision record; option-appraisal and prioritisation tool; lifecycle-costing and financial-sustainability tool; Step 3 decision tree (Figure 3)	UNESCO Readiness Assessment Methodology (RAM), for AI-related options
Step 4: Build the enabling environment	Enabling-environment gap analysis and action plan; responsible procurement and supplier-assurance checklist	Indicative division of responsibilities between levels of government (Section 2.3); U4SSC Procurement for smart sustainable cities; UN-Habitat playbook on building and securing digital public infrastructure; OASC Minimal Interoperability Mechanisms (Recommendation ITU-T Y.4505)
Step 5: Design solutions for and with people	Responsible AI risk and mitigation record; accessibility and inclusive-service checklist; human-oversight, escalation and incident-response plan; public AI register entry	Participatory design and co-creation methods; UN-Habitat playbook on co-creation and collaboration in smart cities; U4SSC Guiding Principles for AI in Cities
Step 6: Implement	Implementation roadmap; pilot or experiment charter; testing and assurance plan; testing, deployment and operational-control record	Procurement checklist; regulatory sandbox guidance, where the legal framework provides for it; NIST AI Risk Management Framework; ISO/IEC 42001; AI Verify; UNESCO Ethical Impact Assessment
Step 7: Track and measure progress and impact	Outcome-monitoring and indicator-specification sheet; initiative monitoring and review report; complaint, review and incident record	U4SSC KPIs; core and supplementary indicators Sections 5.2–5.3); KPI mapping (Annex 4, Table A4.1)
Step 8: Learn, adapt and scale	Evaluation design and review tool; decision tool and review record for adapting, scaling, replicating, replacing or retiring an intervention	Case materials and city practice cards, including examples of interventions that were adjusted or discontinued

Implementation point	Templates and tools proposed in this Guide	Existing resources to use or adapt
Chapter 5: Monitoring, evaluation and continuous improvement	City-wide monitoring and evaluation framework; KPI selection tool; cross-initiative portfolio review tool	U4SSC KPIs; U4SSC Digital Transformation Assessment of People-Centred Cities – Performance and Impact Assessment Guide; UN-Habitat Global Urban Monitoring Framework; U4SSC AI-Driven Urban KPIs.

A6.1 Templates and checklists

Templates and checklists support consistent documentation, review and accountability across the implementation cycle. They may be developed specifically for this Guide, drawn from verified existing resources, or adapted transparently from existing resources. They do not replace professional judgement or applicable legal and technical requirements.

The templates and checklists identified through Chapter 3 and Chapter 4 may include:

- **Problem, needs and public-value template**: Records the urban problem, unmet need, affected people and places, intended public outcomes, existing responses and whether technology is required.
- **Stakeholder, affected-groups and accountability map**: Identifies affected people, responsible authorities, delivery actors, data holders, oversight functions, complaint channels and review arrangements.
- **Option-appraisal and decision record**: Records the options considered, selected option, rationale, evidence, uncertainty and review conditions.
- **Decision and accountability record** (Annex 5, Table A5.7): Records, at each step of the implementation cycle, the public purpose, authority and accountability, affected people, evidence and uncertainty, capability and safeguards, the decision taken and the review date.
- **Responsible AI risk and mitigation record**: Records the public purpose, affected people, risks and uncertainties, mitigation measures, accountability, human-review arrangements and reassessment conditions for a specific AI use.
- **Public AI register entry**: Records the purpose, responsible department, role of AI and level of human involvement, data sources, supplier, impact level, assessment and testing summary, review and complaint routes, and review dates for each AI system (Section 2.3).
- **Testing and assurance plan**: Defines acceptance criteria, local validation, robustness, security and accessibility tests, pilot exit criteria, monitoring after deployment and independent review arrangements (Section 2.3).
- **Responsible procurement and supplier-assurance checklist**: Covers accessibility, interoperability, data and intellectual-property arrangements, cybersecurity, supplier accountability, lifecycle costs, performance monitoring and exit and transition requirements.

- **Pilot or experiment charter**: Defines the public purpose, scope, affected people, responsibilities, safeguards, success criteria and review period before a pilot begins.
- **Accessibility and inclusive-service checklist**: Identifies accessibility requirements and the need for assisted, in-person, human or other non-digital service channels.
- **Human-oversight, escalation and incident-response plan**: Defines review triggers, responsible authority, permission boundaries, incident procedures, rollback, safe recovery and follow-up responsibilities.
- **Outcome-monitoring and indicator-specification sheet**: Connects outcomes and initiative results with indicators, baselines, targets, data sources, responsibilities, review frequency and decision triggers.
- **Complaint, review and incident record**: Documents complaints, requests for review, incidents, corrective action, responsible authorities, resolution status and recurring issues requiring wider examination.
- **Initiative monitoring and review report:** Brings together progress against indicators, results across relevant groups and areas, complaints, review requests, incidents, limitations and matters requiring action or further evaluation.
- **Adaptation, scaling, replication, replacement and retirement review record:** Documents the final decision, evidence, rationale, conditions, responsibilities and follow-up after the corresponding decision-support analysis.

Each template or checklist should state its purpose, intended user, relevant implementation step, expected inputs and outputs, conditions and limitations, status, version and access arrangements.

A6.2 Tools

The following indicative tools may be supported through verified existing resources, transparent adaptations or tools developed for this Guide following expert review and practical testing:

- **Option-appraisal and prioritisation tool:** Compares policy, administrative, capacity-building, physical-investment, conventional digital and AI options, including the effects of taking no action. It may incorporate analysis of needs, service gaps, exclusion risks and whether AI offers sufficient added public value.
- **City or institutional digital and AI readiness assessment**: Analyses governance, existing assets and initiatives, data, infrastructure, staffing, financial and procurement conditions.
- **Lifecycle-costing and financial-sustainability tool**: Estimates the full costs of design, procurement, operation, maintenance, data management, cybersecurity, capacity development, supplier transition and retirement.
- **KPI selection tool**: Connects Chapter 2 outcomes, Chapter 3 baselines, U4SSC KPIs, local indicators, information gaps and Chapter 4 review arrangements.

- **Evaluation design and review tool**: Defines the decision to be supported, evaluation questions, baselines, evidence, results across groups and areas, limitations and review arrangements.
- **Adaptation, scaling, replication, replacement and retirement decision tool**: Assesses what worked, for whom and under what conditions and supports lifecycle decisions based on public value, safeguards, capacity and context.
- **City-wide monitoring and evaluation framework:** Brings together outcomes, indicators, qualitative evidence, accountability arrangements, review schedules and decision points for the city-level process in Chapter 4. It may be supported by a dashboard or scorecard where calculations and weightings are transparent and individual indicators remain visible.
- **Cross-initiative portfolio review tool**: Supports collective review of initiatives to identify unmet needs, unequal results, duplication, dependencies and shared governance or capacity issues.

The responsible procurement and supplier-assurance checklist should address accessibility, interoperability and open standards, controlled data export, data and intellectual-property arrangements, cybersecurity, performance assurance, supplier accountability, lifecycle costs, and exit and transition requirements, including measures to reduce vendor lock-in.

Practice and learning resources may include city practice cards and case materials describing context, the urban challenge, the approach, governance arrangements, available evidence, limitations, lessons learned and transferability. Where relevant, they should indicate what did not work or why an initiative was adjusted, paused or discontinued.

Detailed tools, fillable templates and case materials may be provided through annexes or a maintained online resource library that can be updated as resources are verified and practice evolves. Each formally listed resource should either accompany the publication or have a reliable access route.

Annex 7 – International frameworks and related resources

This annex brings together international frameworks and related resources that inform and support the application of this Guide and contribute to the U4SSC toolbox. Section A7.1 outlines the main international frameworks and their implications for cities, while Section A7.2 identifies relevant U4SSC, ITU and UN-Habitat resources that cities may consult or adapt according to their needs. Together, these references complement the practical implementation guidance in Annex 5 and the tools and resources presented in Annex 6.

A7.1 International frameworks and what they mean for cities

The table maps the main international frameworks and commitments to their implications for cities and identifies where they are addressed in this Guide. It is indicative rather than exhaustive; national law and policy determine how each commitment applies at the local level.

Table A7.1 – International frameworks and what they mean for cities

Framework or commitment	Purpose	Implications for cities	Where in this Guide
2030 Agenda for Sustainable Development (2015)	Achieve the SDGs, including Goal 11 on inclusive, safe, resilient and sustainable cities, leaving no one behind	Direct digital and AI initiatives to local SDG priorities and report progress, for example through Voluntary Local Reviews	Section 2.3; Chapter 5
New Urban Agenda (2016)	Inclusive and sustainable urban development, with a smart-city approach that uses digitalization, clean energy and technologies	Treat technology as an enabler of planning, housing, basic services and participation, not as an end	Sections 2.1 and 2.2; Chapter 4
Paris Agreement (2015) and Sendai Framework for Disaster Risk Reduction 2015–2030	Climate mitigation and adaptation; reducing disaster risk and losses	Use data and digital tools for climate action and resilience, and limit the environmental footprint of digital and AI systems	Principle 2 (Section 2.2); Step 3; Chapter 5
World Summit on the Information Society outcomes and ITU Connect 2030 Agenda	A people-centred, inclusive information society; universal and affordable connectivity	Close local digital divides in access, affordability and skills	Principle 4 (Section 2.2); readiness scan (Section 1.3.1); Step 4

Framework or commitment	Purpose	Implications for cities	Where in this Guide
Global Digital Compact (2024)	Close digital divides; an inclusive, open, safe and secure digital space that respects human rights; responsible data governance; AI governance for the benefit of humanity	Apply these objectives to municipal digital services, data governance and AI use. (Principle 4 builds on the Compact's wording, "an inclusive, open, safe and secure digital space".)	Section 2.2 and Chapter 3
UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	Values and principles for AI across its lifecycle, including proportionality, human oversight, transparency and impact assessment	Assess impacts before deployment, keep human oversight and be transparent about AI use	Chapter 3; Steps 5 to 7
Human Rights Council resolution 41/11 (2019) and General Assembly resolution 77/211 (2022)	Protection of human rights, including privacy, in the design and use of new and emerging digital technologies	Minimize data collection, assess impacts on rights, set safeguards on surveillance and provide access to remedy	Chapter 3; Steps 4 and 5
UN-Habitat Assembly resolution 2/1 (2023) and Technical Guidelines on People-Centred Smart Cities (2025)	International guidelines on people-centred smart cities, with four goals (including "digital human rights, equity and inclusion") and key enablers	The basis for the four principles and the enabling environment used in this Guide	Sections 2.1 and 2.2; Step 4
ITU Resolution 98, ITU Resolution 197, Recommendation ITU-T Y.4900 series and U4SSC Key Performance Indicators	International standards for IoT and smart sustainable cities; a common definition and indicators	Use international standards and KPIs for interoperability, procurement and measurement	Section 2.1; Step 4; Chapter 5; Annex 4

A7.2 Related U4SSC, ITU and UN-Habitat resources

Table A7.2 – Related U4SSC, ITU and UN-Habitat resources

Chapter or step	Resource	Use in this Guide
Chapter 1 (readiness scan); Step 4	U4SSC, *A framework for enabling people-centred cities through digital transformation* (2025); UN-Habitat Readiness Assessment Survey (in the step-by-step guide)	Enabling areas used to structure the readiness scan and the enabling-environment review
Chapter 2	UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025)	Definition, principles and key enablers of people-centred smart cities, with recommended actions by stakeholder type

Chapter or step	Resource	Use in this Guide
Chapter 3	U4SSC, *Guiding Principles for Artificial Intelligence in Cities* (2023)	Responsible AI principles (Table 5)
Chapter 3; Steps 4 and 6	U4SSC, *Autonomous cities and AI: The next frontier of urban transformation* (2026)	Levels of human involvement; assessment of autonomous systems
Chapter 3	U4SSC, *Good Practices for City AI Agents* (2026)	Governance of AI agents
Chapters 1 and 4 (Steps 1, 2, 5)	UN-Habitat (UNITAC), *A step-by-step guide for a people-centred smart city strategy* (2025)	Strategy development and baseline assessment
Step 4	U4SSC, *Building digital public infrastructure for cities and communities* (2025); UN-Habitat, *Building and securing digital public infrastructure*	Digital public infrastructure and cybersecurity
Step 4	OASC Minimal Interoperability Mechanisms; Recommendation ITU-T Y.4505	Interoperability
Step 4	U4SSC, *Compendium of practices on innovative financing for smart sustainable cities projects*	Financing
Steps 4 and 6	U4SSC, *Procurement guidelines for smart sustainable cities* (2026)	Procurement
Step 5	UN-Habitat, *Shaping co-creation and collaboration in smart cities*	Participation and co-creation
Steps 2 and 7; Chapter 5	U4SSC, *Collection Methodology for KPIs for Smart Sustainable Cities*; Recommendation ITU-T Y.4903	City-level indicators (mapped in Annex 4, Table A4.1)
Chapter 5	U4SSC, *Digital Transformation Assessment of People-Centred Cities – Performance and Impact Assessment Guide* (2026)	Performance and impact assessment
Chapter 5	U4SSC, *AI-Driven Urban Key Performance Indicators* (2026)	AI-derived indicators
Chapter 5	U4SSC city case studies (for example, Quito)	Examples of KPI implementation
Chapter 5	UN-Habitat, *Global Urban Monitoring Framework*	Alignment with SDGs and New Urban Agenda reporting

Annex 8 – Glossary, acronyms and references

A8.1 Glossary

- **Agentic AI (AI agent).** An AI system that pursues a goal by planning and carrying out a sequence of steps on its own, using external tools such as software or web search, rather than answering a single request.
- **AI model.** Algorithms trained to recognize patterns in data, which can then make predictions, generate content or support decisions.
- **AI register.** A public list of the AI and algorithmic systems used by an organization, describing their purpose, role, data, safeguards and contact points.
- **Application programming interface (API).** A connection that lets one software system use another's capabilities over a network, for example to send data to a model hosted elsewhere and receive the results.
- **Assurance.** Gathering and assessing evidence that an AI system performs as intended, meets requirements and is safe to use, throughout its life.
- **Augmentation.** Using AI to support people in tasks they continue to perform and oversee, complementing their skills rather than replacing them. Usually contrasted with automation.
- **Automation.** Using AI to perform tasks previously done by people, reducing direct human involvement.
- **Baseline.** The measured starting situation against which progress is later assessed (Step 2).
- **Bias.** A systematic tendency in an AI model's outputs, often traced to imbalances in its training data, that can make results unfair or inaccurate.
- **Chatbot.** An application that lets people interact with a system, often an AI model, in plain language, typed or spoken.
- **Compute.** The processing power from chips and related hardware needed to train and run AI models.
- **Conformity assessment.** Demonstrating that a product, system or service meets specified legal or technical requirements, usually under national or supranational rules.
- **Data sovereignty.** The ability of public authorities and communities to decide, in line with the law, how data about them and their territory are collected, used, shared and kept.
- **Digital human rights impact assessment (DHRIA).** An assessment of how a digital or AI system may affect human rights, carried out before deployment (ex ante) and repeated during use (ex post) when conditions change in ways that may affect people's rights. This Guide calls for it for high-impact uses (Section 3.2) or where the law requires it.

- **Digital public infrastructure (DPI).** Shared digital systems, such as digital identity, payments and data exchange, that enable public and private services at scale.
- **Foundation model.** An AI model trained on broad data that can be adapted to many tasks. Large language models are one type.
- **Generative AI.** AI that creates content, such as text, images, audio or code, usually in response to a request.
- **Human-in-the-loop, human-on-the-loop, human-in-command.** Levels of human involvement in AI systems (Table A2.3.3).
- **Large language model.** An AI model trained on very large amounts of text that can understand and generate language; it underlies chatbots and many writing and coding tools.
- **Machine learning.** Algorithms that learn patterns from data rather than following hand-written rules.
- **Media and information literacy (MIL).** The skills and knowledge to find, critically evaluate, use and create information and media responsibly; distinguish facts from opinion; understand information ecosystems and one's rights within them; recognize ethical issues; and use information to support equality, freedom of expression, intercultural dialogue and peace.
- **Open-source model.** A model released for anyone to use and modify, usually including its code; broader than an open-weight release.
- **Open-weight model.** A model whose internal values (weights) are published, so that others can download and adapt it.
- **Predictive AI.** AI that forecasts outcomes or assigns scores from data, rather than generating content.
- **Red teaming.** Structured adversarial testing in which testers deliberately try to make an AI system fail or behave harmfully, to find and fix weaknesses.
- **Regulatory sandbox.** A controlled environment, set up by a regulator, in which innovative solutions can be tested for a limited time under defined conditions, safeguards and supervision.
- **Training.** The process of teaching an AI model to recognize patterns from data.
- **Validation.** Checking how well a model performs by comparing its outputs with independently verified data, usually data it was not trained on. Because performance can drift, models are revalidated after deployment.
- **Vendor lock-in.** A situation in which a city cannot change supplier or technology without excessive cost or disruption, for example because data cannot be exported or interfaces are proprietary.

A8.2 Acronyms

Table A8.2 – Acronyms

Acronym	Meaning
AI	Artificial intelligence
API	Application programming interface
BEAM	Building and Establishment Automated Mapper
CDO	Chief digital officer
CERT	Computer emergency response team
CIO	Chief information officer
COVID-19	Coronavirus disease 2019
CSIRT	Computer security incident response team
DHRIA	Digital human rights impact assessment
DMT	Department of Municipalities and Transport (Abu Dhabi)
DPI	Digital public infrastructure
ESPON	European Union programme for territorial development and cohesion (ESPON)
EU	European Union
FG-AI4SSC	ITU-T Focus Group on AI for Smart Sustainable Cities and Communities
FG-SSC	ITU-T Focus Group on Smart Sustainable Cities
GeoAI	Geospatial artificial intelligence
GHG	Greenhouse gas
GIS	Geographic information system
GovTech	Government Technology Agency of Singapore
GPU	Graphics processing unit
HLEG	High-Level Expert Group on Artificial Intelligence (European Commission)
HUDERIA	Human rights, democracy and rule of law impact assessment (Council of Europe methodology)
ICT	Information and communication technology
IDRC	International Development Research Centre
IEC	International Electrotechnical Commission
IoT	Internet of Things
ISO	International Organization for Standardization
IT	Information technology
ITU	International Telecommunication Union
ITU-T	ITU Telecommunication Standardization Sector
KPI	Key performance indicator
LLM	Large language model
LORDI	Local and Regional Digital Indicators Framework
M&E	Monitoring and evaluation
M2M	Manufacture-to-Market (WIFT Accelerator)

Acronym	Meaning
MIL	Media and information literacy
NIS2	Directive (EU) 2022/2555 on network and information security
NIST	National Institute of Standards and Technology (United States of America)
NTV	National Telecom Volunteers (India)
OASC	Open and Agile Smart Cities
OECD	Organisation for Economic Co-operation and Development
OHCHR	Office of the United Nations High Commissioner for Human Rights
OWASP	Open Worldwide Application Security Project
RAM	Readiness Assessment Methodology (UNESCO)
RMF	Risk Management Framework
RTA	Roads and Transport Authority (Dubai)
SDG	Sustainable Development Goal
SMEDAN	Small and Medium Enterprises Development Agency of Nigeria
SSC	Smart sustainable city
SWOT	Strengths, weaknesses, opportunities and threats
TRAI	Telecom Regulatory Authority of India
U4SSC	United for Smart Sustainable Cities
UMF	Global Urban Monitoring Framework (UN-Habitat)
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN-Habitat	United Nations Human Settlements Programme
UNITAC	United Nations Innovation Technology Accelerator for Cities
UNOSAT	United Nations Satellite Centre
UNU-EGOV	United Nations University Operating Unit on Policy-Driven Electronic Governance
WCAG	Web Content Accessibility Guidelines
WIFT	Association of Women in Fashion Tech

A8.3 References and further reading

- AI Verify Foundation (Singapore), *AI Verify testing framework and toolkit*. https://aiverifyfoundation.sg/
- Alcaldía Mayor de Bogotá, "Bogotá define cómo se debe usar la Inteligencia Artificial en entidades públicas" (14 February 2026); "IA Sin Filtro: Alcaldía de Bogotá abrió debate sobre inteligencia artificial en lo público" (29 April 2026). https://bogota.gov.co/
- Algorithm Audit, *Risk Profiling for Social Welfare Re-examination* (2023).
- Cities Today, "Helsinki launches AI register to detail city systems" (2020). https://cities-today.com/helsinki-launches-ai-register-to-detail-city-systems/
- Council of Europe, *Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law* (CETS No. 225, 2024).
- Council of Europe, *Methodology for the risk and impact assessment of artificial intelligence systems from the point of view of human rights, democracy and the rule of law (HUDERIA)* (2024).
- Danish Institute for Human Rights, *Guidance on Human Rights Impact Assessment of Digital Activities* (2020).
- Derechos Digitales, *Boti: Study on the natural language processing chatbot of the Government of the City of Buenos Aires, Argentina* (2024). https://ia.derechosdigitales.org/wp-content/uploads/2024/11/2024-ARG-BOTI-ENG.pdf
- ESPON, *LORDI – Local and Regional Digital Indicators Framework*, technical paper (2024). https://www.espon.eu/sites/default/files/projects/files/2024-07/lordi-framework.pdf
- Eurocities, *Algorithmic Transparency Standard*.
- European Commission, High-Level Expert Group on Artificial Intelligence, *Ethics Guidelines for Trustworthy AI* (2019).
- European Union, Directive (EU) 2022/2555 on measures for a high common level of cybersecurity across the Union (NIS2).
- European Union, Regulation (EU) 2024/1689 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act).
- Global Indigenous Data Alliance, *CARE Principles for Indigenous Data Governance* (2019).
- Global Initiative on AI and Virtual Worlds – Discovering the Citiverse, *AI-enabled Citiverse: A Strategic Blueprint for Cities in the Age of AI* (ITU, 2026). https://www.itu.int/epublications/en/publication/ai-enabled-citiverse-a-strategic-blueprint-for-cities-in-the-age-of-ai
- Global Initiative on AI and Virtual Worlds – Discovering the Citiverse, *City Leader's Field Guide: Preparing for the AI-enabled citiverse – The Practical Readiness Assessment for Mayors, Ministers, and Senior City Decision-Makers* (ITU, 2026).

- Government Technology Agency of Singapore (GovTech), "AI Applications in Government: Use Cases & Public Services". https://www.tech.gov.sg/technews/how-govtech-uses-ai-to-enhance-digital-public-services/
- International Telecommunication Union, ITU-T Focus Group on AI for Smart Sustainable Cities and Communities (FG-AI4SSC), established by ITU-T Study Group 20 (May 2026). https://www.itu.int/en/ITU-T/focusgroups/ai4ssc/Pages/default.aspx
- ISO/IEC 23894:2023, *Artificial intelligence – Guidance on risk management*.
- ISO/IEC 27001:2022, *Information security management systems*.
- ISO/IEC 42001:2023, *Information technology – Artificial intelligence – Management system*.
- ISO/IEC TR 29119-11:2020, *Guidelines on the testing of AI-based systems*.
- ITU and 12 United Nations entities, *Toolkit on Digital Transformation for People-Oriented Cities and Communities* (2022). https://toolkit-dt4c.itu.int/
- Mayne, J., "Contribution analysis: Coming of age?", *Evaluation*, vol. 18, No. 3 (2012), pp. 270–280.
- National Institute of Standards and Technology (NIST), *Artificial Intelligence Risk Management Framework (AI RMF 1.0)* (2023) and *Generative AI Profile* (NIST AI 600-1, 2024).
- National Institute of Standards and Technology (NIST), *Cybersecurity Framework 2.0* (2024).
- OECD Observatory of Public Sector Innovation, *Boti, the City's WhatsApp!* https://oecd-opsi.org/innovations/boti-the-citys-whatsapp/
- OECD, *OECD Guidelines for Citizen Participation Processes* (2022).
- OECD, *Recommendation of the Council on Artificial Intelligence* (2019, revised 2024).
- OECD, *Regulatory sandbox toolkit: A comprehensive guide for regulators to establish and manage regulatory sandboxes effectively* (2025). https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/06/regulatory-sandbox-toolkit_cc8d3e50/de36fa62-en.pdf
- OHCHR, *Guidance for Human Rights Impact Assessment on Digital Platforms*.
- OWASP, *Top 10 for Large Language Model Applications*.
- Recommendation ITU-T Y.4505, *Minimal interoperability mechanisms for smart and sustainable cities and communities* (2024).
- Recommendation ITU-T Y.4900/L.1600, *Overview of key performance indicators in smart sustainable cities* (2016). https://www.itu.int/rec/T-REC-Y.4900
- Recommendation ITU-T Y.4903, *Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals* (2022).
- Recommendation ITU-T Y.4904, *Smart sustainable cities maturity model* (2019). https://www.itu.int/rec/T-REC-Y.4904
- Recommendation ITU-T Y.4905, *Smart sustainable city impact assessment* (2019).

- Recommendation ITU-T Y.4906, *Assessment framework for digital transformation of sectors in smart cities* (2019). https://www.itu.int/rec/T-REC-Y.4906
- Rekenkamer Rotterdam (Rotterdam Court of Audit), *Gekleurde technologie* [Coloured technology]: report on the use of algorithms by the municipality (2021). https://rekenkamer.rotterdam.nl/onderzoeken/algoritmes/
- UNDP, *A Toolkit for Public Sector Innovators*.
- UNDP, *Building Responsible Smart Cities: A Toolkit for Public and Private Sector Actors*.
- UNESCO, *Artificial intelligence and digital transformation: competencies for civil servants* (2022). https://unesdoc.unesco.org/ark:/48223/pf0000383325
- UNESCO, *Artificial Intelligence and the Rule of Law*. https://www.unesco.org/en/artificial-intelligence/rule-law
- UNESCO, *Ethical Impact Assessment: A Tool of the Recommendation on the Ethics of Artificial Intelligence* (2023).
- UNESCO, *Media and Information Literate Citizens: Think Critically, Click Wisely*. https://www.unesco.org/mil4teachers/en/curriculum
- UNESCO, *Operational Guidelines: Constructing UNESCO Media and Information Literacy Cities*.
- UNESCO, *Readiness Assessment Methodology* (RAM). https://www.unesco.org/ethics-ai/en/ram
- UNESCO, *Recommendation on the Ethics of Artificial Intelligence* (2021). https://unesdoc.unesco.org/ark:/48223/pf0000380455
- UNESCO, *User empowerment through media and information literacy responses to the evolution of generative artificial intelligence*. https://unesdoc.unesco.org/ark:/48223/pf0000388547
- UN-Habitat, *AI for Spatial Mapping and Analysis: GeoAI Toolkit for Urban Planners* (2025).
- UN-Habitat Assembly, resolution 2/1, *International guidelines on people-centred smart cities* (2023). https://unhabitat.org/sites/default/files/2023/09/english_9.pdf
- UN-Habitat, *Building and securing digital public infrastructure – A playbook for local and regional governments*.
- UN-Habitat, *Global Urban Monitoring Framework*. https://unhabitat.org/the-global-urban-monitoring-framework
- UN-Habitat, IDRC and UNU-EGOV, *Global Assessment of Responsible AI in Cities* (2024). https://unhabitat.org/sites/default/files/2024/08/global_assessment_of_responsible_ai_in_cities_21082024.pdf
- UN-Habitat, *Shaping co-creation and collaboration in smart cities – A playbook for local and regional governments*.
- UN-Habitat, *Technical Guidelines on People-Centred Smart Cities* (2025).

- UN-Habitat (UNITAC), *A step-by-step guide for a people-centred smart city strategy* (2025). https://unhabitat.org/sites/default/files/2025/12/unitac_a_step_by_step_guide_for_a_people_centred_smart_city_strategy.pdf
- UN-Habitat, *World Smart Cities Outlook 2024* (2024). https://unhabitat.org/world-smart-cities-outlook-2024
- United for Smart Sustainable Cities (U4SSC), *A framework for enabling people-centred cities through digital transformation* (2025).
- United for Smart Sustainable Cities (U4SSC), *AI-Driven Urban Key Performance Indicators* (2026).
- United for Smart Sustainable Cities (U4SSC), *Autonomous cities and AI: The next frontier of urban transformation* (ITU, 2026). https://www.itu.int/epublications/en/publication/autonomous-cities-and-ai-the-next-frontier-of-urban-transformation
- United for Smart Sustainable Cities (U4SSC), *Building digital public infrastructure for cities and communities* (ITU, 2025). https://www.itu.int/hub/publication/t-tut-smartcity-2025-9/
- United for Smart Sustainable Cities (U4SSC), *U4SSC City Snapshot: Quito, Ecuador* (ITU, 2025). https://u4ssc.itu.int/wp-content/uploads/2025/04/2500528_U4SSC-City-Snapshot-Quito-Ecuador.pdf
- United for Smart Sustainable Cities (U4SSC), *Collection Methodology for Key Performance Indicators for Smart Sustainable Cities* (ITU, 2017). https://www.itu.int/pub/T-TUT-SMARTCITY-2017-9
- United for Smart Sustainable Cities (U4SSC), *Compendium of practices on innovative financing for smart sustainable cities projects* (ITU, 2022). https://www.itu.int/pub/T-TUT-SMARTCITY-2022-16
- United for Smart Sustainable Cities (U4SSC), *Digital Transformation Assessment of People-Centred Cities – Performance and Impact Assessment Guide* (2026).
- United for Smart Sustainable Cities (U4SSC), *Good Practices for City AI Agents* (2026). https://u4ssc.itu.int/publications/
- United for Smart Sustainable Cities (U4SSC), *Guide to next-generation public procurement in cities* (2023). https://www.itu.int/hub/2023/06/guide-to-next-generation-public-procurement-in-cities/
- United for Smart Sustainable Cities (U4SSC), *Guiding Principles for Artificial Intelligence in Cities* (ITU, 2023). https://www.itu.int/pub/T-TUT-SMARTCITY-2023-15
- United for Smart Sustainable Cities (U4SSC), *Policy benchmarks for digital transformation of people-centred cities* (ITU, 2024). https://www.itu.int/net/epub/TSB/2024-U4SSC-Policy-benchmarks-for-digital-transformation-of-people-centre/index.html
- United for Smart Sustainable Cities (U4SSC), *Procurement guidelines for smart sustainable cities* (2026). https://u4ssc.itu.int/publications/

- United Nations Department of Economic and Social Affairs, *World Urbanization Prospects 2025* (2025).
- United Nations General Assembly, *Pact for the Future*, annex I: *Global Digital Compact* (A/RES/79/1, 2024).
- United Nations, *New Urban Agenda* (2016). https://habitat3.org/the-new-urban-agenda/
- United Nations Office of the Secretary-General's Envoy on Technology and UNDP, *Universal DPI Safeguards Framework: A Guide to Building Safe and Inclusive DPI for Societies*.
- United Nations, *The Sustainable Development Goals Report 2023* (2023).
- UN-Habitat, The Global Urban Monitoring Framework. https://unhabitat.org/the-global-urban-monitoring-framework



For more information,
please contact: u4ssc@itu.int
Website: https://u4ssc.itu.int/

ISBN 978-92-61-43891-3

9 789261 438913

Published in Switzerland
Geneva, 2026

Photo credits: @AdobeStock