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Sustainable cities and communities — Maturity model for smart sustainable communities

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The United Nations (UN) sustainable development agenda, "Transforming Our World: The 2030 Agenda for Sustainable Development", was adopted by world leaders in New York in September 2015. Through 17 Sustainable Development Goals (SDGs) and 169 targets, this agenda aims to end poverty and promote prosperity and well-being by 2030, while reducing the adverse impact of human activities on the environment. The UN SDGs address cities directly through Goal 11, which aims to "Make cities inclusive, safe, resilient and sustainable".

This document was developed in response to an increasing demand from city and community leaders for a simple-to-use, high-level diagnostic tool that will give them an overview of the extent to which they are implementing good practices. The maturity model described in this document has been developed in close collaboration with several pilot cities, including: Birmingham, UK; Cambridge, UK; Glasgow, UK; London, UK; Peterborough, UK; Dubai, UAE; Tianjin, China; Singapore; Moscow, Russia; Sydney, Australia.

This document is structured in five parts:

— Clause 1 describes the scope of the Maturity Model for Smart Sustainable Communities (MMSSC);

— Clause 2 lists normative references;

— Clause 3 sets out the terms and definitions used in this document;

— Clause 4 describes the methodology and principles used in development of the MMSSC;

— Clause 5 presents the structure of the MMSSC that has resulted from this development process, and gives guidance on how to use the MMSSC, looking at

  — how to use the MMSSC to baseline current maturity of a community,

  — how to use the MMSSC to drive improved performance in future, and

  — how to use the MMSSC in conjunction with other maturity models that address specific elements of smart-enabled sustainable development in more detail (such as CEN's smart mature resilience model, and the quality assurance matrix for the key functions of local government described in ISO 18091).

Supporting tools are provided in three annexes:

— Annex A provides the detailed diagnostic tool to be used when applying the MMSSC;

— Annex B maps the wider set of ISO standards and guidance which communities can use in order to build on strengths and address weaknesses that they may identify through use of the MMSSC;

— Annex C provides more detailed mapping of this model against the key functions of local government described in ISO 18091, to facilitate joint use of the two tools.

Sustainable cities and communities — Maturity model for smart sustainable communities

1 Scope

This document provides a top-level maturity model for smart sustainable communities (MMSSC), which can be used for self-assessment by individual cities and communities and as the basis for cross-city benchmarking. The MMSSC is a simple way for community leaders to assess how mature their community is in its journey towards adoption of good practices as set out in ISO standards for sustainable and smart-enabled development; to identify strengths and weaknesses; and then to quickly find their way to the international standards and guidance that are most relevant to their needs.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 37100, *Sustainable cities and communities — Vocabulary*

ISO 37153, *Smart community infrastructures — Maturity model for assessment and improvement*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 37100 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Methodology and structure

4.1 Context

The MMSSC shall use the methodology for developing maturity models in ISO 37153. This is a highly relevant methodology which draws on other widely used standards for maturity models (such as the capability maturity model presented in the ISO/IEC 15504 series, which addresses maturity in the field of software development). This methodology and the resulting structure of the MMSSC is described below:

— 4.3 presents an overview of the MMSSC;

— 4.4 provides more detail on the dimensions and key characteristics of a sustainable and smart-enabled community that are assessed in the model;

— 4.5 describes the five levels of maturity which are used in the MMSSC to describe each of the key characteristics.

First, though, 4.2 sets out the principles that have been followed when applying the ISO 37153 methodology to develop the MMSSC.

4.2 MMSSC design principles

ISO 37153 is a methodology to develop maturity models for use in assessing the maturity of smart community infrastructure. In this document, it has been deployed in order to assess the maturity of a community as a whole. This broad scope for the MMSSC inevitably requires a number of choices to be made when applying the ISO 37153 methodology. These choices are informed by eight principles of what the MMSSC should be, as shown in Table 1.

Inevitably, there could be tensions between some of these principles, for example, the more comprehensive the model becomes, the more detailed it gets and hence less simple to use. In balancing these trade-offs, Principle 1 (user-focus) has been used as the key determining question – what approach is of most value to users?

Table 1 — MMSSC design principles

MMSSC principle	Description
User-focused	The MMSSC should be developed in close conjunction with city and community leaders to ensure it meets their needs in a user-friendly way.
Comprehensive	The MMSSC should cover, at least at a high level, the key city-wide challenges involved in the journey to become a sustainable and smart-enabled community.
Applicable to all communities	The MMSSC should be useful for communities of any scale, both urban and rural, even if some elements are particularly relevant when managing change at city-scale.
Simple to use	The MMSSC should not be complex and should be intuitively easy to use. Its use should not require extensive and costly data collection.
Flexible	The MMSSC should be applicable to very different sizes and types of community, regardless of their social, economic and cultural context.
Technology-neutral	The MMSSC should avoid defining levels of maturity in terms of adoption of specific technologies or solutions, which risk rapidly become outdated.
Action-oriented	The MMSC should be designed so that any gaps or weaknesses it identifies can easily be matched against practical advice within international standards on how a community can address these.
Extensible and interoperable	The MMSSC should use a modular, extensible and interoperable structure, deploying the standardised approach recommended in ISO 37153, in order to easily extend it in future, for example: — by developing sector-specific versions of the model; — through interoperability with other more detailed maturity models that look at individual MMSSC characteristics in greater levels of detail than is possible in an overview model such as MMSSC.

4.3 Overview of the MMSSC structure

A high-level summary of the MMSSC structure is shown in Figure 1. As it illustrates, the model is a matrix, in which a set of 32 characteristics (clustered together in four dimensions: purposes; strategy management; citizen-centric service management; and digital and physical resource management) are each defined against five levels of maturity (on a 1 to 5 scale in which each level represents an improvement in performance from the previous level).

4.4 describes the characteristics and dimensions, and 4.5 describes the definitions for the maturity levels. The achievement criteria table that results is set out in Annex A; it provides detailed descriptions of the criteria that a particular characteristic must meet in order to reach a particular level of maturity.

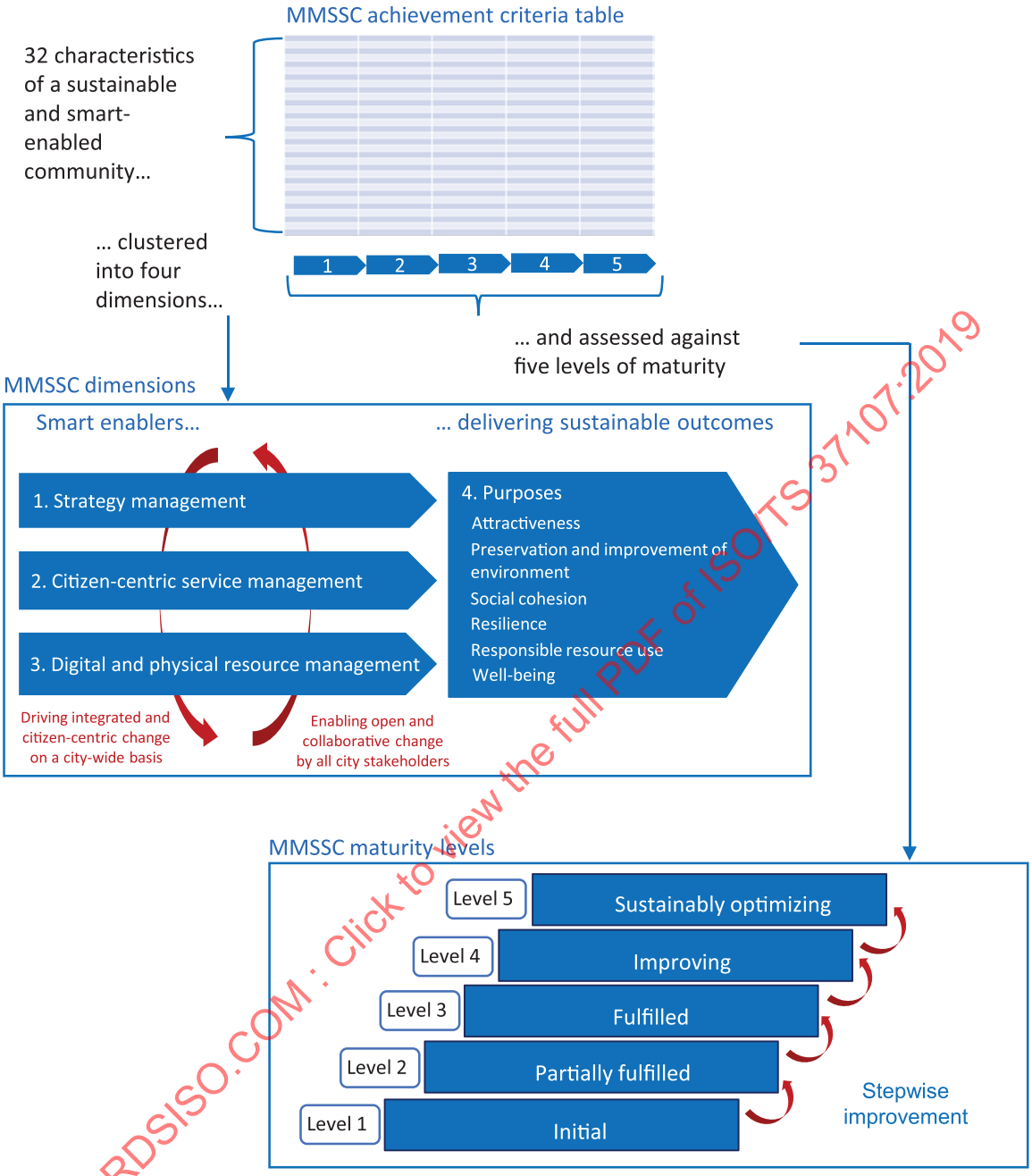

Figure 1 — Overview of the MMSSC structure

4.4 Dimensions and characteristics of a sustainable and smart-enabled community

The MMSSC assesses a community across four dimensions.

Dimensions 1 to 3 of the model assess the city's maturity in establishing smart enablers. The dimensions being assessed are derived from best practices described within ISO standards for smart cities and smart community infrastructures[1)].

1) Specifically, the maturity model gives an overview of city maturity against the best practices described in ISO 37104, ISO 37106, ISO/TS 37151 and ISO/TR 37152.

They cover 26 'smart enablers', grouped in three dimensions[2]:

— Strategy management: the key aspects of governance, planning and decision-making that need to be managed at a whole-of-city level rather than within individual city departments, organizations or sectors.

— Citizen-centric service management: 'smart enablement' of the way in which services for citizens and businesses in the city are planned and delivered, including through co-creation of services that respond to local conditions and needs.

— Physical and digital resource management**:** changes to the way in which physical, technological and information resources are managed in a city that help to accelerate, de-risk and lower the cost of delivering change within the city.

Dimension 4 of the model assesses the city's maturity in achieving the six purposes of a sustainable community described in ISO 37101:

— attractiveness;

— preservation and improvement of the environment;

— resilience;

— responsible resource use;

— social cohesion;

— well-being.

A detailed illustration of the structure of these four dimensions and their sub-dimensions is shown in Figure 2. Users should note that the purpose of the dimensions and sub-dimensions is only to enable communities to report the results of their MMSSC assessment at different levels of summary information and that the actual assessment is made at the level of the 31 detailed characteristics within these dimensions.

2) These dimensions follow the structure used in ISO 37106. However, at the sub-dimensional level (as illustrated in Figure 2), the structure of the MMSSC is similar to ISO 37106 but not identical. This is because ISO 37106 focuses on the business processes that are needed within a smart city while the MMSSC is focused on measuring the performance and outputs of those processes. When a single process contributes to delivery of more than one key characteristic of a smart city, the MMSSC looks separately at the maturity of each characteristic whereas ISO 37106 provides integrated advice on how to manage that process.

Figure 2 — MMSSC dimensions, sub-dimensions and characteristics

4.5 Levels of maturity

The levels of maturity used in the MMSSC shall be those recommended in ISO 37153. The detailed definition of each level varies slightly according to the nature of the characteristic being assessed. Table 2 shows the level definitions used in the MMSSC.

Table 2 — Definitions for the five levels of maturity

	Dimensions 1–3: smart enablers		Dimension 4: purposes
Level	**For characteristics focused on how integrated and citizen-centric the community is[a]**	**For characteristics focused on how open and collaborative the community is[b]**	**For components focused on progress towards the six purposes of a sustainable community[c]**
1. Initial	Processes to manage this smart enabler either do not exist or are managed on a fragmented basis by different community organizations.	Processes to manage this either do not exist or are managed entirely within the local government with no engagement with or transparency to the community.	The community has no strategy to address this purpose; action is ad hoc and fragmented.
2. Partially fulfilled	Some progress is being made towards a community-wide plan, but not within a consistently applied community-wide management framework.	Some processes have been established to consult interested parties, but these are ad hoc.	Community leaders have identified priorities in pursuit of this sustainability purpose and have developed a community-wide plan to deliver these.
3. Fulfilled	The community has established community-wide management processes to deliver best practices in this area.	The community has established community-wide management communication and engagement processes to ensure effective input from interested parties.	Community leaders have baselined current performance against this sustainability purpose, and established success criteria and trajectories for the changes that the community aims to deliver over time. The local government has established community-wide accountability and governance structures to manage these improvements.
4. Improving	The community can demonstrate that it is measuring the performance of these processes and that positive impacts are being achieved.	The community can demonstrate that interested parties (not just the local government) are engaged in the governance of these processes.	Community leaders are actively tracking performance against key indicators for this sustainability purpose and have established clear processes for interested parties to give feedback. There is substantial community and authority buy-in, and there is demonstrable evidence that performance is improving.

[a] These refer to characteristics 1.1.2, 1.2.1, 1.2.3, 1.4.1, 1.5.1, 1.5.2, 1.5.3, 2.1.2, 2.4.2, 3.1.3.

[b] These refer to characteristics 1.2.2, 1.3.1, 1.3.2, 1.4.2, 2.1.1, 2.2.1, 2.2.2, 2.3.1, 2.3.2, 2.4.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2.

[c] These refer to characteristics 1.1.1, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6.

Table 2 *(continued)*

	Dimensions 1–3: smart enablers		Dimension 4: purposes
Level	**For characteristics focused on how integrated and citizen-centric the community is[a]**	**For characteristics focused on how open and collaborative the community is[b]**	**For components focused on progress towards the six purposes of a sustainable community[c]**
5. Sustainably optimising	The community can demonstrate clear evidence of systemic continual improvement, where relevant in real time or near real time.	The community can demonstrate that it is using effective, collaborative and digitally enabled engagement with interested parties to drive systemic continual performance.	Digital dashboards give all interested parties near real-time insight into community performance on key priorities for this sustainability purpose. There is clear evidence that the community is evaluating the effectiveness of its policies to deliver this sustainability purpose and using the learning from this to drive continuous improvement – both within the community and across wider regional, national and international networks.

[a] These refer to characteristics 1.1.2, 1.2.1, 1.2.3, 1.4.1, 1.5.1, 1.5.2, 1.5.3, 2.1.2, 2.4.2, 3.1.3.

[b] These refer to characteristics 1.2.2, 1.3.1, 1.3.2, 1.4.2, 2.1.1, 2.2.1, 2.2.2, 2.3.1, 2.3.2, 2.4.1, 3.1.1, 3.1.2, 3.2.1, 3.2.2.

[c] These refer to characteristics 1.1.1, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6.

5 Structure and use of the MMSSC

5.1 How to baseline current maturity

The diagnostic tool for use when assessing the maturity of a city or community against the MMSSC is given in Annex A. This provides detailed assessment criteria for each of the 31 key characteristics of a sustainable and smart-enabled community to determine which maturity level the community has reached.

Users are recommended to assess their community's maturity both:

— now; which of the achievement criteria given in Table A.1 best describes the community's current performance for each characteristic?

— in two years; based on current plans that community leaders have already put in place, would the community be expected to meet a high level of achievement criteria in two years' time?

This dual assessment will give an overview of both current strengths and weaknesses, and of where there are key gaps in existing plans for improvement.

Different approaches may be used to gather evidence for the maturity assessment. As summarized in Figure 3, these differ in both the degree of confidence they deliver in the accuracy of the resulting assessment, and in their cost and complexity.

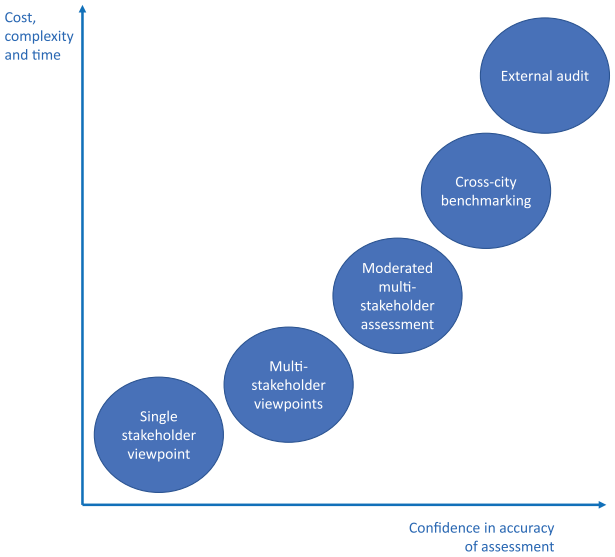

Figure 3 — Assessment methods

— Single stakeholder viewpoint: any individual or organization with an interest in and knowledge of the community could simply use the MMSSC diagnostic tool to develop their own assessment of their community's maturity.

— Multi-stakeholder viewpoints: by aggregating the knowledge and perceptions of multiple interested parties (from across key units of the local government, the wider public sector, civil society and the private sector), communities can develop a more accurate view of their current maturity and also identify any key differences of perception between stakeholder groups.

— Moderated multi-stakeholder assessment: the accuracy of a multi-stakeholder self-assessment can be increased by bringing interested parties together, for example through a facilitated workshop, to exchange views, share evidence and develop a consensus-based assessment.

— Cross-city benchmarking: an additional level of accuracy can be gained by different cities and communities coming together to exchange the results of their assessments of their own local conditions, in order to compare across cities and to moderate and challenge the evidence base that underpins these.

— External audit: finally, trusted third parties may wish to develop services that audit and certify they have independently verified evidence that a community meets the MMSSC assessment criteria.

In all cases, seeking wide views from city stakeholders (e.g. through surveys) is helpful. However, many of the characteristics assessed in the MMSSC are not ones on which most citizens typically have a view, because they require knowledge of the internal operations of the city administration and its key delivery partners. Dimension 2 of the MMSSC (citizen-centric service management) contains the most relevant characteristics of larger-scale citizen engagement.

5.2 How to use the model to drive improved performance in future

Communities can use the MMSSC to inform the PDCA cycle for continuous improvement. ISO 37104 gives detailed guidance on how to implement such a process in the context of implementing the ISO 37101 management system for sustainable communities, recommending a five-stage process for communities to use: commitment; baseline review, strategy definition; establishing and implementing the action plan; and performance evaluation and continuous improvement. Figure 4 illustrates how the MMSSC can be used at each stage of this process.

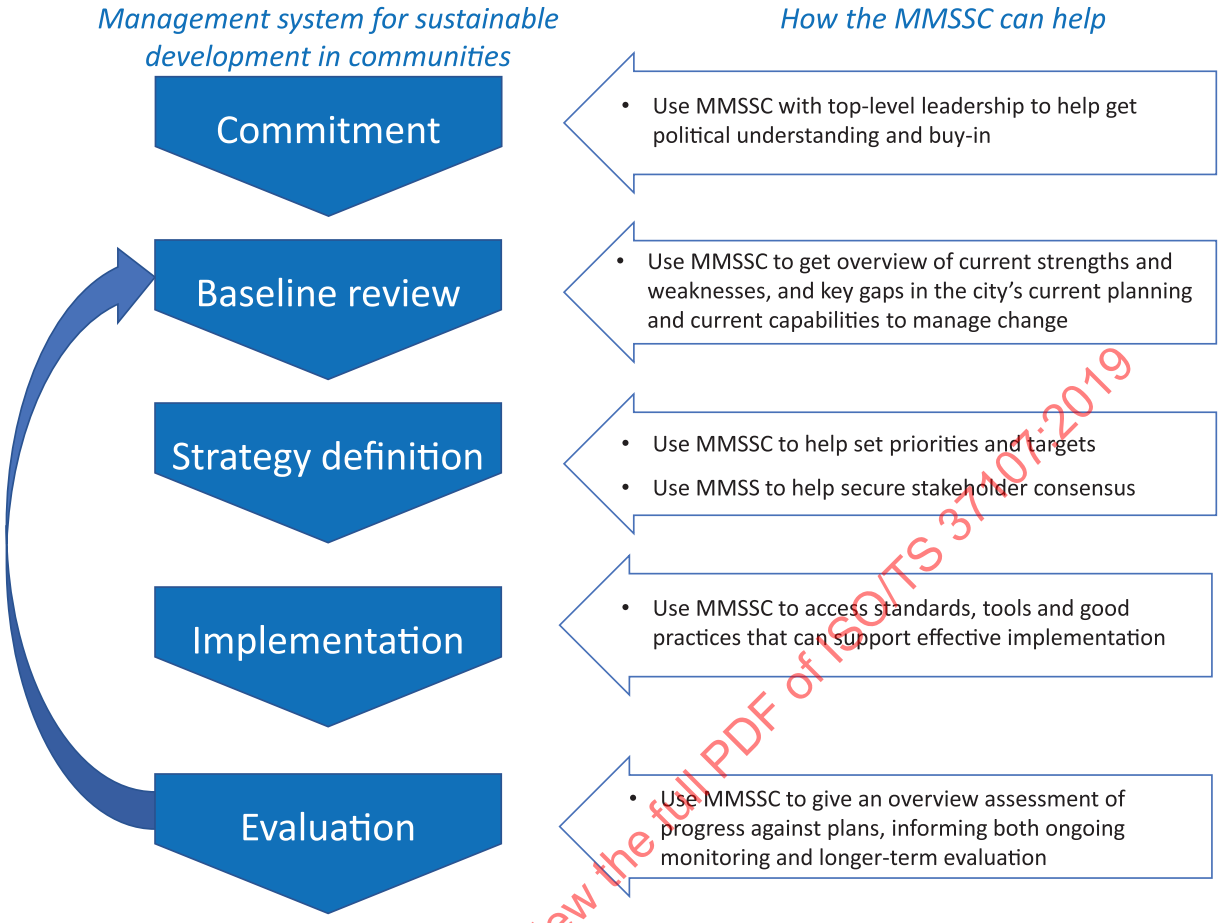

Figure 4 — Use of the MMSSC to support the strategy development and implementation process

The MMSSC is intended to help a community get an overview of its current maturity and of key areas where it needs to improve in order to be better able to implement sustainable change. As such, it is a starting point, not the end of the analysis and planning a community will need. Table 3 summarizes the key documents that are available from ISO to support communities as they take forward action on the different elements of the MMSSC model; Annex B maps out in further detail how these support each of the different dimensions and sub-dimensions of the MMSSC.

Table 3 — Documents that communities can use to improve performance

Document	Description
ISO 37101	Sets out a management system for communities that commit to the sustainable development of their territories, targeted on the six purposes of a sustainable community.
ISO 37104	Provides more detailed operational guidance on how cities and other urban communities can apply the general requirements of ISO 37101. Provides practical guidance to all types of cities on initiating, planning, implementing, measuring and managing sustainable development activities in a way that is both inclusive and holistic.
ISO 37106	Provides guidance on how communities can ensure that their vision and strategy for the future is underpinned by a smart city operating model using smart technologies, smart data and smart ways of working to implement change faster and with reduced delivery risk.
ISO 37120	Sets out a common core of key performance indicators for cities to use within their impact evaluation and benefit realization work on city services and quality of life.
ISO 37122	Supplements ISO 37120 with additional indicators relevant to smart cities.
ISO 37123	Supplements ISO 37120 with additional indicators relevant to resilient cities.

Table 3 *(continued)*

Document	Description
ISO 37101	Sets out a management system for communities that commit to the sustainable development of their territories, targeted on the six purposes of a sustainable community.
ISO/TR 37152	Gives guidance on planning, development, operation and maintenance of infrastructures in ways that harmonize them as part of a smart community and ensure that the interactions between multiple infrastructures are well orchestrated.
ISO/TS 37151	Sets out principles and requirements for measuring how smart community infrastructure can support such an integrated citizen-centric approach.
ISO 37157	Describes criteria to help plan or organize smart transportation for compact cities.
ISO 30145	Describes a smart city ICT reference framework, mapping out how ICT supports smart cities, including the detailed engineering architecture that supports delivery of the 'open, service-oriented, city-wide IT architecture' described at high level in the MMSSC.
ISO/IEC 30182	Describes and gives guidance on a smart city concept model that can provide the basis of interoperability between component systems of a smart city, by aligning the ontologies in use across different sectors.
ISO 18091	Describes how to deliver quality-assured management of 39 core functions of local government. Many of those functions are directly relevant to achieving the purposes of a sustainable community described in ISO 37101, which form a core part of the MMSSC.

5.3 How to use the model in conjunction with other maturity models

This subclause addresses specific elements of smart sustainable development in more detail (such as CEN's smart mature resilience model and the quality assurance matrix for the key functions of local government described in ISO 18091).

Communities may wish to develop a more detailed assessment of their current maturity in some areas than can be provided in a top-level city-wide strategic framework such as the MMSSC.

That is, in keeping with the design principle 7 (see 4.2), the MMSSC was developed to align with other models that explore some of these characteristics in more detail. Its assessment criteria are designed to allow interoperability, in particular with:

— the quality assurance matrix for the key functions of local government described in ISO 18091;

— the European Union's resilience maturity model;

— the digital inclusion and digital accessibility maturity model developed by the global initiative for inclusive ICTs (G3ict, an initiative launched in 2006 by the UN Global Alliance for ICT and Development, in cooperation with the Secretariat for the Convention on the Rights of Persons with Disabilities at UN DESA).

Table 4 gives more details of the points of interconnection between the MMSSC and these more narrowly focused models.

Table 4 — Interconnection between MMSSC and other maturity models

Maturity model	Point(s) of interconnection with the MMSSC	How to use with the MMSSC
ISO 18091	Purposes – all	ISO 18091:2019[a] Annex B provides a three-level maturity model describing quality-ensured management of 39 core functions of the local government. Many of those functions are directly relevant to achievement of the purposes of a sustainable community described in this document, which form a core part of the MMSSC. Users of the two maturity models should: — use the MMSSC to get an overview of the community's readiness to plan, manage and improve its performance against each of the ISO 18091 purposes on a holistic basis; — use the maturity model in ISO 18091:2019, Annex B to look in more detail at specific functions of the local government that are relevant to each of the six ISO 37101 purposes (Annex C maps out which of the local government functions described in ISO 18091 are of most relevance to each purpose).
CEN Smart Mature Resilience Model	Purposes – resilience	The EU's resilience maturity model breaks down the concept of urban resilience into 10 characteristics, grouped into four dimensions (leadership and governance; infrastructure and resources; preparedness; cooperation). Users of the two maturity models[b] should: — use the MMSSC to get an overview of the community's resilience; — use the resilience maturity model to get a more detailed analysis of maturity against different elements of resilience.
Digital inclusion and digital accessibility maturity model	— Inclusiveness of stakeholder engagement is integral to many aspects of the MMSSC — Key point of interconnection, however, is the MMSSC sub-dimension 2.3, channels and access	Users of the two maturity models should: — use the MMSSC and in particular the sub-dimension 2.3, channels and access, to get an overview of the community's maturity in taking an inclusive approach to digital services; — use the digital inclusion and digital accessibility maturity model[c] to explore these issues in more detail;

[a] ISO 18091 uses a three-level maturity model:

— red: essential practices are missing or not performed in an adequate manner by the local government;

— yellow: the local government has made some efforts to implement the essential elements and is able to provide the product service as required;

— green: minimum acceptable conditions are achieved to deliver reliable operations.

These three levels are broadly equivalent to levels 1 to 3 in the MMSSC.

[b] Both models use a similar five-level definition of maturity (i.e. a score of "1 = non-existent" for resilience within the MMSSC is likely to be associated with an average score of "1 = starting" across the different dimensions of the resilience maturity model).

[c] Both models use the same 1 to 5 maturity levels.

Annex A
(informative)

MMSSC achievement criteria

Table A.1 provides the detailed diagnostic tool to be used when applying the MMSSC.

Table A.1 — MMSSC achievement criteria

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1. Strategy management						
1.1 City vision						
1.1.1 An outcome-focused city vision and strategy	There is no published vision and strategy for the future of the city.	City leaders have published their vision and strategy for the future of the city, but it is unclear how key social, economic and environmental outcomes will be different in future.	City leaders have published their vision and strategy for the future of the city, and this sets out clear objectives and plans, aligned with the UN SDGs for the economic, social and environmental outcomes that city leaders plan to achieve.	In addition to the achievement criteria indicated at level 3, the objectives are underpinned by clear measures of success, which are being tracked by the leaders of city administration.	In addition to the achievement criteria indicated at level 4, there is regular public reporting of progress against the success measures, with clear processes in place for interested parties to give feedback.	Level now: Level in 2 years based on current plans:
1.1.2 A smart-enabled city vision and strategy	There is no published vision and strategy for the future of the city.	City leaders have published their vision and strategy for the future of the city, but it is unclear how they plan to address the opportunities opened up by smart technologies, smart data and smart collaboration in order to deliver the city vision.	City leaders have published their vision and strategy for the future of the city, and this sets out a clear plan on how the city will invest in the opportunities offered by smart technologies, smart data and smart collaboration.	In addition to the achievement criteria indicated at level 3, the vision is underpinned by an action plan with clear milestones to establish smart enablers, which is being tracked by city leaders.	In addition to the achievement criteria indicated at level 4, there is regular public reporting of progress against the action plan and milestones for establishing smart enablers, with clear processes in place for interested parties to give feedback.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.2 Leadership and governance for city-wide change						
1.2.1 Integrated governance for city-wide change	There is no clear focus of accountability within the city administration for development and delivery of smart-enabled change at a city-wide level.	A clear focus of leadership and accountability for development and delivery of smart-enabled change at a city-wide level has been established within the city administration, but the people involved are not empowered with the authority, governance processes and resources needed to influence organizational priorities in a significant way.	A clear focus of leadership and accountability for development and delivery of smart-enabled change at a city-wide level has been established within the city administration, and the people involved are empowered with the authority, governance processes and resources needed to influence organizational priorities in a significant way.	In addition to the achievement criteria indicated at level 3, the leadership of smart-enabled cross-city change is not seen as the responsibility of a central team, but as embedded in the roles of senior managers across the city administration. Clear programme management processes have been established to support the delivery of this shared agenda.	In addition to the achievement criteria indicated at level 4, real-time information systems give city leaders full transparency on progress of implementation by the wide range of delivery partners who are involved, with early warning of potential delivery problems.	Level now: Level in 2 years based on current plans:
1.2.2 Open and collaborative governance for city-wide change	Leadership and governance processes for cross-city change are managed internally within the city administration.	The city administration has established processes to consult and engage interested parties as it delivers its vision and strategy.	Leadership and governance processes for cross-city change are transparent to citizens through a rich mix of mechanisms, for example, the publication of key programme documentation, regular public reporting on progress, clear feedback mechanisms, use of social media to widen civil participation.	In addition to the achievement criteria indicated at level 3, these processes are not seen solely as the responsibility of the city administration, but they also engage leaders from the private sector and civil society in open and collaborative governance processes.	In addition to the achievement criteria indicated at level 4, there is clear evidence that these governance processes have a significant impact in shaping strategy and priorities for the city. City stakeholders play a leading role in wider regional, national and international networks of smart and sustainable communities.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.2.3 Leadership skills for city-wide change	Leadership skills are defined and managed only at the level of individual city business units.	The city has defined the set of leadership skills it needs within the teams responsible for delivering and leading city-wide change, for example, strategy development skills, stakeholder engagement skills, marketing skills, commercial skills and technology management skills. Significant skill gaps exist.	The city has defined the set of leadership skills it needs within the teams responsible for delivering and leading city-wide change, for example, strategy development skills, stakeholder engagement skills, marketing skills, commercial skills and technology management skills. Effective mechanisms are in place to develop, recruit and retain necessary skills. Some skill gaps remain.	In addition to the achievement criteria indicated at level 3, the city uses formal mechanisms (e.g. competency frameworks) to monitor and manage the skills needed within its city-wide change programme. No significant skill gaps remain.	In addition to the achievement criteria indicated at level 3, city leaders have access to real-time management information on the skill levels in all relevant roles across the different city organizations collaborating to deliver the city-wide change programme.	Level now: Level in 2 years based on current plans:
1.3 Collaborative engagement						
1.3.1 City-wide engagement with interested parties	There is no city-wide programme of communication and engagement with parties who have an interest in the development and implementation of the city's strategy for the future. Engagement with interested parties is managed only by individual city business units.	The city administration has established a formal, city-wide programme of communication and engagement with interested parties.	In addition to the achievement criteria indicated at level 2, there is clear evidence that an inclusive approach is being taken, with appropriately tailored communication approaches for different stakeholder groups and with pro-active measures to engage with any groups at risk of being excluded from the process.	In addition to the achievement criteria indicated at level 3, there is clear evidence that all key stakeholder groups have a clear understanding of the city's vision and strategy for the future, and of how they can engage with and influence its delivery.	In addition to the achievement criteria indicated at level 4, there is clear, publicly available evidence of how the views of interested parties are shaping the development and implementation of the city's vision and strategy, and feedback systems have been put in place to facilitate ongoing dialogue between interested parties about future plans.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.3.2 Digitally enabled engagement	City leaders do not use digital channels to engage and communicate with interested parties about future plans and priorities for the city.	City leaders use websites, email and other digital channels to engage and communicate with interested parties about future plans and priorities for the city.	In addition to the achievement criteria indicated at level 2, city leaders are: — using digital modelling, data visualization and/or other technologies to 'bring to life' what it will be like to live and work in the city's vision for the future; — using social media and other digitally-enabled means of communication to facilitate widespread active participation by interested parties.	In addition to the achievement criteria indicated at level 3, in addition, there is clear evidence that city leaders are using feedback from interested parties to improve the effectiveness of the digital tools and digital channels they use to develop and communicate the city's vision for the future.	In addition to the achievement criteria indicated at level 4, city leaders have developed a full virtual model of the city and its systems, for use by interested parties in modelling different scenarios for future development of the city.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.4 Smart procurement and supplier management						
1.4.1 Integrated procurement and supplier management	There is no city-wide procurement and supplier management strategy. Requirements are specified and purchased independently by each city business unit, and the city has limited ability to fund solutions where costs and benefits fall across multiple organizations.	The city administration has established a strategy to move towards more coordinated procurement, but control mechanisms are weak. There are some examples of inter-business unit shared procurements, but these are ad hoc and driven by individual local managers.	The city administration has established city-wide policies to optimize procurement and supplier management across different city business units, including: — the setting of holistic and flexible budgets that can fund cross-organizational projects; — the focusing on achieving best value for money for the city as a whole rather than for an individual business unit; — the embedding of smart contracting principles (defined in ISO 37106) in all contracts, which are: focus on procuring business outcomes; build open data into all procurements; incentivize innovation and collaboration between suppliers; avoid supplier lock-in, by integrating interoperability requirements into all ICT procurement.	In addition to the achievement criteria indicated at level 3, these policies are now underpinned by clear business processes, measurements and controls to ensure compliance across all city procurements.	In addition to the achievement criteria indicated at level 4, there is clear evidence that the city has effective mechanisms to secure feedback from city business units and from city suppliers on the practical implementation of these policies, which it is using to drive continuous improvement.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.4.2 Open and collaborative procurement and supplier management	Potential suppliers to the city have little advance visibility of its procurement requirements. Procurement processes are complex, unclear and difficult for small businesses to engage with. Suppliers of innovative solutions have no clear champion within the city administration. Procurement and contracting are based on traditional purchaser-provider relationships.	The city administration publishes and updates an online pipeline of its own upcoming procurement requirements. Steps are being taken to encourage procurement of innovative solutions, but these are ad hoc and not fully embedded across all city procurements.	The city administration publishes and updates an online pipeline of major city procurement opportunities from all city partners, focused on the challenges the city faces and the outcomes it wishes to achieve. Clear processes are in place to facilitate procurement of innovative solutions, and these are embedded in management processes that ensure they are followed for all city procurements. A range of more innovative delivery models are deployed, including joint ventures and public-private partnerships.	There is clear evidence that the city manages an active process of market engagement to nurture an innovation ecosystem across the city and its suppliers, including by investing to: — search for and champion innovative procurement solutions to city challenges; — engage early and iteratively with potential suppliers; — stimulate SME-led innovation; — build strategic partnerships with private and not-for-profit organizations to drive innovation, particularly where markets are underdeveloped.	In addition to the achievement criteria indicated at level 4, there is clear evidence that the city has effective mechanisms to secure feedback from city business units and from city suppliers on the performance of the city's innovation ecosystem, which it is using to drive continuous improvement.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
1.5 Benefit realization						
1.5.1 Benefit mapping	There is no city-wide business case to support investment in smart-enabled change within the city. Most individual projects for smart-enabled change do not have a clear and quantified business case.	There is no city-wide business case for smart-enabled change. Most individual projects for smart-enabled change have a clear and quantified business case, meeting best practice standards agreed at city-wide level.	There is a city-wide business case setting out the costs and benefits expected across the whole city from its investments in smart-enabled change.	In addition to the achievement criteria indicated at level 3, this business case is underpinned by a clear logic model showing how the outputs from key investments deliver impact against the key social, economic and environmental outcomes targeted in the city's vision and strategy.	In addition to the achievement criteria indicated at level 4, there is clear evidence that the business case and logic model is kept under review and updated in the light of experience.	Level now: Level in 2 years based on current plans:
1.5.2 Benefit tracking	City leaders have not defined key performance indicators to measure progress in delivering the city's vision and strategy at a city-wide level; any performance management is conducted only at the level of individual business units.	City leaders have defined key performance indicators to measure progress in delivering the city's vision and strategy.	In addition to the achievement criteria indicated at level 2, for every key performance indicator, the city has: — baselined its current performance; — established success criteria and trajectories to show the changes that the city aims to deliver on that indicator over time.	In addition to the achievement criteria indicated at level 3, actual performance against these indicators is being actively tracked by city leaders, using management information systems that give city-wide visibility of progress in delivering the expected benefits.	In addition to the achievement criteria indicated at level 4, these systems are open and accessible to citizens through easy-to-use data visualization, giving real-time or near real-time insight into city performance.	Level now: Level in 2 years based on current plans:
1.5.3 Benefit delivery	City leaders have not defined the social, economic and environmental outcomes they wish to achieve.	City leaders have defined the social, economic and environmental outcomes they wish to achieve, but accountability structures for delivering these outcomes sit only within individual business units.	The city administration has established cross-business unit accountability and governance structures to manage delivery of the outcomes targeted by the city vision and strategy.	In addition to the achievement criteria indicated at level 3, there is clear evidence that these structures are effective in managing risks and issues that cut across organizational boundaries.	In addition to the achievement criteria indicated at level 4, there is clear evidence that city leaders are undertaking impact evaluations and that learning from measurement and evaluation is systematically fed back into improved delivery plans.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
2. Citizen-centric service management						
2.1 Delivering integrated, citizen-centric services						
2.1.1 Agile and participatory service development	City services tend to treat citizens and businesses as passive recipients of those services. Service design is managed with little consultation or engagement with users.	There are some examples of services being co-designed with users and informed by detailed citizen insight, but on an ad hoc basis.	The city administration has established clear policies for service design to ensure that iterative and user-centric approaches are used to design city services that are deeply informed by detailed citizen insight and co-created with their users.	In addition to the achievement criteria indicated at level 3, these policies are underpinned by effective governance processes and cross-service benchmarking aimed at ensuring compliance and driving continuous improvement.	In addition to the achievement criteria indicated at level 4, investment in real-time information systems means that city services are now able to adapt with agility to changing and personalised needs of their users.	Level now: Level in 2 years based on current plans:
2.1.2 Integrated one-stop service delivery	City services are designed and delivered in silos. Little or no effort is made to build services for or gather data on citizen and business needs that cut across the boundaries of individual city business units. There is no integrated view of the customers for city services.	There are some examples of citizen-centric services being developed in an integrated way across multiple service departments, but on an ad hoc basis.	The front-end delivery of services from the city administration is coordinated through digital and/or physical one-stop shops, but these have little impact on design and development of services, which remain the responsibility of individual business units in the city.	Citizens and businesses can access user-centric services through an integrated, multi-channel one-stop service. This delivers information and services that are built around citizen and business needs and not around the structure of the city's individual business units.	In addition to the achievement criteria indicated at level 4, the one-stop service is supported by an integrated business and information architecture, which enables a whole-of-city view of and engagement with specific customer groups for city services.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
2.2 Empowering the city community through city data						
2.2.1 Enabling community innovation with city data	Data about the city and city services is locked within individual systems, with no way for others to access or use it to innovate and create new value.	Some initial steps have been taken towards opening city data, but on an ad hoc basis by individual systems and services. There is no city-wide framework in place to establish ownership and control responsibilities for city data.	A clear city-wide policy has been established to open the city administration's data to enable citizens, small business, community organizations and others to innovate and create new value with that data. A city data platform has been created to facilitate access to and reuse of open city data, that is based on open standards that ensure data are easily discoverable, interoperable and reliable.	In addition to the achievement criteria indicated at level 3, the city data platform is now: — enhanced with tools to facilitate exploration and experimentation with city data by application developers; — systematically using feedback from data users to drive improvements in the quality and range of data provided through the platform. A significant amount of city data is available through the platform.	In addition to the achievement criteria indicated at level 4, the city data platform not only makes available open data, but also provides a trusted space for users to share and innovate with non-open data sets in ways that comply with relevant regulation and are protective of personal privacy. Most city data are now available through the platform, which supports a flourishing 'city information market-place'.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
2.2.2 Growing the market for re-use of city data	City data are only used by the business units that create and store the data.	Some initial steps have been taken to encourage re-use of city data by other organizations, but on an ad hoc basis.	The city administration has established a clear and effectively resourced programme of work aimed at encouraging and incentivising citizens, small businesses, educational organizations, community organizations and others to innovate and create new value with city data.	In addition to the achievement criteria indicated at level 3, this program of work has developed to the point where it now includes: — a clear 'fair trading policy, ensuring a level playing field between public, private and voluntary sector organizations that develop services based on city data; — investment to pump-prime the market with seed-corn funding and/or incubation facilities to stimulate innovative application development using city data to solve city challenges.	In addition to the achievement criteria indicated at level 4, the city administration has established a strong partnership with other major service providers and asset owners in the city (from the public, private and voluntary sectors), aimed at opening their data sets through city data platforms.	Level now: Level in 2 years based on current plans:
2.3 Channels and access						
2.3.1 Digital inclusion	A significant set of citizens do not have the access, skills or trust needed to access services through digital channels, and no significant support is available to them from the city.	A significant set of citizens do not have the access, skills or trust needed to access services through digital channels. Some support is available to help them, but awareness and use of this support is limited.	Strategies are in place to ensure access to and use of digital channels by all customer segments. Targeted strategies for "hard-to-reach" groups of digital non-users are in place.	In addition to the achievement criteria indicated at level 3, these strategies are backed by significant city investment, which aims to use the benefits from future universal digital access to fund the costs of ensuring digital inclusion now.	In addition to the achievement criteria indicated at level 4, in addition, this digital inclusion strategy for the city is developed and delivered through a multi-stakeholder partnership involving the city administration, the community, voluntary and private sectors.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
2.3.2 Channel management	There is no overarching channel strategy in place for the city. The city has no overall view of the channels it uses to deliver its services, and the costs and service levels achieved through each. The city administration's services are delivered primarily through channels which are managed and branded by the city administration. Take-up of digital services is low.	A channel management strategy has been set by the city administration to ensure a joined-up approach to deliver its services via the most appropriate and cost-effective channels, with a focus on shifting customers into lower-cost digital channels, wherever appropriate. However, relatively little progress has been made. Take-up of digital services is low.	A channel management strategy has been set by the city administration to ensure a joined-up approach to deliver its services via the most appropriate and cost-effective channels, with a focus on shifting customers into lower-cost digital channels, wherever appropriate. Strategies are in place to ensure access to and use of digital channels by all customer segments, with adequate assisted digital provision for the digitally excluded.	In addition to the achievement criteria indicated at level 3, these strategies are underpinned by clear management information systems giving city leaders real-time information on the cost, performance and take-up of different channels for city services.	In addition to the achievement criteria indicated at level 4, integrated channel strategies with other city partners from the public, private and voluntary sectors are commonplace, with channel-sharing and integrated, citizen-centric service delivery.	Level now: Level in 2 years based on current plans:
2.4 Privacy and security						
2.4.1 Identity and privacy management	There are many separate identifiers for users of city services, which are not linked to any common citizen identifier across different city service departments. Personal data are managed in silos, with authentication for digital services done separately for each service.	There is some standardization of key user identity data sets across different city business units, although there is still a lack of trust across business units to facilitate full data sharing.	Citizens can access a single place to register and enrol for digital services from multiple city organizations, and they can authenticate themselves to those services using a single secure method.	Citizens can choose to manage all their digital engagements with the city through a single account, choosing from a range of assured public and private identity providers in order to authenticate themselves to the city. They have access to trusted arbitration if they are concerned about any breech of their privacy by the city.	In addition to the achievement criteria indicated at level 4, citizens can see and update their own data held by the city, and they are able to use secure digital channels to see who in the city administration is using their data.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
2.4.2 Smart city security	IT and data security for smart city services are managed separately by individual city organizations. There is no city-wide assessment of the security risks associated with smart city developments (e.g. the increase in volume of data and information being generated, collected, utilized and stored, greater sharing and dissemination of data and information within and across organizations, automated machine-to-machine data sharing between applications).	City leaders have mapped out the major increased risks to security posed by smart city developments. There are examples of inter-organizational initiatives to address these through joint action, but these are ad hoc and not managed within a city-wide governance framework.	Smart city security risks have been mapped and prioritized, and a strategy and action plan to address these has been established. Clear governance arrangements and accountabilities are in place to oversee delivery on a city-wide basis.	In addition to the achievement criteria indicated at level 3, there is clear evidence that a security-minded culture has been embedded across all organizations responsible for smart city services and infrastructure. Mechanisms are in place to ensure that compliance with the smart city security plan is designed in at the outset to all new smart city developments.	In addition to the achievement criteria indicated at level 4, systems have been established to give real-time management information on any security breaches, with rapid feedback systems ensuring both that the immediate security breach is rectified and that lessons for the future are built into the ongoing smart city security strategy and action plan.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
3. Digital and physical resource management						
3.1 Managing smart city developments and infrastructures						
3.1.1 Citizen-centric development	The planning of city developments and infrastructures is undertaken with minimal consultation and engagement with interested parties.	The planning of city developments and infrastructures is often undertaken with significant consultation and engagement with interested parties, but on an ad hoc basis.	Clear policy and planning frameworks have been established to ensure that all major physical developments and infrastructures in the city are: — rooted in an overall vision the future of the city that is clear, compelling and jointly owned by all interested parties; — designed in partnership with citizens, businesses, service providers and community organizations so that they work well for the people who live in and use them.	In addition to the achievement criteria indicated at level 3, these policies are underpinned by effective governance processes and benchmarking to ensure compliance and drive continuous improvement.	In addition to the achievement criteria indicated at level 4, there is clear, publicly available evidence of how the views of interested parties are shaping the development and implementation of the city's physical infrastructure, and feedback systems have been put in place to facilitate ongoing dialogue between interested parties about future plans.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
3.1.2 Collaborative management of city assets	Physical assets and infrastructures are managed in silos across the city. There is no clear map of what assets exist. No policies or processes have been established to ensure that synergies between city assets can be fully exploited.	The city administration has started to map out its physical assets and infrastructures. There are examples of initiatives to promote synergies between different assets, but on an ad hoc basis.	The city administration has developed a clear map of the physical assets and infrastructures it controls. It has established common, administration-wide asset management policies aimed at exploiting synergies between all assets controlled by the city administration. Compliance with these policies is patchy, however, and the city lacks the governance structures and incentives to drive compliance.	In addition to the achievement criteria indicated at level 3, the city administration has developed a clear map of the physical assets and infrastructures it controls and common asset management policies to exploit synergies between them. In addition, these policies are underpinned by effective governance processes and benchmarking aimed at ensuring compliance and driving continuous improvement.	The city administration, in partnership with other major service providers and asset owners in the city (from the public, private and voluntary sectors), has a developed a clear map of the physical assets and infrastructures it controls. City partners are implementing common, city-wide asset management policies aimed to exploit synergies between major city assets (such as: use of city assets developed for one purpose to deliver benefits against wider city objectives, e.g. use of street lights for wi-fi; collaborative installation and maintenance protocols; use of joint sensor networks to monitor the integrity and performance of the different infrastructures), underpinned by collaborative, cross-sectoral governance and benchmarking processes. The city actively explores and promotes the development of innovative business models and public private partnerships that enable the sharing and joint development of assets across organizational and sectoral boundaries.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
3.1.3 Integration of physical and digital assets	The city's physical assets are typically not digitally enabled. There has been little investment in sensors and connectivity to deliver real-time digital data on the status and performance of city assets.	The city's physical assets are typically not digitally enabled. There have been some initial investments in sensors and connectivity to deliver real-time digital data on the status and performance of city assets, but this has been managed on an ad hoc basis by individual asset owners.	Clear policy and planning frameworks have been established to ensure that all major physical developments and infrastructures in the city have digital assets and communications networks built into them from the start.	In addition to the achievement criteria indicated at level 3, these policies are underpinned by effective governance processes and benchmarking aimed to ensure compliance and drive continuous improvement.	In addition to the achievement criteria indicated at level 4, there is clear evidence that, on a widespread basis, city leaders are now: —using digital modelling of the city to test and compare different options, evaluating their likely impact on the city; — using digital visualizations to engage interested parties in more meaningful consultation and co-creation of city spaces; — using analysis of real-time data on the status and performance of city assets to improve neighbourhood management and service delivery.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
3.2 Managing IT and data						
3.2.1 Mapping and management of city data assets	Data assets are managed in silos across the city. There is no clear map of what assets exist. No policies or processes have been established to ensure that they can interoperate with each other.	The city has started to map out its data assets. There are examples of initiatives to promote interoperability between specific systems, but on an ad hoc basis.	The city has started to map out its data assets, and to develop policies, processes and standards to encourage interoperability and re-use on a systematic basis. Compliance with these policies is, however, patchy, and the city lacks the governance structures and incentives to drive compliance.	The city administration and its suppliers have full transparency of the data assets that exist in the city. Clear leadership and collaborative governance processes have been established across the city administration to encourage interoperability and re-use on a systematic basis.	In addition to the achievement criteria indicated at level 4, these collaborative governance arrangements for data asset management have been opened up to include all major data users and suppliers across the city's data ecosystem. A broad cross-sectoral partnership of city organizations is committed to publishing and sharing data against common standards.	Level now: Level in 2 years based on current plans:
3.2.2 Mapping and management of city technology assets	Technology assets are managed in silos across the city. There is no clear map of what assets exist. No policies or processes have been established to ensure that they can interoperate with each other.	The city has started to map out its technology assets. There are examples of initiatives to promote interoperability between specific systems, but on an ad hoc basis.	The city has started to map out its technology assets, and to develop policies, processes and standards to encourage interoperability and re-use on a systematic basis. Compliance with these policies is patchy, however, and the city lacks the governance structures and incentives to drive compliance.	The city administration and its suppliers have full transparency of the technology assets that exist in the city. Clear leadership and collaborative governance processes have been established across the city administration to encourage interoperability and re-use on a systematic basis.	In addition to the achievement criteria indicated at level 4, these collaborative governance arrangements for technology asset management have been opened up to include all major IT users and suppliers across the city's IT ecosystem.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
3.2.3 Open, service-oriented, city-wide IT architecture	The city's IT architecture is a mishmash of unconnected systems, which use different technologies and standards, and which do not easily interoperate. Each major system is designed in a bespoke way with significant costs catered for to make changes not envisaged in the original design. This leads to significant duplication with very limited re-use and sharing of IT and data assets.	There are some examples of IT and data asset sharing and re-use, but these are ad hoc and costly.	A comprehensive IT strategy and enterprise architecture has been established for the local government, based on open standards, modular design and service-oriented architecture. A roadmap for transition towards this architecture has been established, and strong leadership and collaborative governance arrangements have been established to manage the transition.	In addition to the achievement criteria indicated at level 3, the local government manages all its IT on a platform basis, with either: — all its business units sharing an integrated city platform; or — widespread sharing and re-use of strategic IT and data assets between different parts of the local government and its suppliers, based on interoperable systems and open standards.	In addition to the achievement criteria indicated at level 4, the local government platform is now part of an open, service-oriented, city-wide IT architecture which: — brings together all major public and private sector suppliers of city services; — enables a significant degree of city-wide asset re-use and sharing and facilitates service innovation across the ecosystem.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
4. Purposes of a sustainable community (as described in ISO 37106)						
4.1 Attractiveness	There is no clear strategy for enhancing the attractiveness of the city. That is, city leaders have not explicitly identified the factors about the city that appeal to its citizens and to external parties such as visitors and investors. Actions to enhance these factors are ad hoc and fragmented, rather than planned and managed on an integrated city-wide basis.	City leaders have explicitly identified the factors about the city that appeal to its citizens and to external parties such as visitors and investors, and they have developed a city-wide plan to enhance these factors.	In addition to the achievement criteria indicated at level 2, city leaders have baselined current performance against the key factors determining attractiveness, and established success criteria and trajectories for the changes that the city aims to deliver over time. The local government has established city-wide accountability and governance structures to manage these improvements.	In addition to the achievement criteria indicated at level 3, city leaders are actively tracking performance against key indicators of attractiveness, and they have established clear processes for interested parties to give feedback. There is substantial community and authority buy-in, and there is demonstrable evidence that attractiveness is improving.	In addition to the achievement criteria indicated at level 4, digital dashboards give all interested parties near real-time insight into city performance on key drivers of attractiveness. There is clear evidence that the city is evaluating the effectiveness of its policies to improve attractiveness and using the learning from this to drive continuous improvement – both within the community and across wider regional, national and international networks.	Level now: Level in 2 years based on current plans:
4.2 Preservation and improvement of environment	There is no clear strategy for preserving and improving the environment. That is, city leaders have not explicitly identified key priorities for improving environmental performance (e.g. greenhouse gas emission; protection, restoration and enhancement of biological diversity and ecosystem services; reduced health hazard). Actions to address these issues are ad hoc and fragmented, rather than planned and managed on an integrated city-wide basis.	City leaders have explicitly identified key priorities for improving environmental performance of the city, and they have developed a city-wide plan to deliver these improvements.	In addition to the achievement criteria indicated at level 2, city leaders have baselined current performance against their key priorities for improving environmental performance, and established success criteria and trajectories for the changes that the city aims to deliver over time. The local government has established city-wide accountability and governance structures to manage these improvements.	In addition to the achievement criteria indicated at level 3, city leaders are actively tracking performance against key indicators of improved environmental performance, and they have established clear processes for interested parties to give feedback. There is substantial community and authority buy-in, and there is demonstrable evidence that environmental performance is improving.	In addition to the achievement criteria indicated at level 4, digital dashboards give all interested parties near real-time insight into city performance on key priorities for environmental performance. There is clear evidence that the city is evaluating the effectiveness of its policies to preserve and improve the environment and using the learning from this to drive continuous improvement – both within the community and across wider regional, national and international networks.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
4.3 Resilience	There is no clear strategy for ensuring the resilience of the city to crises and external shocks. Actions to improve resilience are ad hoc and fragmented, rather than planned and managed on an integrated city-wide basis. Crisis management is based on risk assessment for the city that is fragmented and incomplete. Critical infrastructure providers operate independently of each other, and a disruption to one critical infrastructure can have cascading effects across others.	City leaders have developed a resilience action plan based on a holistic risk assessment, including identification of inter-dependencies between critical infrastructures.	In addition to the achievement criteria indicated at level 2, this resilience action plan is now underpinned by a formalized resilience management process. Leading and lagging indicators of resilience are identified and monitored.	In addition to the achievement criteria indicated at level 3, all relevant interested parties are fully engaged in delivery, monitoring and continuous improvement of the resilience action plan through collaborative and participative governance processes, and they understand the benefits to them. There is demonstrable evidence that resilience is improving.	In addition to the achievement criteria indicated at level 4, digital dashboards give all interested parties near real-time insight into city performance on key priorities for resilience. There is clear evidence that the city is evaluating the effectiveness of its policies to enhance resilience and use the learning from this to drive continuous improvement – both within the community and across wider regional, national and international networks.	Level now: Level in 2 years based on current plans:

Table A.1 *(continued)*

Dimension	Maturity Level					Assessment
	1: Initial	2: Partially fulfilled	3: Fulfilled	4: Improving	5: Sustainably optimising	
4.4 Responsible resource use	There is no clear strategy for using resources more responsibly; city leaders have not explicitly identified key priorities for improving resource user (including land management; reduction, re-use and recycling of materials; sustainable production, storage and distribution). Actions to address these issues are ad hoc and fragmented, rather than planned and managed on an integrated city-wide basis.	City leaders have explicitly identified key priorities for improving resource use in the city, and they have developed a city-wide plan to deliver these improvements.	In addition to the achievement criteria indicated at level 2, city leaders have baselined current performance against their key priorities for improving resource use, and established success criteria and trajectories for the changes that the city aims to deliver over time. The local government has established city-wide accountability and governance structures to manage these improvements.	In addition to the achievement criteria indicated at level 3, city leaders are actively tracking performance against key indicators of responsible resource use, and they have established clear processes for interested parties to give feedback. There is substantial community and authority buy-in, and there is demonstrable evidence that environmental performance is improving.	In addition to the achievement criteria indicated at level 4, digital dashboards give all interested parties near real-time insight into city performance on key priorities for resource use. There is clear evidence that the city is evaluating the effectiveness of its policies to preserve and improve the environment and to use the learning from this to drive continuous improvement – both within the community and across wider regional, national and international networks.	Level now: Level in 2 years based on current plans: