

SMART CITIES GUIDANCE NOTE

Smart Cities Standards

July 2017

Smart **Cities** Council

Australia New Zealand

About us



Smart Cities Council Australia New Zealand is part of the Smart Cities Council, the world's largest network of smart cities companies, practitioners and policy makers, embracing technology, data and intelligent design to accelerate liveability, workability and sustainability in our cities and towns.

Further information about the Smart Cities Council can be found [here](#).

This guidance note was developed in collaboration with our Associate Partner, the Professional Construction Strategies Group (PCSG).



PCSG is a leading built environment consultancy working across the smart cities, Internet of Things and Building Information Modelling agenda. PCSG's global digital and sustainability teams are working jointly with public and private clients to solve real business problems and create value through their information and data.

Further information about PCSG can be found [here](#).



Introduction

The need to drive the best policies, the most effective plans, and more efficient delivery of city-building practices has never been more challenging. Efforts to scale and replicate success can be difficult in markets that are often defined by heightened risk management, entrenched mindsets, siloed governments, low cost and margins, challenging procurement processes, skills shortages, and complex supply chains.

These are just some of the issues faced by the smart cities movement as it seeks to advance sustainability outcomes through the adoption of technology, data and intelligent design.

The smart cities marketplace is truly global, and with rapidly advancing innovation and technologies, the Smart Cities Council believes that the implementation of specifications and frameworks will help organisations adapt and innovate successfully.

Standards can play an important role in helping establish those specifications and frameworks. The “standardisation” of processes is a key enabler to achieve critical mass in any market. The construction and service sector are substantially fragmented, which provides challenges to the implementation of any data exchange program. Standards are key enablers to ensure these criteria can be met.

The purpose of this guidance note is to provide an overview of the ecosystem of smart cities standards available globally, the benefits of their use and a structured list of some key standards and frameworks.

The note also covers a representation of the built environment and the core components undergoing digital transformation. The key smart city elements used to categorise the standards included in this document include:

- Building Information Modelling
- Internet of Things
- Sustainable communities
- Smart cities frameworks and process standards.



About smart cities standards

The categories of smart cities standards

Standards and guidance documents describe good practice and clearly set out what needs to be done to comply with them, and just as importantly, what needs to be specified in procurement processes to ensure goods and services supplied are fit for purpose.

There are three levels of standards relating to smart cities - strategic, process and technical – with each playing an important role in ensuring that the smart cities movement is built on firm foundations.

A description of each level is detailed below.

Strategic-level standards - provide guidance to government leadership on the process of developing a clear and effective overall smart cities strategy, identifying priorities, and developing a practical implementation roadmap and an effective approach to monitoring and evaluating progress.

Process-level standards - cover good practice in procuring and managing cross-organisational and cross-sectorial smart cities projects, including guidance on putting together appropriate financing packages.

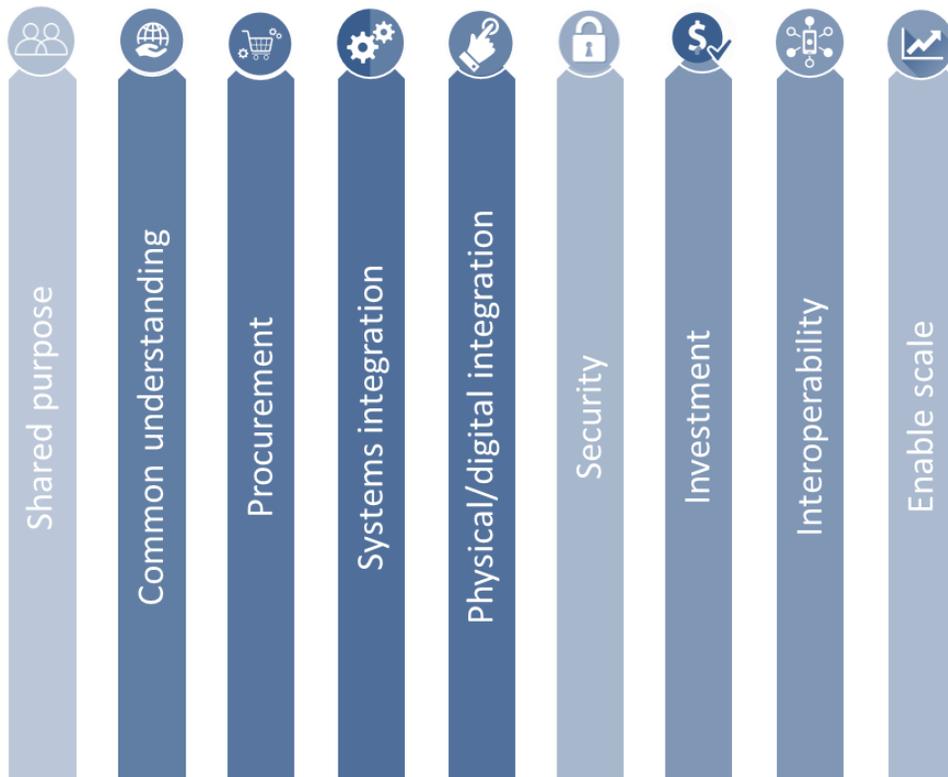
Technical-level standards - cover the practical requirements for products and services to ensure that they achieve the results needed.

Strategic-level standards are of most relevance to government leadership, with process-level standards relevant to people in management positions. However, technical specifications are also relevant to people in management positions as they need to know which standards should be referred to when procuring technical products and services.

A select catalogue of smart cities standards and frameworks across these three levels is provided at the end of this document.

The value of smart cities standards

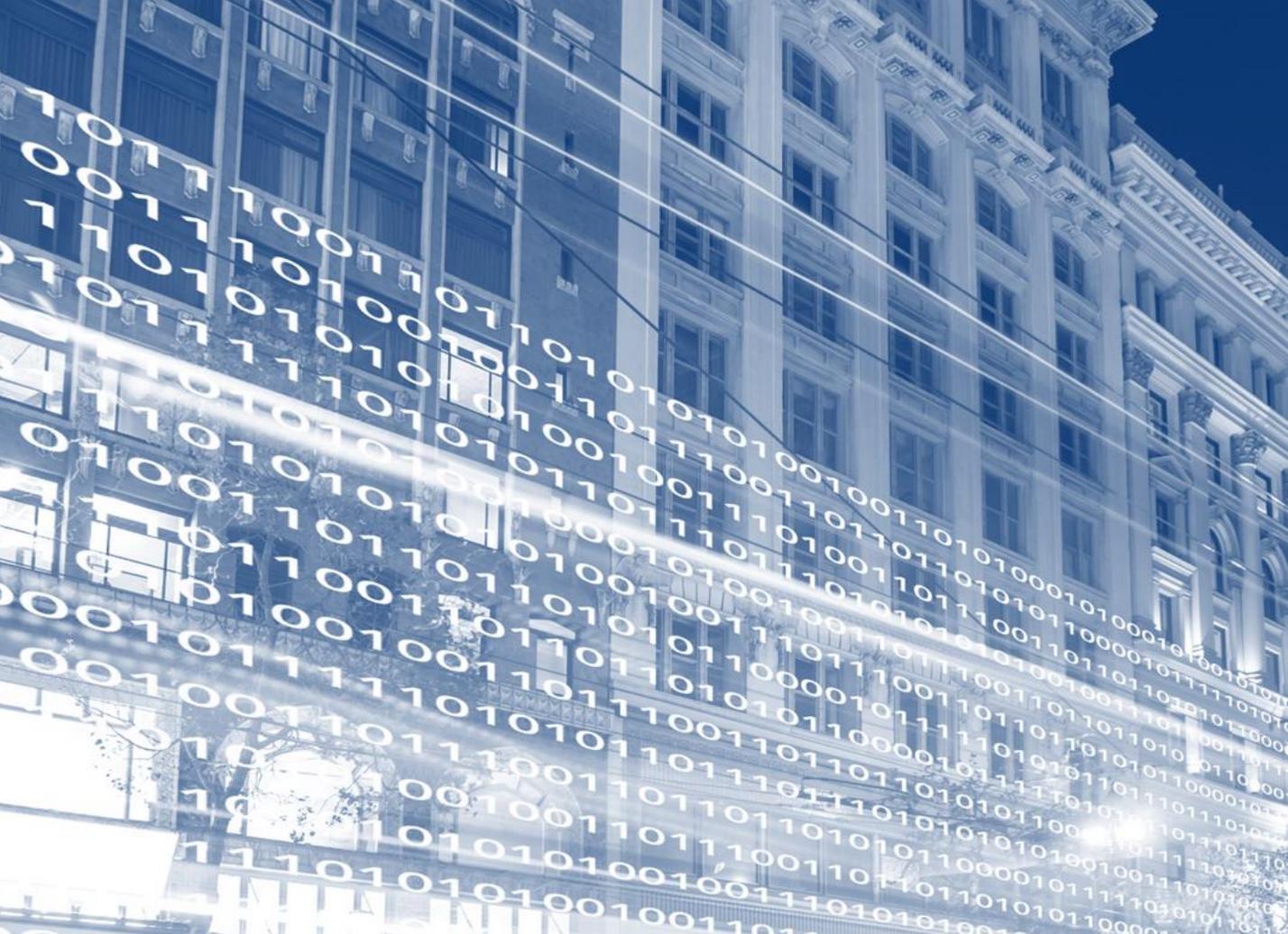
Standards can provide a range of benefits to cities and the industries that support them. Outlined below are some of the key advantages the smart cities movement can realise from embracing standards.



The Smart Cities Council is a strong advocate for smart cities standards and frameworks, and the value they create in building a thriving and influential marketplace. A key goal for the Smart Cities Council is to build a culture within our industry to embrace the value of standards and to support their advancement.

This guidance note is the first step in achieving this outcome, by providing information to help build awareness and capacity to act. The Council will continue to build a body of knowledge around smart cities standards and advocate and engage in their development, testing, and refinement.

As identified in this guidance note, diverse standards are available to support smart cities activities. The Council encourages industry stakeholders (Government and private sector) to review, test, and share experiences in the application of smart cities standards.



“For data to be of value to the city services market it must be of high quality and be able to be reliably exchanged”

Mark Bew MBE, Chair of UK Government Digital Built Britain Programme



A selection of smart cities standards

Strategic standards

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|--------------------|---|---|---------------|
| ISO 37120:2014 | Smart city indicators | Sustainable development of communities – Indicators for city services and quality of life | International |
| ISO 37101:1:2016 | Smart and resilient city management systems | Sustainable development in communities – Management system for sustainable development | International |
| ISO 37102:2016 | Definition | Sustainable development and resilience of communities – Vocabulary | International |
| ISO/TR 37121:2017 | Sustainable development in communities | Inventory of existing guidelines and approaches on sustainable development and resilience in cities | International |
| ISO/TR 37152 | Framework and Operation | Smart community infrastructures -- Common framework for development and operation | International |
| ISO/TR 37150 | Infrastructure benchmarking | Harmonising and benchmarking metrics to evaluate smartness of infrastructure | International |
| ISO/IEC 30182:2017 | Smart city concept model | Smart city concept model -- Guidance for establishing a model for data interoperability | International |
| PAS 180:2014 | Definition | Common terminology for smart cities – shared understanding of concepts | UK |
| PD 8100 | Overview for city leaders | PD 8100, Smart cities overview – Guide | UK |
| PD 8101 | City planning and development | Guidance on the planning and development process | UK |

Strategic standards (continued)

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|---------------|---|--|----------|
| BS 8904: 2011 | Community-based sustainable development | Guidance for community sustainable development | UK |
| NDRC | Smart city implementation | Guidance on how to best promote “Healthy development of Smart Cities | China |

Process standards

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|--------------|---------------------------------|--|---------------|
| ISO 14001 | Environmental Management System | Standards in developing Environmental management systems | International |
| ISO 20121 | Event management | Standards around achieving sustainable events | International |
| ISO 50001 | Energy management | Standards in developing Energy management systems | International |
| ISO 27001 | Data security | Ensuring proper security around information management | International |
| ISO 16739 | Building Information Modelling | Data sharing in the construction and facility management area – focus around Industry Foundation Class (IFC) | International |
| PAS 181:2014 | Smart cities | Guidance on strategies for establishing smart cities | UK |
| PAS 182:2014 | Smart cities | Guidance on normalisation and classification of information (increase data interoperability and discovery) | UK |

Process standards (continued)

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|--------------|--------------|--|----------|
| PAS 183:2017 | Smart cities | Smart cities – Guide to establishing a decision-making framework for sharing data and information services | UK |
| PAS 184:2017 | Smart cities | Smart cities – Developing project proposals for delivering smart city solutions – Guide | UK |

Technical standards

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|----------------------|---|---|---------------|
| ISO 15686 | Building Information Modelling | Standards on assets related to buildings and construction | International |
| ISO 16745-1:2017 | Sustainability | Sustainability in buildings and civil engineering works -- Carbon metric of an existing building during use stage -- Part 1: Calculation, reporting and communication | International |
| ISO 16745-2:2017 | Sustainability | Sustainability in buildings and civil engineering works -- Carbon metric of an existing building during use stage -- Part 2: Verification | International |
| IEEE Standard 1686 | Intelligent Electronic Devices (IED) Cyber Security | Security regarding the access, operation, configuration, firmware revision and data retrieval from an IED | International |
| IEEE Standard 1547.3 | Renewables | Guidance on functionalities, parameters and methodologies for monitoring, information exchange and control of distributed resources (fuel cells, PV, wind turbines, etc.) | International |

Technical standards (continued)

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|--------------------------|--------------------------------|---|---------------|
| ISO 2948 1-1:2016 | Building information modelling | This standard is intended to facilitate interoperability between software applications used during all stages of the life cycle of construction works, including briefing, design, documentation, construction, operation and maintenance, and demolition.. | International |
| ISO/TS 12911:2012 | Building information modelling | Establishes a framework for providing specifications for the commissioning of building information modelling (BIM). | International |
| ISO 16739:2013 | Building information modelling | Specifies a conceptual data schema and an exchange file format for Building Information Model (BIM) data. Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries | International |
| ISO/TS 8000- 1:2011 | Information and data quality | Contains principles of data quality, the high-level data architecture of ISO 8000, description of the structure of ISO 8000, and summary of the content of the other parts of the general data quality series of parts of ISO 8000. | International |
| ISO 8000- 8:2015 | Information and data quality | Describes fundamental concepts of information and data quality, and how these concepts apply to quality management processes and quality management systems. | International |
| ISO/TS 8000- 150:2011 | Information and data quality | Specifies fundamental principles of master data quality management, and requirements for implementation, data exchange and provenance management systems standards, for example, ISO 9001. | International |

Technical standards (continued)

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|------------------------|--------------------------------|---|----------|
| PAS 1192-3:2014 | Building Information Modelling | Specification for information management for the operational phase of assets using building information modelling | UK |
| BS 1192-4:2014 | Building Information Modelling | Collaborative production of information. Fulfilling employer's information exchange requirements using COBie. Code of practice | UK |
| PAS 1192-5:2015 | Building Information Modelling | Specification for security-minded building information modelling, digital built environments and smart asset management | UK |
| BS 8536-1:2015 | Building Information Modelling | Briefing for design and construction. Code of practice for facilities management (Buildings infrastructure) | UK |
| BS 8536-2:2016 | Building Information Modelling | Briefing for design and construction. Code of practice for asset management (Linear and geographical infrastructure) | UK |
| PAS 212:2016 | Internet of Things | Automatic resource discovery for the Internet of Things – Specification | UK |
| BS 1192:2007 + A2:2016 | Building Information Modelling | Collaborative production of architectural, engineering and construction information. Code of practice | UK |
| PAS 1192-2:2013 | Building Information Modelling | Specification for information management for the capital/delivery phase of construction projects using building information modelling | UK |
| UNE 178303 | City management | Requirements of proper city asset management - addressed to any local entities | Spain |

Technical standards (continued)

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|---|--|--|--------------------------------------|
| TR39 | Internet of Things | Defines three types of Internet of Things (IoT) Standards – sensor network standards, IoT foundational standards and domain-specific standards | Singapore |
| Green Star | Community and building design, construction and management | Performance-based rating tool guiding the planning, design, construction and operation of buildings and communities. | Australia, New Zealand, South Africa |
| IPWEA Model Specification for LED Public Lighting and Control Systems | LED Lighting and smart controls | The Institute of Public Works Engineering Australasia (IPWEA) developed two Model Specifications to assist public lighting buyers, vendors, contractors, funders and advisors to efficiently and economically engage in procurement of LED lighting and control systems for public lighting. | Australasia |

Standards under development

| STANDARD | AREA | DESCRIPTION | COVERAGE |
|--------------------------------|--------------------------------|---|---------------|
| ISO/IEC AWI 30145 | Smart city ICT framework | Information technology – Smart city ICT reference framework | International |
| ISO/IEC AWI 30145 | Smart city ICT framework | Information technology – Smart city ICT indicators | International |
| ISO 37106 | Smart cities strategy | Sustainable cities and communities - Guide to establishing strategies for smart cities and communities | International |
| IEEE P2413 | Internet of Things | Draft version of a standard on the relationship model between different IoT and common architectural elements | International |
| ISO/DIS 19650-1 | Building Information Modelling | Organisation of information about construction works -- Information management using building information modelling -- Part 1: Concepts and principles | International |
| ISO/DIS 19650-2 | Building Information Modelling | Organisation of information about construction works -- Information management using building information modelling -- Part 2: Delivery phase of assets | International |
| The Code for Smart Communities | Urban planning and development | Smart Cities Council is creating a guidance document on embracing smart cities approaches to brownfield and greenfield development projects | Australia |
| PAS 185 | Smart city - Security | Smart cities – Specification for establishing and implementing security-minded framework | UK |
| PAS 1192-6 | Building Information Modelling | Specification for collaborative sharing and use of structured Health and Safety information using Building Information Modelling | UK |
| PAS 1192-7 | Building Information Modelling | Construction product information – Specification for defining, sharing and maintaining structured digital construction product information | UK |

Adam Beck
Executive Director

+61 (0)422 496 043
adam.beck@anz.smartcitiescouncil.com

Twitter/Facebook/Instagram: @smartcitiesanz
www.smartcitiescouncil.com

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