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Smart cities – Vocabulary

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Foreword

This PAS was sponsored by the Department of Business, Innovation & Skills (BIS). Its development was facilitated by BSI Standards Limited and is published under licence from The British Standards Institution. It came into effect on 28 February 2014.

Acknowledgement is given to Mike Perry of the Building Research Establishment (BRE), as the technical author, and the following organizations that were involved in the development of this PAS as members of the Steering Group:

- Atkins
- Building Research Establishment (BRE)
- Connected Liverpool
- Ethos Smart
- Infodoc Services
- Red Ninja
- University of Cambridge, Department of Architecture
- University of Westminster, International Eco-Cities Initiative
- Co-opted

Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.

The PAS process enables a guide to be rapidly developed in order to fulfil an immediate need in industry. A PAS can be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

Relationships with other publications

This PAS is issued as part of a suite of BSI publications related to smart cities:

- PAS 181, *Smart city framework – Guide to establishing strategies for smart cities and communities*, which gives guidance on a framework for decision-makers in smart cities and communities (from the public, private and voluntary sectors) to develop, agree and deliver smart city strategies that can transform their cities ability to meet future challenges and deliver future aspirations;
- PAS 182, *Smart city concept model – Guide to establishing a model for data interoperability*, which will provide a framework that can normalize and classify information from many sources so that data sets can be discovered and combined to gain a better picture of the needs and behaviours of a city's citizens (residents and businesses);[1)]

[1)] In preparation.

- PD 8100, an overview document that will provide guidance on how to effectively communicate the value of smart cities to key decision-makers;[1)]
- PD 8101, *Smart cities – Guide to development*, a smart city planning document, which will provide guidance to local authorities on what they need to require or incentivize new infrastructure developments to support the overall smart city plans for their area.[1)]

Presentational conventions

The terms in this PAS are arranged by topic and an index is provided so the location of each term can be identified easily.

When the terms defined in this PAS are used in the definition or notes of another term, they are shown in bold type. Spelling conforms to *The Shorter Oxford English Dictionary.*

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a PAS cannot confer immunity from legal obligations.

1) In preparation.

Introduction

Smart cities and smart city systems

Cities, or large urban conurbations, bring many positive benefits to communities and economies – locally, nationally and globally. Beneficial impacts range from the objective, e.g. economic impacts, to the cultural, for example – providing a context to support vibrant arts, music, literary & drama communities.

There is a cost to these benefits. The accelerating growth of cities and their disproportionate consumption of physical and social resources is assessed by the United Nations to be the greatest challenge to mankind since we became social.

Cities are currently occupied by c.51% of the global population of 7+billion but consume c.80% resources disproportionately consuming physical and social resource.

NOTE Figures taken from Fischer-Kowalski, M., et al, "Decoupling Natural Resource Use and Environmental Impacts From Economic Growth, A Report of the Working; Group on Decoupling to the International Resource Panel", UNEP, 2011.

By 2050 the global population is forecast to grow to 9+ billion, 80% of which will inhabit cities. The increase in demand for all resources is unsustainable, as are traditional delivery mechanisms, which are unresponsive and too costly. To maintain quality of life expectations in the developed world, and match these in the developing world, we urgently need to identify and implement innovative delivery systems to more effectively manage and control resource use in the built environment – particularly cities.

Smart city systems are emerging as a major response to the joint challenges of resource management and economic recovery in cities – nationally and globally. These systems will displace traditional delivery vehicles for physical and social resources, potentially providing cost effective and innovative delivery channels.

Reducing complexity – a terminology and analytical language

In common with many natural and manmade systems, cities are complex. Our understanding of complex systems is achieved by reducing the complexity to a manageable number of well understood fundamental parameters – first principles.

To be able to specify meaningful and effective systems to monitor, manage and control resource use in our cities, we must first establish the first principles of cities' behaviour. At this stage of development we can empirically identify a number of vital issues that are likely to be shown part of the set of fundamental building blocks.

This empirical understanding can be used to develop first principles, and applied to develop an analytical language to inform the objective specification of smart city systems.

In the meantime an agreed set of working terms is needed to encourage convergence of the different discussions about the future of cities agenda, and the function of smart city systems in resolving the challenges facing cities, particularly resource use and management.

This PAS 180 is the first version of a "smart cities vocabulary", the beginning of a process to collate the diverse range of terms and expressions used in day-to-day discussions about smart city systems. The vocabulary aims to provide an agreed set of working terms to enable practitioners to better share a common understanding.

Structure of the vocabulary

At this stage of the vocabulary's development the collation of terms and expression is open, with no defined model or framework of what a smart city or smart city system may be. This is a deliberate choice to ensure a diverse collection of terms and expressions.

The vocabulary's working structure is as follows:

a) Enabling concepts;
   1) Smart city systems;
   2) Public and private service delivery models;
   3) Resource management processes;
   4) Technology and infrastructure;
   5) Governance;

b) Applications (output channels);
   1) Environment;
   2) Finance and economy;
   3) Mobility;
   4) Community, education and skills;
   5) Lifestyle, health and well-being.

This structure, like the definitions, is open to change and expansion in the future, but is sufficiently broad to capture the first collation rounds.

1 Scope

This PAS defines terms for smart cities, including smart city concepts across different infrastructure and systems elements and used across all service delivery channels.

It covers information, processes, methodologies and applications.

This PAS is aimed at UK city leaders. It can also be helpful to leaders of communities other than at city-scale – including both smaller urban areas and larger regional-scale initiatives – and for city leaders outside the UK. However, the prime intended audience, for whom the guidance has been developed and tested, is UK city leaders, including:

- policy developers in city authorities – both those responsible for the authority's service design, commissioning and delivery role, and also those responsible for its community leadership role, in particular:
  - elected leaders;
  - senior executives of local authorities (including chief executives, chief information officers and directors of key departments);
  - senior executives of other public bodies with a city-wide remit;
- other stakeholders interested in leading and shaping the city environment, including:
  - senior executives in the private sector who wish to partner with and assist cities in transformation of city systems to create shared value;
  - leaders from the voluntary sector organizations active within the city;
  - leaders in the higher and further educations sectors;
  - community innovators and representatives.