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SYSTEMS REFERENCE DELIVERABLE

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Smart city system ontology – Part 1: Gap analysis

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The text of this Systems Reference Deliverable is based on the following documents:

Draft	Report on voting
SyCSmartCities/322/DTS	SyCSmartCities/334/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Systems Reference Deliverable is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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- withdrawn, or
- revised.

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INRODUCTION

Ontology is becoming a key subject in the world of big data, AI, IoT, and smart city system standards. The following benefits of ontology are recognized as important with respect to interoperability, connectivity, traceability of digital content, particularly machine readability, executability and interpretability of digital content for decision making and actions.

– Increase interoperability across domains.
– Enable machine-readable code for computational reasoning and decision making.
– Create semantic linkages between data, information and knowledge systems.
– Build accessible APIs and semantic linkages between web-based data objects.
– Link data domains with shared concepts or canonical data models.
– Connect shared data concepts and definitions between domains.

However, ontology has a variety of definitions in different international standards. How to understand different meanings of ontology and select the right definition for the right stakeholders' concerns for the right purposes is a big challenge for effective integration of business, data, information, knowledge and decision making, across disciplines, domains, systems, platforms and applications in smart cites. Moreover, how to deal with the grand challenges of interoperability of many and various ontologies to satisfy the demands from artificial intelligence and big data analytics are gaps to be filled in the area of smart city systems. How to develop digital content that is machine readable, executable and interpretable, working in the system without human effort for a smart city system are emerging needs to be studied. There are significant demands for better communication, coordination, cooperation, collaboration and connectivity of existing ontology standards to smart cities practical sectors. This document aims:

- to identify existing ontology standards from different Standards Development Organizations (SDOs) and to provide best practice examples and considerations of ontology standards development and maintenance for smart city systems;
- to identify gaps in existing ontology standards for smart city systems and the opportunities and challenges in ontology standards development taking into account multi-dimensional and muti-domain stakeholders' concerns city wide, and to provide recommendations for ontology standards development and maintenance to enable integration, interoperability, efficiency and effectiveness of smart city systems.

SMART CITY SYSTEM ONTOLOGY –

Part 1: Gap analysis

1 Scope

This document provides a gap analysis on ontology relevant standards for smart city systems to be used as a base document for mapping, developing and maintaining a set of ontology standards for smart city systems.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
characteristic
abstraction of a *property* (3.8)

Note 1 to entry: Characteristics are used to describe concepts.

[SOURCE: ISO 1087:2019, 3.2.1, modified – The EXAMPLE has been deleted.]

3.2
concept
unit of knowledge created by a unique combination of *characteristics* (3.1)

[SOURCE: ISO 1087:2019, 3.2.7, modified – The Notes to entry have been deleted.]

3.3
definition
representation of a concept by an expression that describes it and differentiates it from related *concepts* (3.2)

[SOURCE: ISO 1087:2019, 3.3.1]