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Title: A.1 Justification for a new work item on draft Recommendation ITU-T Y.DT-interop “Interoperability framework of digital twin systems in smart cities and communities”

Purpose: Discussion

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Abstract: This TD contains the A.1 Justification for a new work item on draft Recommendation ITU-T Y.DT-interop “Interoperability framework of digital twin systems in smart cities and communities”.

Please see below.

A.1 justification for proposed draft new Recommendation

Question:	1/20	Proposed new ITU-T Recommendation	Virtual, 17 to 27 May 2021
Reference and title:	Y.DT-interop "Interoperability framework of digital twin systems in smart cities and communities"		
Base text:	TD2218-R3	Timing (Target date):	Q2, 2024
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Scope (defines the intent or object of the Recommendation and the aspects covered, thereby indicating the limits of its applicability):

This Recommendation defines interoperability framework for digital twin systems in smart cities and communities with a focus on data, intelligence and infrastructure aspects. It sets the main foundational elements of the data interoperability aspect; intelligent digital data processing aspect; and infrastructure aspect, and specifically covering:

- Overview of digital twin concept in smart cities and communities
- Interoperability framework for smart cities and communities
- Intelligent data processing and modelling
- Semantic and process interoperability of digital twin for smart cities and communities
- Strategic implementation guidelines

Strategic implementation guidelines consider the strategies best suited for implementing digital twin technology based on the analysis of a variety of use cases presented in an Appendix.

Summary (provides a brief overview of the purpose and contents of the Recommendation, thus permitting readers to judge its usefulness):

Digital twins can improve the efficiency and sustainability of cities and communities by creating a virtual representation of a city and using it to simulate challenges, emergencies and other situations that its counterpart may experience in the physical world. Digital twins provide a safe testing environment that enable city stakeholders to enhance operational efficiency across sectors, improve urban design, better prepared in disaster situations and among other benefits that are crucial for the transition to smart city and community and contribute to the achievement of the Sustainable Development Goals and other global objectives.

Implementing digital twin technology in cities and communities involves creating a complex system that consists of a multitude of key functionalities including real-time monitoring, seamless connectivity, dynamic simulations, and predictions (e.g. preventive maintenance use cases) for safe and secured operation of cities and communities. To realize such system, digital twin cities need to take into consideration three key aspects. First, it is the data interoperability aspect by developing semantics, and modeling languages that would facilitate interoperability of data, effective data collection and management. Second, it is the digital data processing aspect which refers to the use of different digital technologies (e.g., 5G, AI, cloud, big data analytics etc.) to facilitate the operation of digital twins. And third, it is the infrastructure aspect which refers to the digital infrastructure required to enable connectivity among all connected objects. The

framework described in this Recommendation will provide guidance to city stakeholders to implement and operate digital twin technology based on the criteria of these three aspects.

Relations to ITU-T Recommendations or to other standards (approved or under development):

Y.4000, Y.scdt-reqts, Y.dt-smartfirefighting, Y.DTN-ReqArch

Liaisons (Relations to other study groups or to other standards bodies):

ITU-T SG13, ISO/IEC JTC 1/SC 41, ETSI Smart M2M, 3GPP, OMA, IETF, IEEE-SA

Supporting members that are committed to contributing actively to this work item:

Egypt, Nigeria, Algeria, Senegal, Tunisia.
