



# Can digital twins change our cities?

ISO TC 268 – perspective

by

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International  
Organization for  
Standardization





# Smart and Sustainable Cities developments

Complex Challenges but Great Opportunities moved to reality through:



- Long term vision and commitment
- Citizens' engagement

- Holistic approach, priorities
- Integrated planning



- **STANDARDIZATION**
  - Supporting Cities transformation





# Smart and Sustainable Cities developments

- Vision (incl. results related)
- Commitment/Decision

**Strong political engagement and citizens' engagement**

- Strategy with objectives
- Sectorial/area Roadmaps with targets

**Definition of targets with Performance indicators**

**Implementation and culture of results**

- Measure progress and monitor
- Evaluate against planned targets
- Improve to meet the objectives
- Communication & reporting

**Digitalization as key driver and enabler**



➤ **Benchmarking-Benchlearning**





# Smart and Sustainable Cities developments



**Standards drive the changes**  
**Standards accelerate digital transformation in cities and communities**



**Standards make benchmarking and benchlearning effective**  
**Standards bring trust and confidence**



# Smart and Sustainable Cities developments



## How to support decision making ?

- Needs trust in existing best practices
- Needs simulations towards setting:
  - ✓ strategies based on impacts' projection of actions adapted to local context
  - ✓ targets and objectives
  - ✓ Implementation improvement measures to meet the objectives



**Digital Twin brings new capacities towards setting pathways to cities' sustainable development**

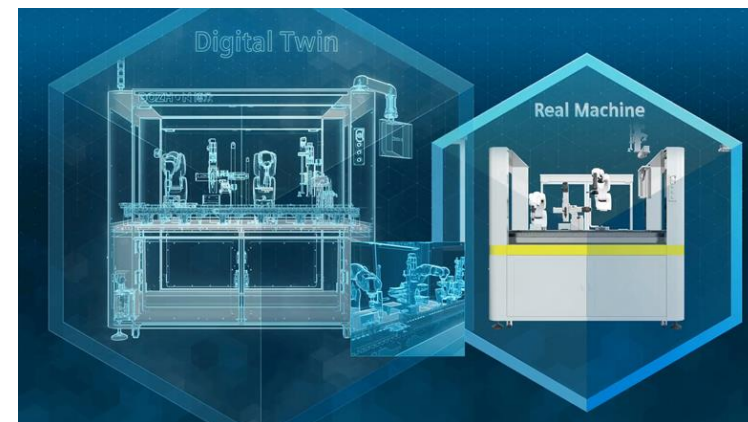


# Smart and Sustainable Cities developments

## Digital Twin, a powerful tool for supporting cities' journey towards their transformation

A digital twin is a digital representation of a physical process, person, place, system or device.

Digital twins were originally designed to improve manufacturing processes using simulations with highly accurate models of individual components.



In the urban context, a digital twin is a **virtual replica of the main elements of the city** and its critical infrastructures connected to databases and sensors. This model of the city and its processes allows analysing, modelling, simulating and predicting scenarios or elaborating what-if questions for better decision-making on urban planning and management, in multiple domains and in an integrated way.

Ref from: EU SMART CITIES MARKETPLACE ACTION CLUSTER FACTSHEET on digital twins for integrated planning



# Smart and Sustainable Cities developments

## Digital Twin a powerful tool for supporting cities' journey towards their transformation

Digital Twin allows virtual forms of designing, testing, and applying new strategies, technologies, products and connected innovative solutions.

### Which domains can digital twins cover?

Urban digital twins can be used, both for planning and for operational management in several urban domains, such as:

- ✓ Built environment
- ✓ Infrastructures
- ✓ Transport and accessibility
- ✓ Land use and spatial planning
- ✓ Environmental quality and pollution
- ✓ Climate change, prediction of extreme weather patterns
- ✓ Climate change adaptation, management of climate risks
- ✓ Energy efficiency and renewable energy sources
- ✓ Maintenance/asset management





# Smart and Sustainable Cities developments

## Digital Twin a powerful tool for supporting cities' journey towards their transformation

Digital Twin allows virtual forms of designing, testing, and applying new strategies, technologies, products and connected innovative solutions.

Within these domains, several use cases and applications can be mentioned, such as :

- ✓ Traffic control and related applications;
- ✓ Physical security and anti-intrusion systems;
- ✓ Energy optimization of buildings and grids;
- ✓ Satellite image analysis for land and soil management;
- ✓ Monitoring of critical infrastructures;
- ✓ Big data analysis for urban logistics optimization;
- ✓ Public administration support systems;
- ✓ Sustainable mobility with unmanned vehicles;
- ✓ Waste, water management
- ✓ ....







# Smart and Sustainable Cities developments

## Digital Twin a powerful tool for supporting cities' journey towards their transformation

Digital Twin allows virtual forms of designing, testing, and applying new strategies, technologies, products and connected innovative solutions.

### How can digital twins facilitate planning and accelerate urban transition?

- ✓ The use of digital twins in urban planning allows the **connection and relationship** between real world and simulation models (**AI and Big Data**). This facilitates **georeferencing of information** (such as city structure, the location of services or accessibility restrictions, air pollution) through 3D geospatial models.
- ✓ At the same time, it provides an intuitive visualization and interaction with the urban space that helps to **understand the simulation results and the impact of decisions**.
- ✓ Digital twins can be of enormous help to **support integrated planning** for every integrative aspect mentioned earlier through co-design, co-creation and co-realisation within the local ecosystem:





# Smart and Sustainable Cities developments

## Digital Twin a powerful tool for supporting cities' journey towards their transformation

### A few benefits from Digital Twin in the urban context:

**TIME:** digital twins can simulate how the built environment and urban infrastructures will develop over time given specific assumptions or in particular scenarios.

**SECTORS AND DISCIPLINES:** by providing intuitive visualisation and interaction in a shared virtual environment, stakeholders and practitioners of different backgrounds and disciplines can work in the same virtual environment.

**TECHNOLOGIES:** digital twins offer the possibility to play with the combination of different solutions and technologies within a specific area, and simulate the effect on e.g., air pollution and CO2 emission.

**STAKEHOLDERS:** citizens and local businesses to become aware of the impact of developments, e.g., climate change, population dynamics, or increased traffic flows.

**FINANCIAL ASPECTS AND CO-BENEFITS:** digital twins can help to visualise the costs and benefits of investments of plans for the built environment and urban infrastructures, but also demonstrate co-benefits, for example less air pollution and improved road safety due to mobility as a service.



# Smart and Sustainable Cities developments

## Digital Twin a powerful tool for supporting cities' journey towards their transformation

### Role of standards

Standardized “tools” do not only support **compliance with regulatory frameworks**, but also contribute to **behaviour changes and** motivate **co-creation**.

#### Standards especially ensure:

- ✓ interoperability and alignment, (incl. set of data needed and open data,...)
- ✓ collection of case studies and best practices towards replication and scaling-up
- ✓ Guidelines towards setting:
  - A long term vision
  - Strategies and roadmaps with targets
  - Action plans' implementation and improvement
  - Communication and reporting
  - Collection of best practices
    - benchmarking and benchlearning



Urban digital twins approach is of real support towards Integrated planning – enabling to select roadmaps options - then is of course towards operational management.  
However, there is a key need for open data.

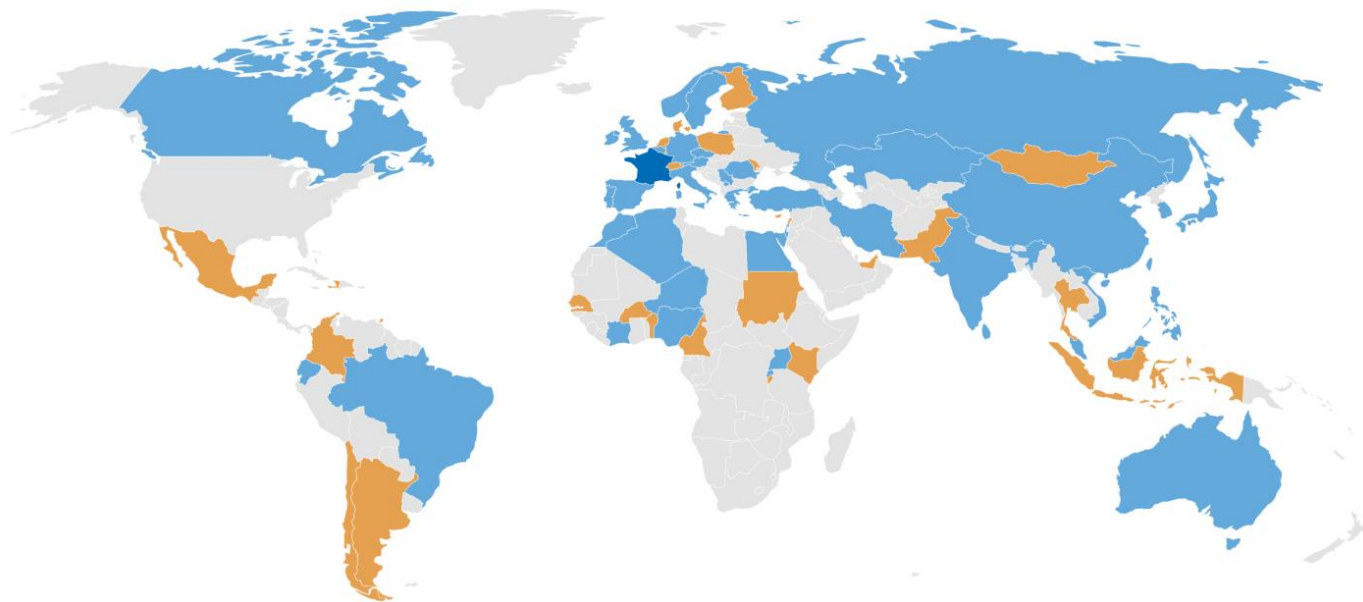


# ISO TC 268 Sustainable cities and communities

The proposed series of International Standards will encourage the **development and implementation of holistic and integrated approaches** to sustainable development & sustainability.

70 countries from all continents

Participating countries: 41  
Observing countries: 29



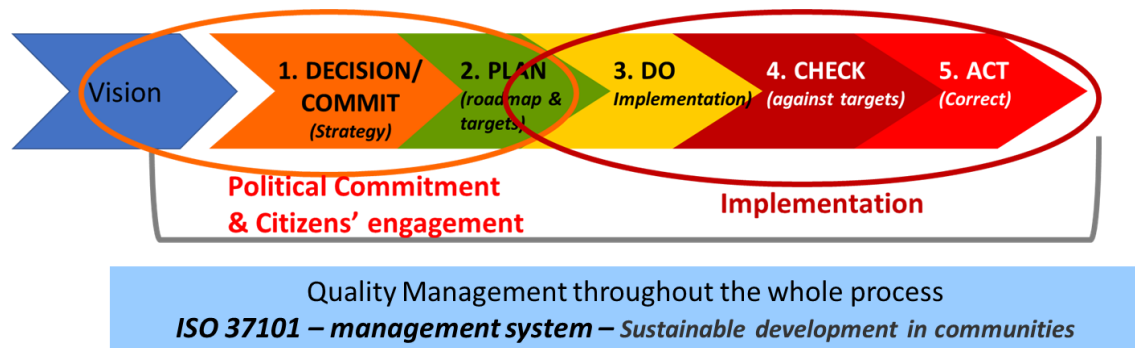
TC 268 contributes to the **UN Sustainable Development Goals** through its standardization work.

Secretariat: AFNOR, Mrs. Caroline Reis  
Chairman: Dr. Bernard Gindroz  
Creation date: 2012

About 50 standards published or under development



# ISO TC 268 Sustainable cities and communities



## ISO TC 268 :

- ✓ **develops standards, from vision to implementation**
- ✓ ISO 37101 management system ensures coherent and robust sustainable urban development, through citizens' engagement and a culture of results
- ✓ paves the way to digital transformation by setting baselines and strategic targets with clear roadmaps and KPIs.
- ✓ **Considers all innovative «tools» in support of urban transformation**
- ✓ **Engages in strong and permanent cooperation with IEC and ITU in support of cities and communities in their journey towards smartness and sustainability (IEC/ISO/ITU Joint Smart Cities Task Force)**





# Conclusions and perspectives

## *Digital Twins are boosters towards urban transformation*

- ✓ *They offer multiple benefits, such as by providing intuitive visualisation and interaction that helps to understand the simulation results and the impact of decisions*





# Conclusions and perspectives

## ***Standards are key drivers for Digital Twins' implementation***

- ✓ ***They contribute to :***
  - ***Open Data framework,***
  - ***interoperability and alignment,***
  - ***collection of case studies and best practices towards replication and scaling-up***
  - ***Guidelines towards integrated planning***
  - ***....***

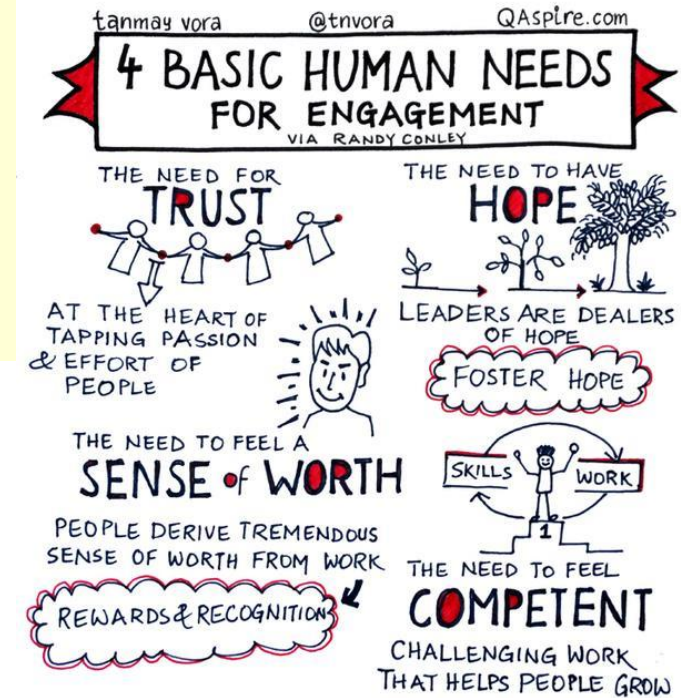




# Conclusions and perspectives

**Standards are key enablers to accelerating transformation of Cities and Communities**

✓ **They bring TRUST & CONFIDENCE, and thus, citizens' acceptance and engagement**







# Conclusions and perspectives

***Standards are key enablers to accelerating transformation of Cities and Communities***

✓ ***They support confidence in decision making, thanks to benchmarking of best practices, robust technical references & guidance, and management systems***





# Conclusions and perspectives

## ***Standards are key enablers to accelerating transformation of Cities and Communities***

- ✓ ***They contribute to de-risking decision and investment, thanks to alignment of understanding among stakeholders, setting reference framework & solutions, results oriented engagement***





# Conclusions and perspectives

***Standards are key enablers  
to accelerating transformation of Cities and Communities***

***Thanks to strengthened cooperation  
between IEC, ISO and ITU  
for the benefit of cities and communities  
and in full support of  
sustainable development goals (UN SDGs)***





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**A big thanks to the EU SMART CITIES MARKETPLACE and its ACTION CLUSTER FACTSHEET on digital twins for integrated planning**