Performance indicators towards sustainability

Reporting framework for cities

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SDGs - Responsibility of

Government, Local Government and communities

- sustainable development and sustainability/ every entity and activity
- sustainable cities and communities/human/urban settlements and systems
- smart infrastructure and smart cities
- safety and security
- quality of services and quality of life in cities
- resilience
- inclusive growth and pro-poor development
- accountability and reporting/ value and negative impacts to society and environment balance

Achieving goals/objectives

Management systems or establishing and achieving objectives

risk management

address threats and opportunities

risk

effect of uncertainty on (achieving) objectives

- An effect is a deviation from the expected. It can be positive, negative or both, and can address, create or result in opportunities and threats.

Indicators of performance

- assess the performance towards sustainability/ in achieving SDGs
- promote reporting and citizens consultation and engagement
- Social and Expert Observatories
- Evaluation by experts and verification
- benchmarking
- promote best practice and smart solutions

Draft Hellenic Standard ELOT 1457

Sustainable Development in cities and communities – Reporting and Indicators of sustainability performance

- Metrics in achieving sustainability goals and performance while providing quality city services and quality of life
- what is measured, and how that is measured
- Monitoring and reporting
- Based on ISO 37120, Sustainable cities and communities -- Indicators for city services and quality of life
- Different classification structure, more logical order
- more emphasis on identity subjects and related policies, more focus on addressing opportunities/creation of value instead of managing only threats or risks resulting in negative impacts

ELOT 1457 - Sustainability Core Subjects

- **1. Economy and Finance** (2)
- **2. Environment and Infrastructure** (3-7)
  - Environment, ecosystems, energy
  - Urban planning
  - Urban mobility
  - ICT
  - Wastes-circular economy
- **3. Society/basic services for all** (8-11)
  - Safety, emergence response
  - Shelter/Housing

ELOT 1457 - Sustainability Core Subjects, cont.

- Water and sanitation
- Health and care in the community
- **4. Policies - Identity** (12-15)
  - Inclusive/Collaborative governance
  - Open data, applications and services
  - Knowledge –based economy and society, Innovation and Education
  - Cultural heritage and culture, preservation and valuation – attractiveness for tourists and investors

Role of standardization bodies to the road for Smart and Sustainable Cities (SSC)

The standardisation efforts for Smart and Sustainable Cities (SSC) are expanding following the commitment of national governments to UN AGENDA 2030 and SDG.

Standardization bodies can play an important role as standards are providing a solid base for:

- interoperability of equipment and networks
- risks limitation
- common framework
- stakeholders consensus , in case of SSC: cities administrations and public authorities, city residents, vendors and service providers of SSC, third party organizations and academia.

There are standardization efforts by ETSI (oneM2M), 3GPP and ITU (Study Group 20, Smart City Platform) for the specifications of 5G and the use cases related to SSC.

The International Standards Organisation (ISO) and the International Electrotechnical Commission (IEC) through JTC1 are working on a program intended to establish a reference framework for smart cities.

The envisioned Cities

There is a continuous growth of the urbanization of the population globally leading to demand for new infrastructures, efficient use of resources and effective administration. The level of urbanisation in the European Union is above 75 per cent and is predicted to rise to 80 per cent by 2020. (*In Europe there are 468 cities with a population of over 100.000 in EU28 Member States)*.

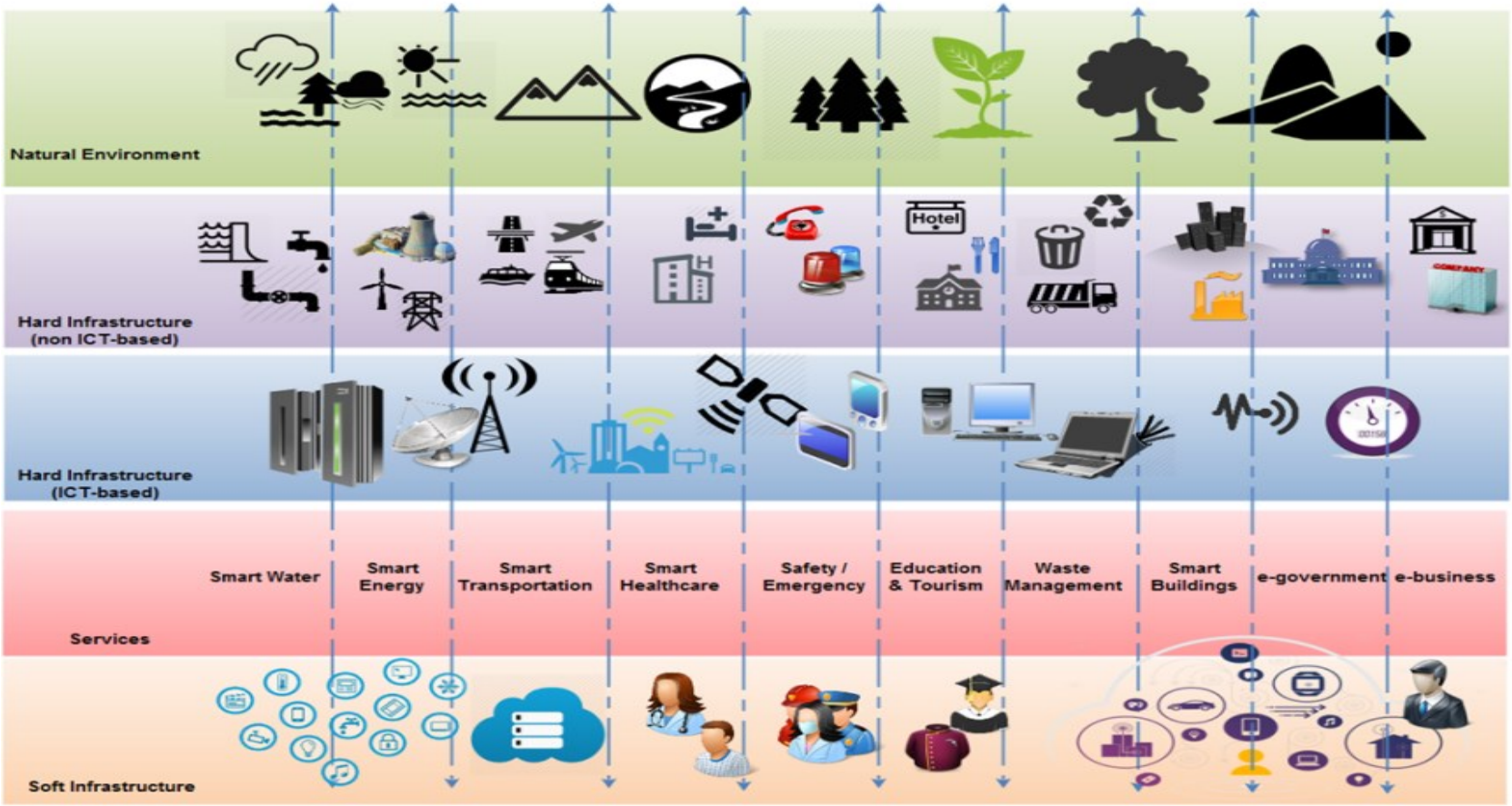
- The envisioned cities are more viable, resilient, energy efficient using ICT for interactions with their citizens and making their infrastructures smart for the purposes of improving quality of life while making them attractive to business, investors and visitors.





- The sustainability of a smart city is based on five main aspects: economic, social, environmental, cultural, governance and it is driven by ICT.

The SSC ecosystem enabled by ICT



Source: ITU-T Focus Group on Smart Sustainable Cities, "Master plan for smart sustainable cities".

The cities as users of 5G

The 5G is an end-to-end communication system enabling a smart interconnected city with new business models and evolving a variety of partners.

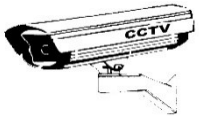
There are specific use cases of SSC that are based on a capable communication network in terms of very high data rates, high availability, reliability, low latency and guaranteed QoS such as 5G:

- real-time visualized information for traffic and utilities



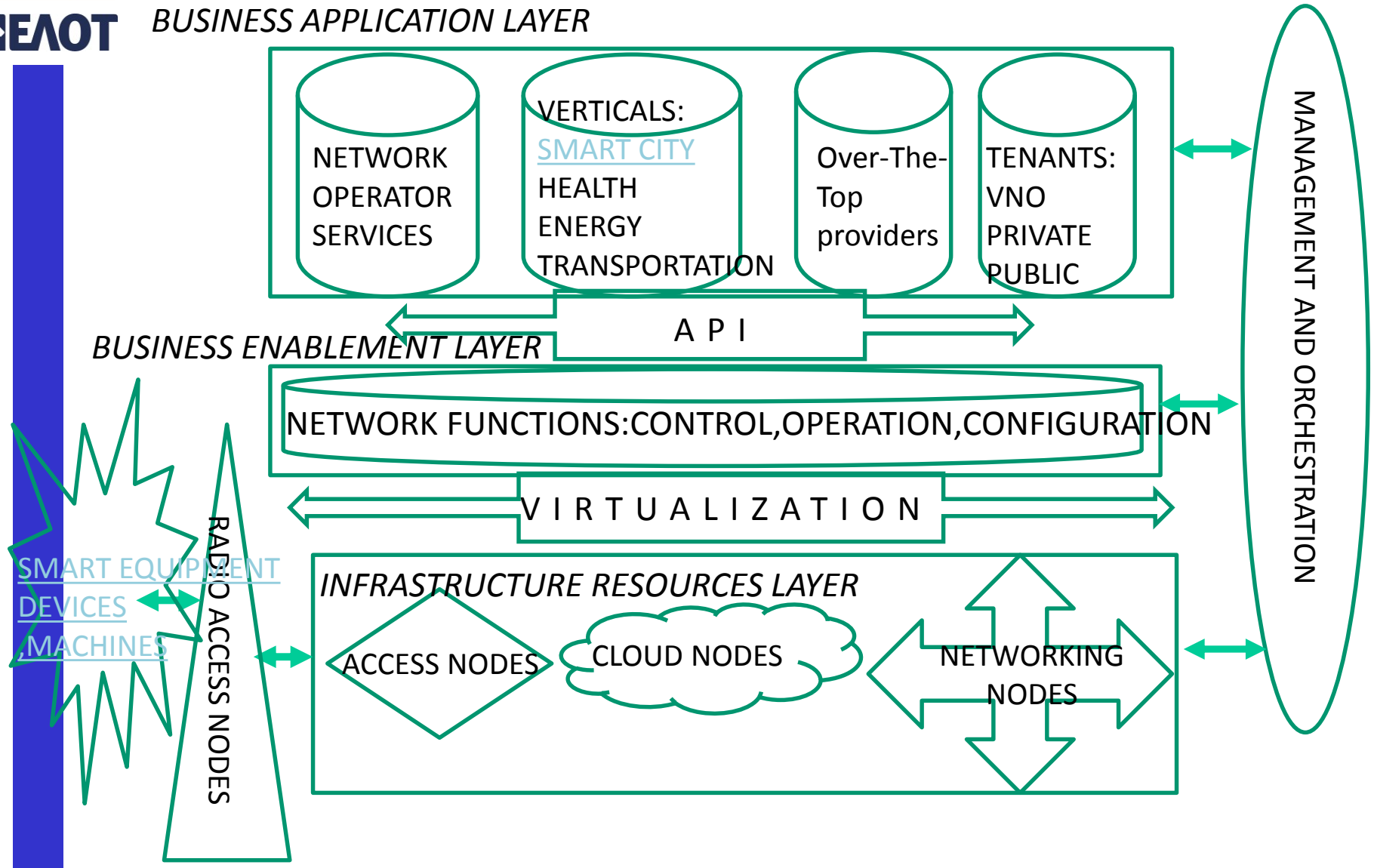

- critical communication with SMS, voice or video and emergency service management


- public safety (crime prevention, detection and fighting)




- massive communications (smart street lighting, parking, waste collection)

5G and SSC


BUSINESS APPLICATION LAYER
NETWORK OPERATOR SERVICES
VERTICALS:
SMART CITY
HEALTH
ENERGY
TRANSPORTATION
Over-The-Top providers
TENANTS:
VNO
PRIVATE
PUBLIC
MANAGEMENT AND ORCHESTRATION
A P I
BUSINESS ENABLEMENT LAYER
NETWORK FUNCTIONS:CONTROL,OPERATION,CONFIGURATION
V I R T U A L I Z A T I O N
SMART EQUIPMENT
DEVICES
MACHINES
RADIO ACCESS NODES
INFRASTRUCTURE RESOURCES LAYER
ACCESS NODES
CLOUD NODES
NETWORKING NODES

Common use cases of 5G and SSC

The following table presents the performance requirements of future 5G-SSC use cases:

5G use cases for SSC	Experienced data rate	Latency	Reliability (IP packet delivery within latency bound)	Devices
Real-time video for monitoring and guidance	4K (2160/60/P): ~ 30-40 Mb/s 8K (4320/60/P): ~ 80-100 Mb/s HD H.265/HEVC: ~ 10 Mb/s	100 ms end-to-end	Critical	10^3/ km^2 - activity factor=50%
Massive connectivity for non-time-critical sensing (weather, pollution levels, etc.)	1 Mb/s or less	In the order of sec. to min.	Not critical	10^4/ km^2
Massive connectivity for time-critical sensing and feedback (detection of natural disasters, smart grid control, context-aware lighting)	Uplink: small data rate per sensor, but multitude of sensors results in bandwidth demand in backhaul; Smart grid: Up to 5 Mb/s in downlink and uplink	30 ms end-to-end Smart grid: <5 ms end-to-end for transmission/ grid backbone, <50 ms end-to-end for distribution/ grid backhaul, <1 s end-to-end for access	Critical for smart grid 99.9% – 99.999% for the different domains/ applications	10^4/ km^2

Source: NGMN Alliance, "Perspectives on Vertical Industries and Implications for 5G".

ELOT WG “KPIs for ICT in SSC”

The purpose of ICT KPIs is to use them as:

a) criteria for assessment of ICT contribution to the creation of a more smart and sustainable city.

b) means for the self assesment of a city as it is necessary to monitor the achievement of its goals. A city with KPIs can quantify and evaluate the transformation into a SSC.

ELOT established a Working Group under Technical Committee “Electronic Communications” in order to develop and select the suitable KPIs for ICT for the draft standard ELOT 1457.

The WG consists of 8 experts working on a voluntary basis from academia, public authorities, vendors and network operators.

ELOT 1457 KPIs for the use of ICT for a SSC

The Annex C of ELOT 1457 covers various sectors of the SSC ecosystem using ICT :



- Building management
- Capital investment
- Data openness, applications and services
- Development and promotion of cultural heritage sites
- Education
- Electromagnetic fields
- Electronic services
- Energy, environment, GHG emissions and air quality
- Health
- ICT and ICT security *(the development of ICT as a driver for the SSC)*
- Innovation
- Noise management
- Public security and emergency
- Road infrastructure and transportation
- Sewage









Subset of Annex C of ELOT 1457

Indicator name	Description	CORE	ADDITIONAL	SDG
Availability of computers or similar devices	Proportion of households with at least one computer or similar device (tablet, smart phones, etc.)	x		9.c
Household with a mobile device	Proportion of households with at least one smartphone or similar device		x	9.c
Availability of Internet access in households	Proportion of households with Internet access for any household member via a fixed or mobile network at any given time.	x		9.c, 17.8
Availability of fixed broadband subscriptions	Fixed (wired) broadband subscriptions per 100 inhabitants.	x		9.c
Availability of wireless broadband subscriptions	Wireless-broadband subscriptions per 100 inhabitants	x	x	9.c, 5.b
Availability of cultural resources online	Proportion of cultural institutions and events in the city for which online participation is offered.	x	x	11.4
Interest in online access to cultural resources	On-line visits to cultural resources per capita.	x		8.9, 11.4
Use of electronic health records	Proportion of city inhabitants with electronic health records.	x		3.8
Adoption of telemedicine	Proportion of patients involved in telemedicine programs including services, such as e-consultation, e-monitoring, online health care advice and guidance etc.	x	x	3.8
SMEs	Proportion of small and medium-sized enterprises (SMEs)		x	9.3, 8.3
Use of e-learning system	The proportion of city inhabitants using e learning systems.	x	x	4.3
Students ICT access	Proportion of students/pupils with classroom access to ICT facilities	x		4.4
Connected libraries	Number of connected libraries per 100 000 population	x		9.c, 4.4
Child online protection (COP)	Existence of rules and regulations to ensure COP		x	1.3
Availability of smart water meters	Proportion of the water consumers (including households, companies, etc.) with ICT based water meters.	x		9.1
Drainage system management	Proportion of drainage system ICT monitored		x	6.5, 6.4
Air pollution monitoring system	Number of outdoor installations of ICT based air quality monitoring systems per km2		x	11.6, 12.4
Traffic monitoring	Proportion of major streets monitored by ICT		x	9.1
Real-time public transport information	Proportion of public transport stops and stations with real time traffic information available	x		11.2

Next tasks for standardization!

Research on metrics, data sources, calculations and measurements

Examination of management systems applicability and indicator's analysis

Identification of best practice solutions and use cases for the development of SSC services.

Proposals for pilot projects and implementation of trials.

N E E D F O R F U N D I N G !

Thank you for your attention !

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