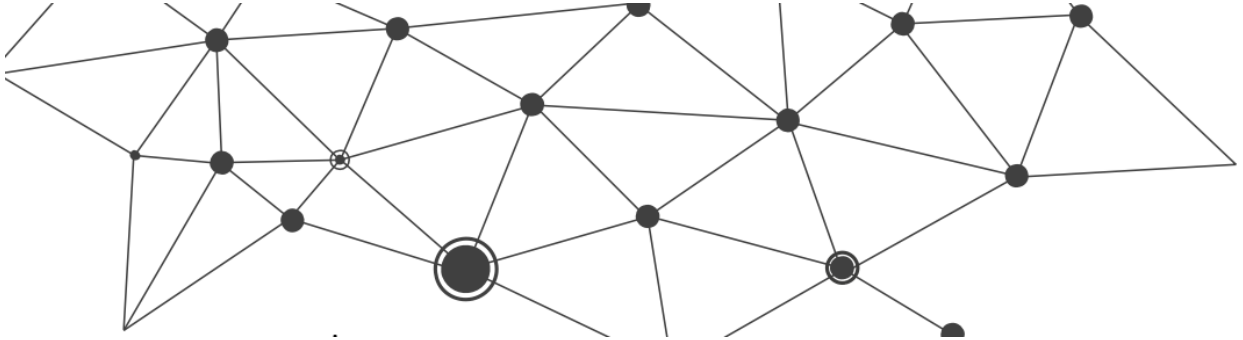

Smart cities development models and concepts

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29 April 2021

In cooperation with:

Partners of Connective Cities

Deutscher Städtetag

ENGAGEMENT GLOBAL
Service für Entwicklungsinitiativen

with its SERVICE AGENCY
COMMUNITIES IN ONE WORLD

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Commissioned by

Federal Ministry for Economic Cooperation and Development

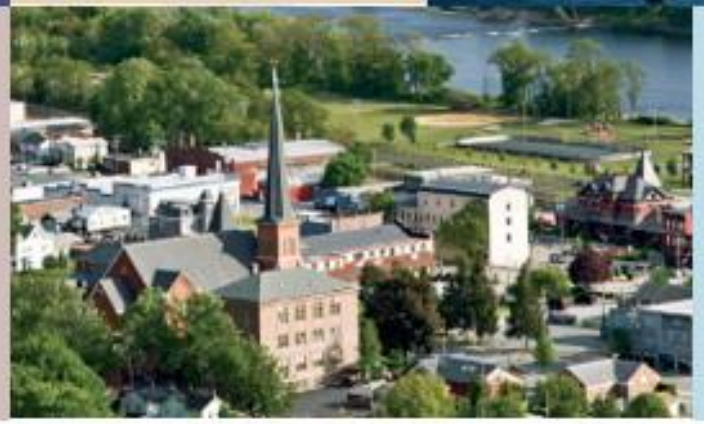
Some city facts

Cities account for about two-thirds of **global energy demand.**

Buildings produce a fifth of the world's **CO2 emissions.**

Cities produce up to 70% of global **greenhouse gas emissions.**

Buildings account for roughly 40% of the world's **energy use.**



An estimated 80% of global **GDP** is generated in cities.

Taking up the challenge

“Updates about data of air quality are important to me. On ‘bad’ days I’d rather stay inside.”

SANJAY (PUNE, INDIA)

“Finding a parking spot is so time consuming. I wish my car could do that on its own.”

EMILY (SAN FRANCISCO, U.S.)

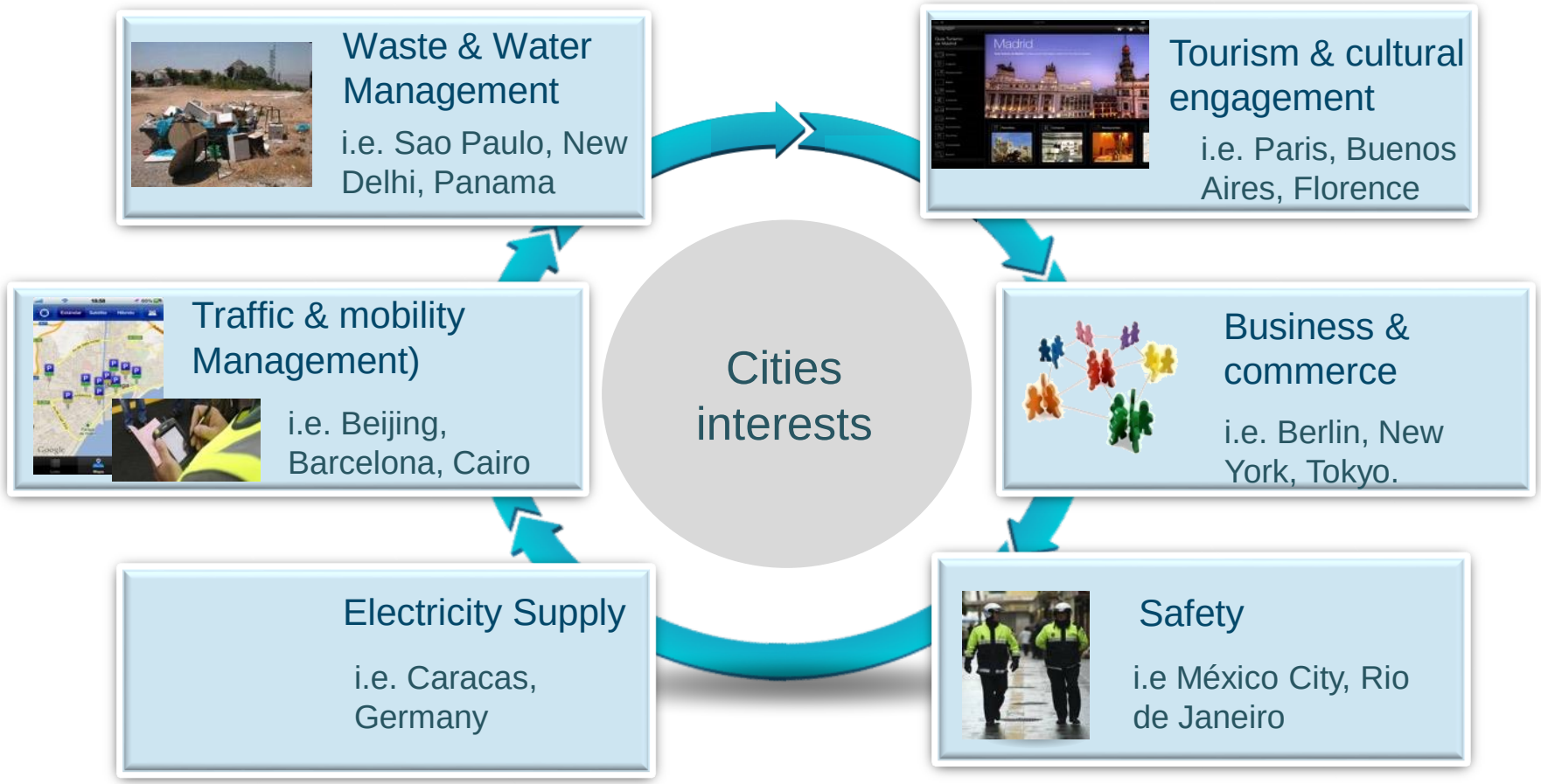
“Smart technologies could help the 15 million people living in my city save lots of energy.”

XIAOFEI (TJANJIN, CHINA)

“Whether I go jogging in the park or come home late – I want to feel safe.”

PAULA (BERLIN, GERMANY)

City challenges vs citizens interests



Sources: (1) McKinsey Global Institute - Big Data Report. (2) 2012E, Strategy Analytics , Global Social Network Market Forecast.

Cities face quite similar challenges, most of them related to sustainability

What Exactly is a Smart City?

Video: https://www.thalesgroup.com/en/markets/digital-identity-and-security/iot/inspired/smart-cities

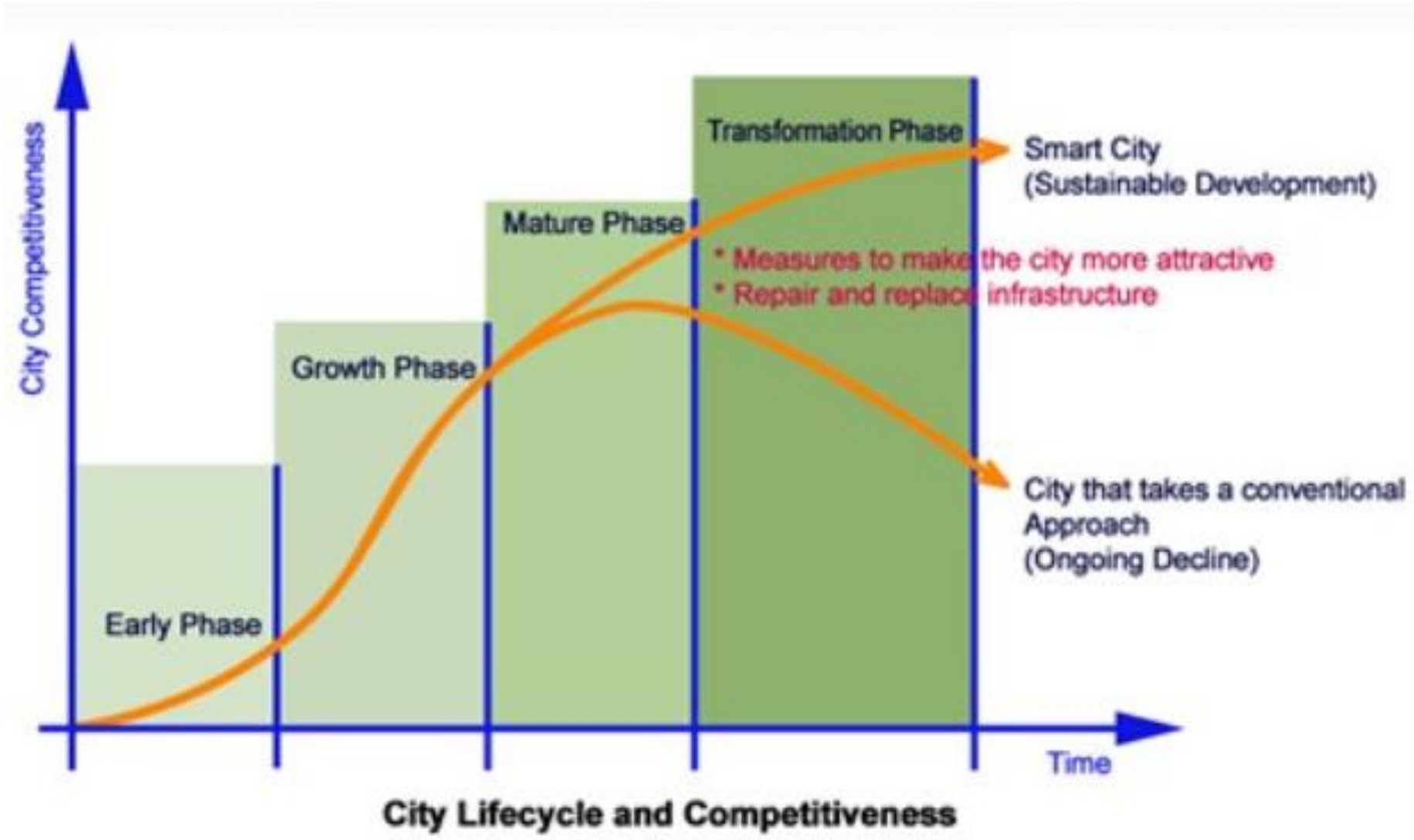
International definition

"*A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to* ***economic, social, environmental as well as cultural aspects***".

UNECE

Smart Sustainable Cities

What Smart cities are needed now?



Smart city: introduction

Definition of Smart City *by Boyd Cohen*:

- Smart cities use information and communication technologies (ICT) to be more intelligent and efficient in the use of resources, resulting in cost and energy savings, improved service delivery and quality of life, and reduced environmental footprint--all supporting innovation and the low-carbon economy.

Origin of Smart city

- The concept of smart cities originated at the time when the entire world was facing one of the worst economic crises. In 2008, IBM began work on a 'smarter cities' concept as part of its Smarter Planet initiative. By the beginning of 2009, the concept had captivated the imagination of various nations across the globe.

Initiative of European cities for being Smart

- European cities tend to be denser and have better public transit.
- Larger commitment to cycling and walking.
- A stronger focus on sustainability and low-carbon solutions.

Smart cities for growing population

There is a worldwide trend toward Smart Cities as shown by the following:

- Half of the world population is living in cities in 2013
- Half of the population of Asia will be living in cities by 2020
- Half of the population of Africa will be living in cities by 2035
- Population in cities is expected to grow from 3.6 Billion to 6.3 Billion by 2050.
- Over 50% of urbanization involves cities of less that 500K people
- India's Population in 2011 was 1.21 billion
- Current Population of India in 2014 is 1.27 billion
- Nine satellite cities could be covered under this scheme.
- About 44 cities with 10 lakh to 40 lakh population, 17 state capitals, 10 tourist and religious cities and another 20 with 5 lakh to 10 lakh population could also make it to the list.

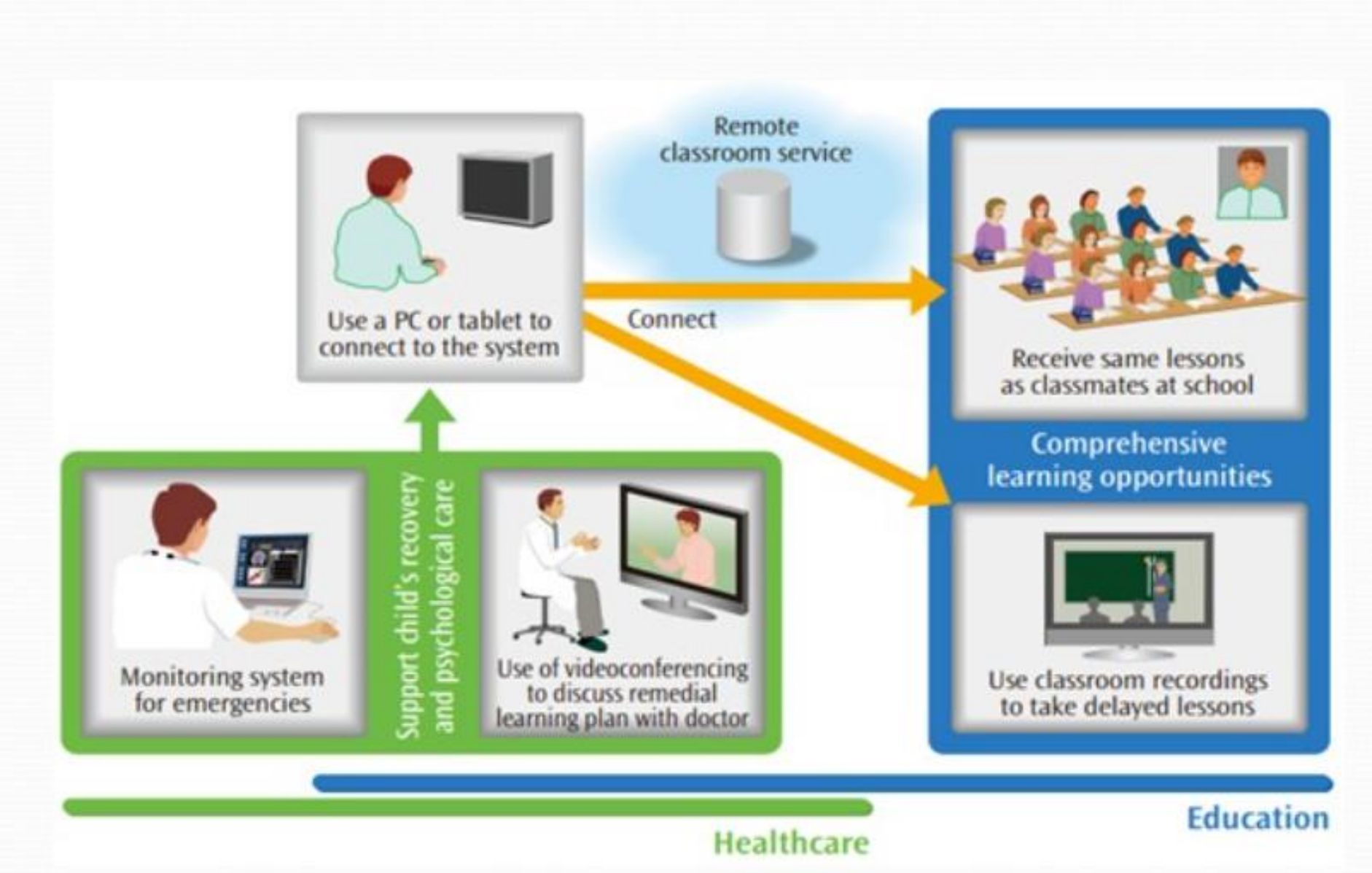
"Smart cities" includes

- Smart Living
- Smart Building & Home
- Smart Transportation
- Smart Energy (Renewable generation & storage, AMI,PQM,PLM,OMS)
- Smart Water Management
- Smart Waste Management(Recycling of waste, residual management, Recovery of waste organics & Energy)
- Smart Education(e-Education)
- Smart Governance(e-governance)
- Smart Medical Facility(e-Medical)
- Smart Communications
- Smart Networks
- Environmental Awareness (i.e. changing weather conditions; human defined changes)

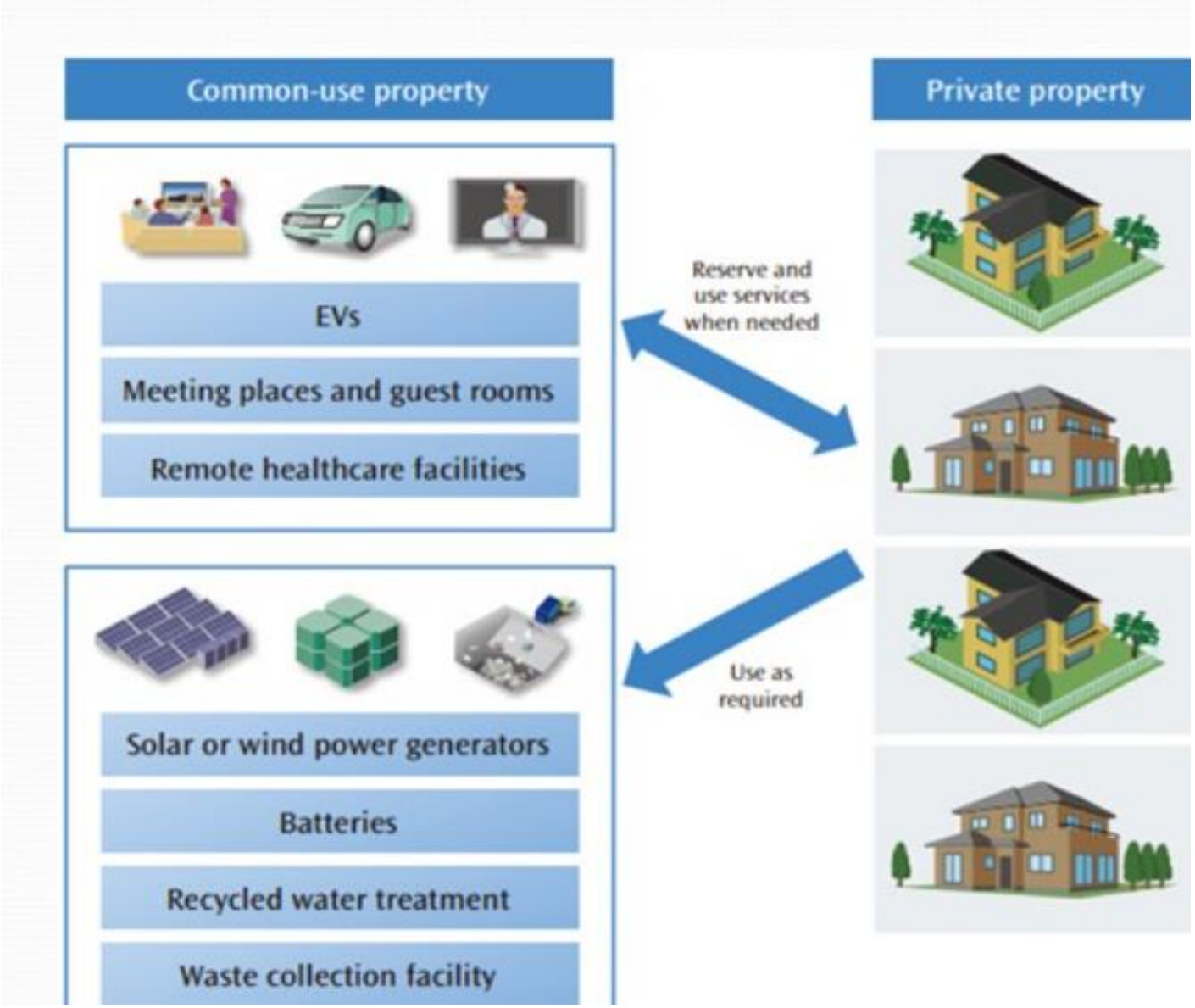
Different approaches of the Smart city

Different approaches of the Smart city (1)

Different approaches of the Smart city (2)



Different approaches of the Smart city (3)



Shared use
of neighborhood facilities

Smart city development models and concepts

The Smart Transportation model

The smart transportation model refers to cities that aim to control urban congestion by leveraging technologies, such as IT and communications as well as public transportation, car sharing and/or self-driving cars.

Singapore and Dubai are included in this group.

Video: https://edition.cnn.com/style/article/dubai-autonomous-public-transport/index.html

The Essential Services Model

The essential services model characterizes cities by their use of mobile networks in emergency management and health-care services. Cities like Tokyo and Copenhagen already have mature communication infrastructures and have invested in a few, well-chosen programs

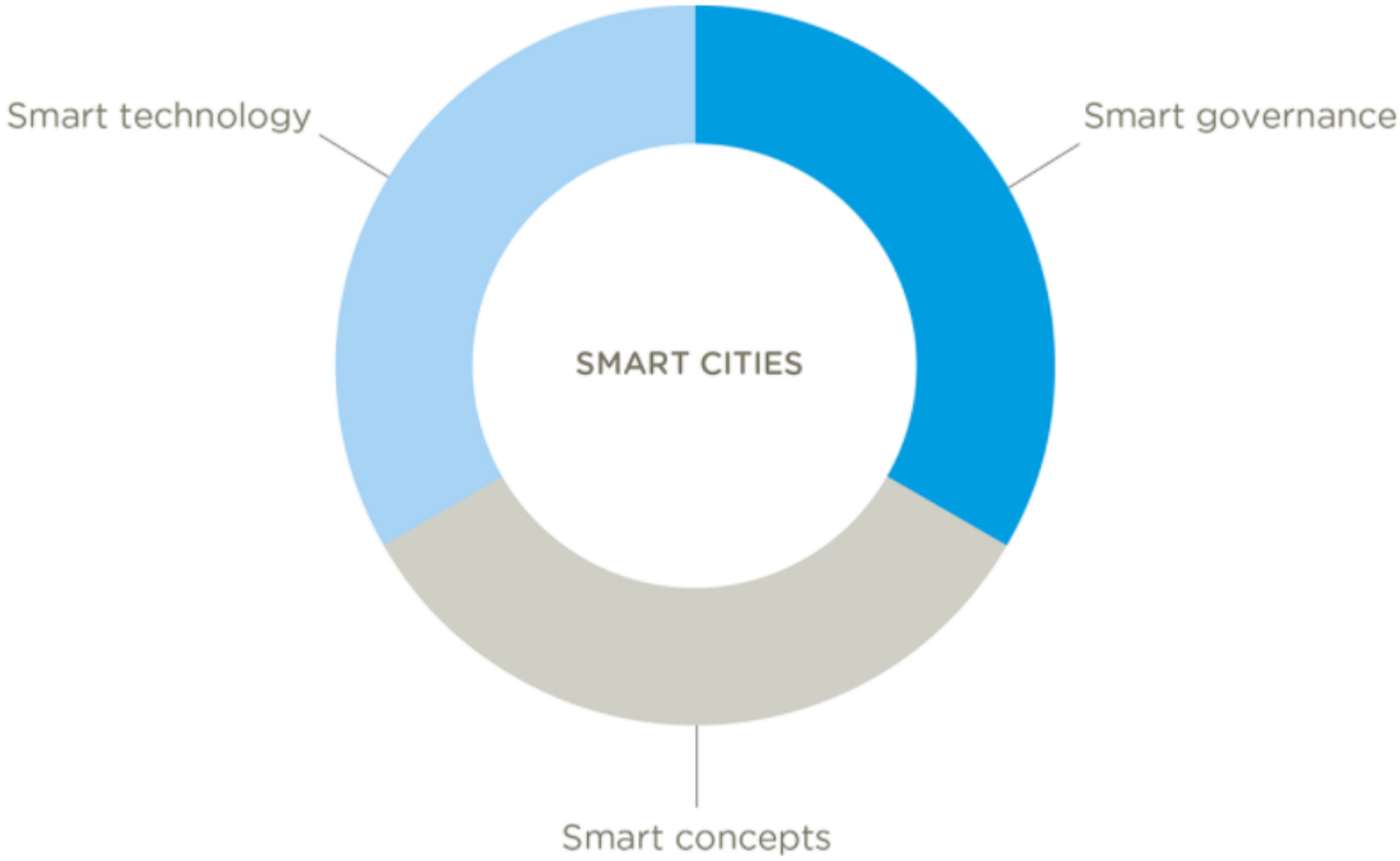
The broad spectrum model

Cities using the broad spectrum model tend to have a high level of civic participation and emphasize management of urban services, such as water, sewage and waste as well as pollution control

The Business Ecosystem Model

The business ecosystem model is the most common tactic. It uses technology development to jumpstart economic activity by investing in digital skills training and supports high-tech businesses

Smart city development models and concepts



The Smart city standard: ISO 37120

“Smart” describes the city’s ability to create well-being for its citizens

The Smart city standard: ISO 37120

Sl No.	Title	Core Indicators
1	The long road to zero waste cities	Solid waste collection & its recycling.
2	Economic indicators in the new smart city standard	City's unemployment rate and population living in poverty.
3	Why education may be the most important smart city indicator of all?	Female school-aged population enrolled in school, students completing primary education & secondary education, student/teacher ratio.
4	Does your city's air quality measure up to the new smart city standard?	Particulate matter (PM2.5- PM10) concentration and Greenhouse gas emissions measured in tonnes per capita.
5	How debt, spending and tax collections add up in new smart city standard?	Debt service ratio.
6	Fire and emergency response indicators -- how safe is your city?	Number of firefighters, fire related deaths and natural disaster related deaths.

The Smart city standard: ISO 37120

Sl No.	Title	Core Indicators
7	How voting, women and corruption figure in the smart city standard	Voter participation in last municipal election and Women as a percentage of total elected to city-level office.
8	How healthy is your city?	Average life expectancy, no. of in-patient hospital beds & no. of physicians, mortality rate.
9	How fun is YOUR city?	None
10	How safe is your city?	Number of police officers & homicides.
11	The homeless challenge cities face	City population living in slums.
12	What the new smart city standard says about energy?	Residential electrical use per capita (kWh / year), city population with authorized electrical service, energy consumption of public buildings per year (kWh / m2) and energy derived from renewable sources.

The 10 Smart cities in Europe

The 10 Smart cities in Europe

1. COPENHAGEN
2. AMSTERDAM
3. VIENNA
4. BARCELONA
5. PARIS
6. STOCKHOLM
7. LONDON
8. HAMBURG
9. BERLIN
10. HELSINKI

The Smart cities in Europe (1)

No. 1: COPENHAGEN

- Led the Siemens Green City Index for Europe
- One of the lowest carbon footprints/capita in the world (less than two tons/capita).
- Aspire to achieve carbon neutrality by 2025
- All new buildings to be carbon neutral (green building).
- Approximately 40% of all commutes are conducted by bike.
- The city also recently collaborated with MIT to develop a smart bike equipped with sensors to deliver to provide real-time info to not only the rider but also to administrators for open data aggregation on issues of air contamination and traffic congestion.

No. 2: AMSTERDAM

- 67% of all trips are done by cycling or walking.
- First bike sharing project in the world was occurred in Amsterdam decades ago.
- At present 40 smart city projects ranging from smart parking to the development of home energy storage for integration with a smart grid.

No. 3: VIENNA

- The "Citizen Solar Power Plant" being developed with a goal of obtaining 50% of their energy from renewable sources by 2030.
- Testing out a range of electric mobility solutions from expanding their charging network from 103 to 440 stations by 2015.
- Residents are sharing vehicle with neighbors.

No. 4: BARCELONA

- Bike-sharing project with more than 6,000 bikes.
- Using various sensors from noise and air contamination to traffic congestion and even waste management.
- The life expectancy in Barcelona is among the highest of cities (approx 83 years).

No. 5: PARIS

- The city has more than 20,000 bikes for sharing.
- 5% reduction in vehicle congestion in the city.
- The city partnered with Bolloré to create one of the world's first and most expansive EV car sharing programs.
- Autolib' will soon have 3,000 EVs in its car sharing fleet.
- Paris' ecosystem was rated 11th best in the world.

The Smart cities in Europe (2)

No. 6: STOCKHOLM

- About 40% of its land mass is dedicated to green space.
- Rated 2nd in Siemens Green City Index.
- Citizens are also amongst the highest per capita users of the Stockholm Metro system.
- Aspires to become carbon neutral, by 2025.
- Endeavour to boast about its 800 kilometers of cycling paths.
- Received top marks for its commitment to digital governance.
- Scored 1st amongst cities for its commitment to data privacy and security for citizens.

No. 7: LONDON

- Earned 1st place in the smart economy category and it has long been considered the financial capital of Europe.
- The Startup Genome project rated London the 7th best entrepreneurial ecosystem in world, and No. 1 in Europe.
- The greenest and smartest buildings of Europe is located in the city eg., The Crystal, built by Siemens.

No. 8: HAMBURG

- 2nd largest city in Germany and the 1st of two to make the top 10 ranking this year.
- Awarded the European Green Capital designation in 2011.
- High standard of living having been ranked 17th globally by Mercer in 2012 and 8th globally by Numbeo.
- Wide scale transformation is taking place at 157 hectares, Hafen City (Harbor City) ,which is Europe's largest urban regeneration project.

No. 9: BERLIN

- Berlin is able to attract and retain the creative class and it has two zoos, three major opera houses, seven symphony orchestras, and scores of museums
- People prefers to walk instead of use car to travel short distance.

No. 10: HELSINKI

- The 10th and final spot in this year's rankings by barely edged out Oslo.
- Having more than 1,000 open datasets and have been actively promoting engagement with developers through collaborative computer programming.
- Launched Virium Smart City Project to provide ubiquitous data to their citizens in hopes of improving quality of life.

European Green Capital Indicators

1. Climate change: mitigation and adaptation
2. Local transport
3. Green urban areas incorporating sustainable land use
4. Nature and biodiversity
5. Ambient air quality
6. Quality of the acoustic environment
7. Waste production and management
8. Water management
9. Waste water treatment
10. Eco innovation and sustainable employment
11. Energy performance
12. Integrated environmental management

Examples: new highlights

The new smart city – from hi-tech sensors to social innovation

- At last week's Smart City World Expo in Barcelona, Jong-Sung Hwang, former CIO of the Seoul metropolitan government, informed of the city's attempt to capture real-time traffic data. For years the city invested millions of dollars in sensors embedded into the road infrastructure.
- Open311 interface allows citizens to send photos or update reports on anything from pot holes to traffic signs, the imagination is the limit.
- Rio de Janeiro won best smart city 2013 at the World Expo, its Central Operations Centre the poster child of smart cities– a hub of 400 staff, myriad screens and an 80 square metre master screen, viewing images from the streets, a smart map of live city transport, even predictive analytics .
- In 2012, however, the city's 25,000 taxis introduced a touch card payment system using GPS technology, effectively giving Seoul the real-time traffic information it had long craved at a fraction of the cost.

Biometric data could help create sustainable cities of a smart nature

- Biometric information is generated via sensors in electronic devices, such as GPS, accelerometers, light sensors and so forth. Fit these high tech gadgets with a low energy communication medium such as Bluetooth and the data created can then be read and potentially shared by smartphones and other internet-enabled devices.
- Wifi-enabled scales that measure your body fat percentage as well as your weight, heart rate monitors, and so on. Apps such asEndomondo and RunKeeper are helping cyclists and runners keep tabs on their physical exertions as well as track their routes and speed.
- He cites the use of GPS data to determine individuals' real-life travel patterns. Understand that en masse and you can optimise the linkages between forms of public transport or the design of new roads or cycle paths.

Data is already affecting street lights in Barcelona

- In certain areas of Barcelona, Cisco use video to identify the density of public squares. And suing these data the intensity of street lights can be changed.
- The company matches that data alongside other elements, such as whether there is a half- or full-moon and sends instructions of whether to reduce or increase the brightness of the LED street lights.

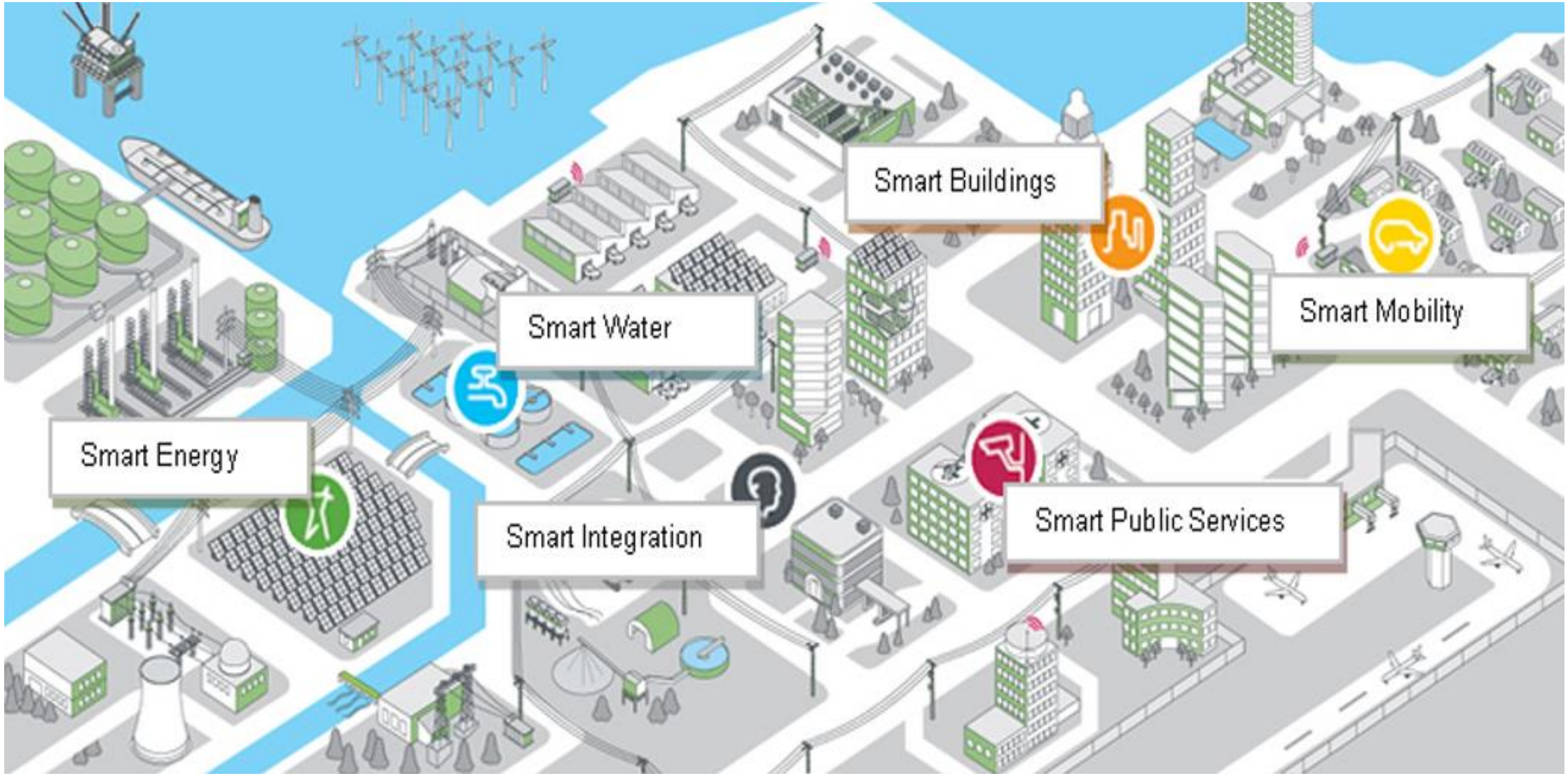
Examples: new highlights

Smart Sensors Provide Cost-Saving Solutions in Finland

- In the summer overfilling at the local recycling stations was becoming more common, causing increased littering and cleaning costs. Customers were demanding increased collection intervals, while the service was getting too expensive to maintain.
- The wireless fill-level sensor system provided by Finland-based logistics solution company Enevo, a Council Associate Partner, measures and forecasts when waste containers will be full. Reduce the amount of collections by 51%.

Video: https://reuters.screenocean.com/record/159868

Smart cities: fundamentals

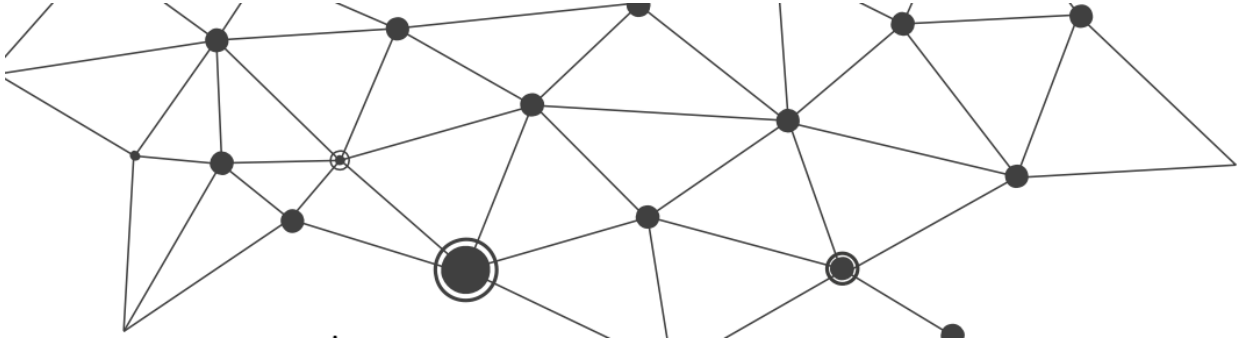


Key findings

- Due to rapid urbanization, many cities have ageing infrastructure with high replacement costs. Converting existing infrastructure to smart infrastructure is the key to improving city operations, and it is directly correlated to quality of life improvements

- Smart technology is a key enabler in achieving sustainable and livable cities. Making informed decisions about which technologies best support a city’s overall development strategy depends on establishing the right governance and identifying the most suitable technical concepts

- The system-of-systems model is the one that provides the best, long-term chances of truly making cities smart; however, it must start with the most important system: people



Дякую!

Dziękuję!

Рахмат!

Salamat!

Շնորհակալություն!

Faleminderit!

Спасибо!

Благодаря!

Gracias!

Didi madloba!

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