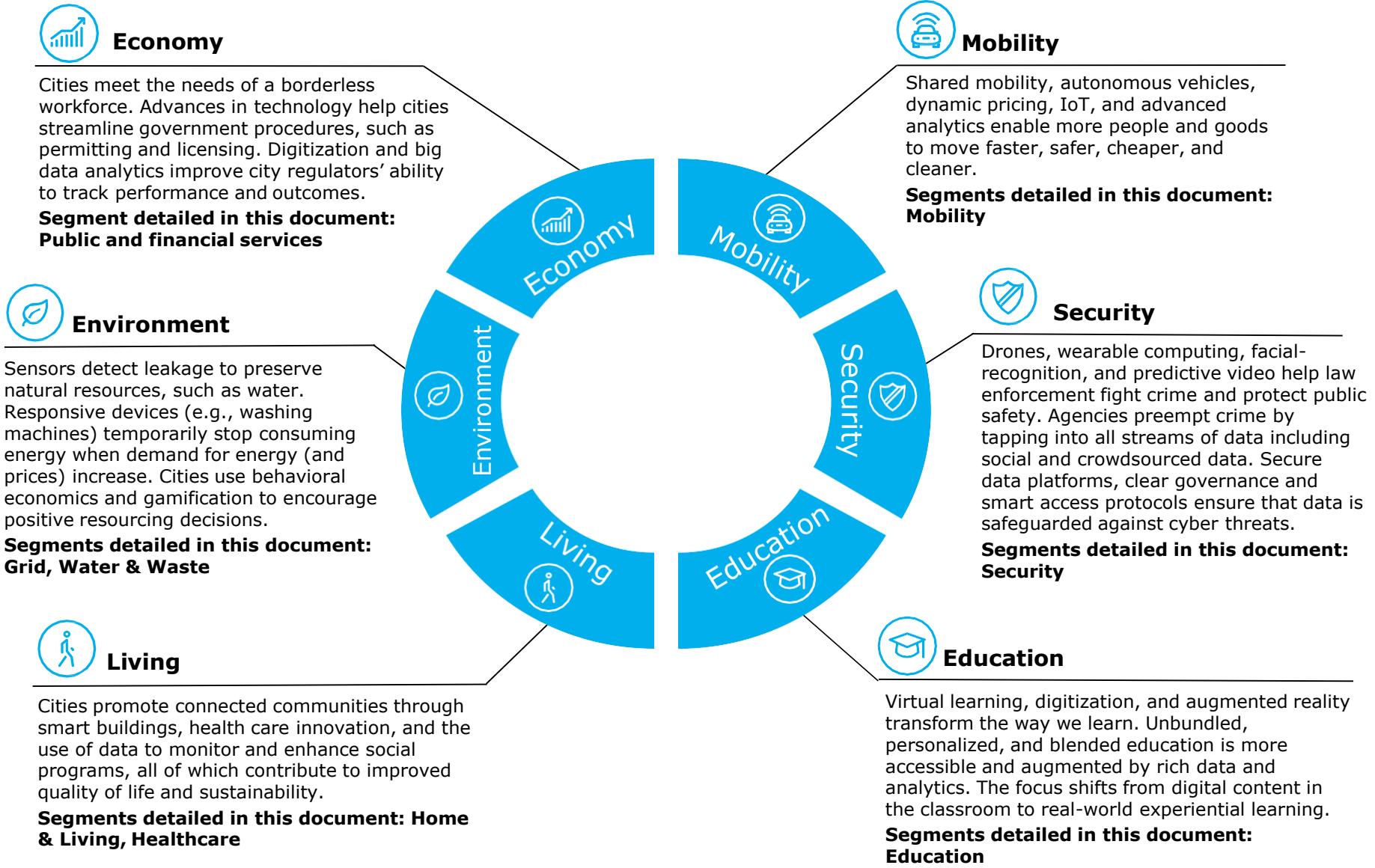




Smart Cities

Smart City Domains



Technology is integral to the global smart city concept...

Sustainability, quality of life, urbanization and intelligence are key attributes of smart cities as defined by governments, academia, industry associations and corporations. As per International Telecommunication Union's (ITU) analysis, Information and Communication Technology(ICT) is the most common attribute in global Smart City definitions.



A city can be defined as 'smart' when investments in human and social capital, and traditional (transport) and modern (ICT) communication infrastructure, fuel sustainable economic development and a high quality of life, with effective management of natural resources.¹

During the **Focus Group on Smart Sustainable Cities** meetings in October 2015 in Geneva, the following definition was agreed upon for smart cities²:

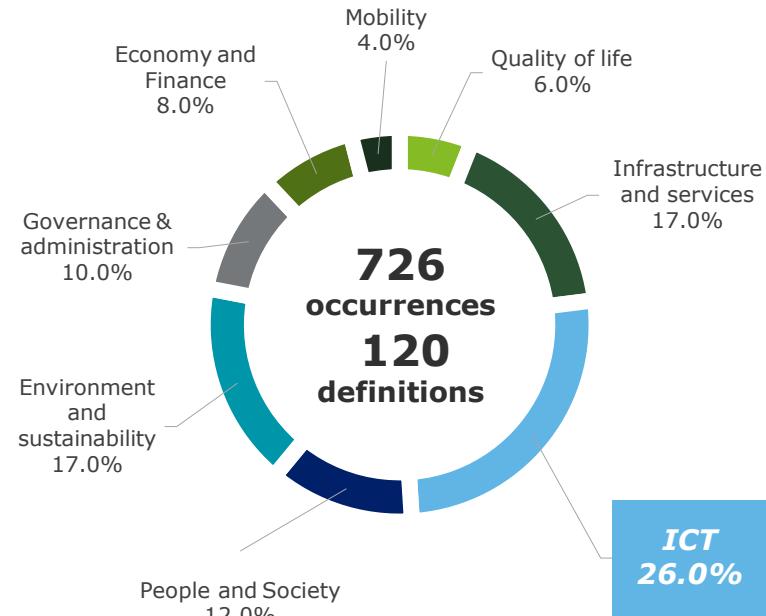
"A smart sustainable city is an innovative city that uses ICTs and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well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

Key objectives of a Smart City development

- Improve the quality of life of its citizens.
- Ensure tangible economic growth via higher standards of living and employment opportunities
- Improve the well-being of citizens including medical care, welfare, physical safety and education.
- Establish environmental responsibility and sustainability
- Streamline the physical infrastructure based services such as transportation, water, energy, telecommunications, and manufacturing
- Reinforce prevention of natural and man-made disasters including the impacts of climate change.
- Provide effective policy framework for regulatory, compliance and governance mechanisms

Source: Deloitte, ITU

**Key words across Smart City definitions²,
ITU** (International Telecommunication Union)**



****Statistics based on ITU's analysis of 120 global definitions as stated by governments, academia, industry associations and corporates**

Demographic and environmental pressures converging with technology advancements to help drive demand for smart cities

To counter imminent urbanization challenges, governments across the globe are leveraging disruptive technologies to speed adoption of smart city solutions.

Challenges emerging from urbanization

By 2025, **58% of the global population will be living in the urban areas¹**, mounting pressure on city infrastructure, resulting in key urbanization issues:

-  **Traffic congestion:** Urban commuters in the U.S collectively lost 6.9 billion hours to traffic delays in 2014²
-  **Water shortage:** Globally, water shortage will diminish global GDP by 6% by 2040³
-  **Power shortage:** World Bank estimated that 5% of electricity sales were lost globally due to outages in 2015⁴
-  **Waste volume:** Global waste volume is projected to reach 22.1 bn tons in 2016, from 20.9 bn tons in 2015⁵
-  **Air pollution:** According to WHO, global urban air pollution levels have increased by 8% from 2008 to 2013.⁶

Digital transformation

Disruptive technologies are rapidly gaining traction, enabling the seamless implementation of smart cities:

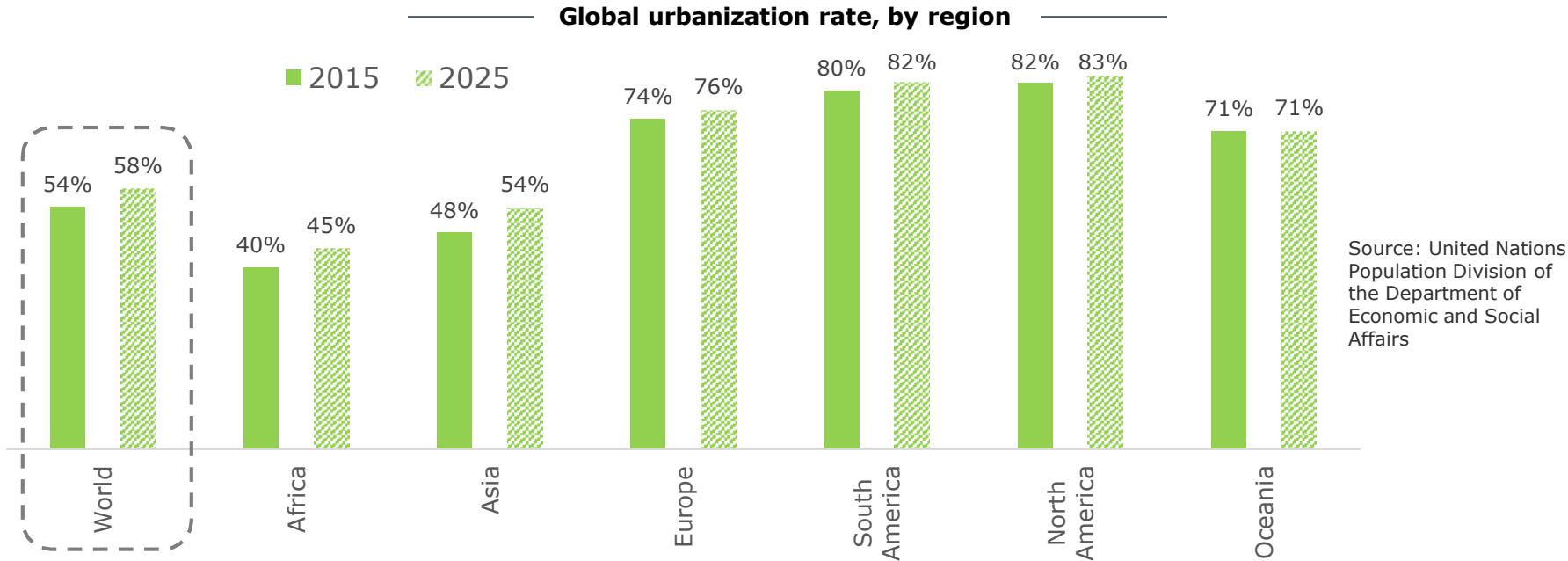
-  **IoT** in smart cities market is projected to grow at a **CAGR of 23.2%** to reach USD147.51 billion by 2020 from USD51.96 billion in 2015⁷
-  **Global market for sensors** and related technologies is projected to grow at a **CAGR of 10.1%** to reach USD154.4 billion by 2020 from USD95.4 billion in 2015⁸
-  **Global cloud services** market is projected to grow at a **CAGR of 17.6%** to reach USD555 billion by 2020 from USD209.9 billion in 2014⁹
-  **Big Data** market is projected to grow at a **CAGR of 20.5%** to reach USD57.3 billion in 2020 from USD22.6 billion in 2015¹⁰
-  **Cognitive computing** market is projected to grow at a **CAGR of 33.1%** to reach USD13.7 billion by 2020 from USD2.5 billion in 2015¹¹

A city is smart when investments in (i) human and social capital, (ii) traditional infrastructure and (iii) disruptive technologies fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance.¹²

⁵ Please refer to [slide 110](#) for detailed references

Growing urbanization will continue to pressure the global urban infrastructure over the next decade

Municipalities worldwide are under pressure to ensure their infrastructure supports growing demand for housing, municipal services and efficient transport. Urban communities also seek reliable water, power and communication access.



Traffic congestion	Water shortage	Power shortage	Waste volume	Air pollution
<ul style="list-style-type: none">Urban commuters in the U.S. collectively lost 6.9 billion hours to traffic delays in 2014¹Excess fuel and lost productivity totaled USD160 billion in 2014¹	<ul style="list-style-type: none">Globally, water shortage will diminish global GDP by 6% by 2040²Middle East, Central and East Asia may lose nearly 14%, 11% and 7% of their GDP, respectively³	<ul style="list-style-type: none">World Bank estimates that 5% of electricity sales were lost, globally, due to outages in 2015⁴Power shortages in U.S. and India totaled USD 180 bn and USD 68 billion of GDP, respectively^{5, 6}	<ul style="list-style-type: none">Currently, 3.0 bn people globally lack access to waste disposal facilities⁷Global waste volume is projected to increase to 22.1 bn tons in 2016, from 20.9 bn tons in 2015⁸	<ul style="list-style-type: none">According to WHO, global urban air pollution levels have increased by 8% from 2008 to 2013⁹The highest urban air pollution is experienced in Southeast Asia⁹

Source: UN; Forbes; The Guardian; WRI; World Bank; WHO

Please refer to [slide 112](#) for detailed references

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Smart cities offer urban cities sustainable economic growth...

Being well-connected, Smart Cities tend to be more resilient than other developed urban areas. A Smart City enabled by ICT and smart grid technology helps cities manage energy consumption more efficiently and enable governments to respond proactively to critical situations.

Goals

- Improved quality of life
- Enhanced ecological footprint
- Government budget surplus resulting from lower expenses
- Energy efficient city with lower pollution levels

Factors for success
<ul style="list-style-type: none">• Public-private ecosystems• Technology adoption• Business attractiveness• Data transparency• Innovation culture• Human capital



Growth Drivers
<ul style="list-style-type: none">• Technological disruptions• Greenhouse emissions• Poor mobility in big cities• Growing urbanization• Energy supply-demand imbalance• Need for sustainability

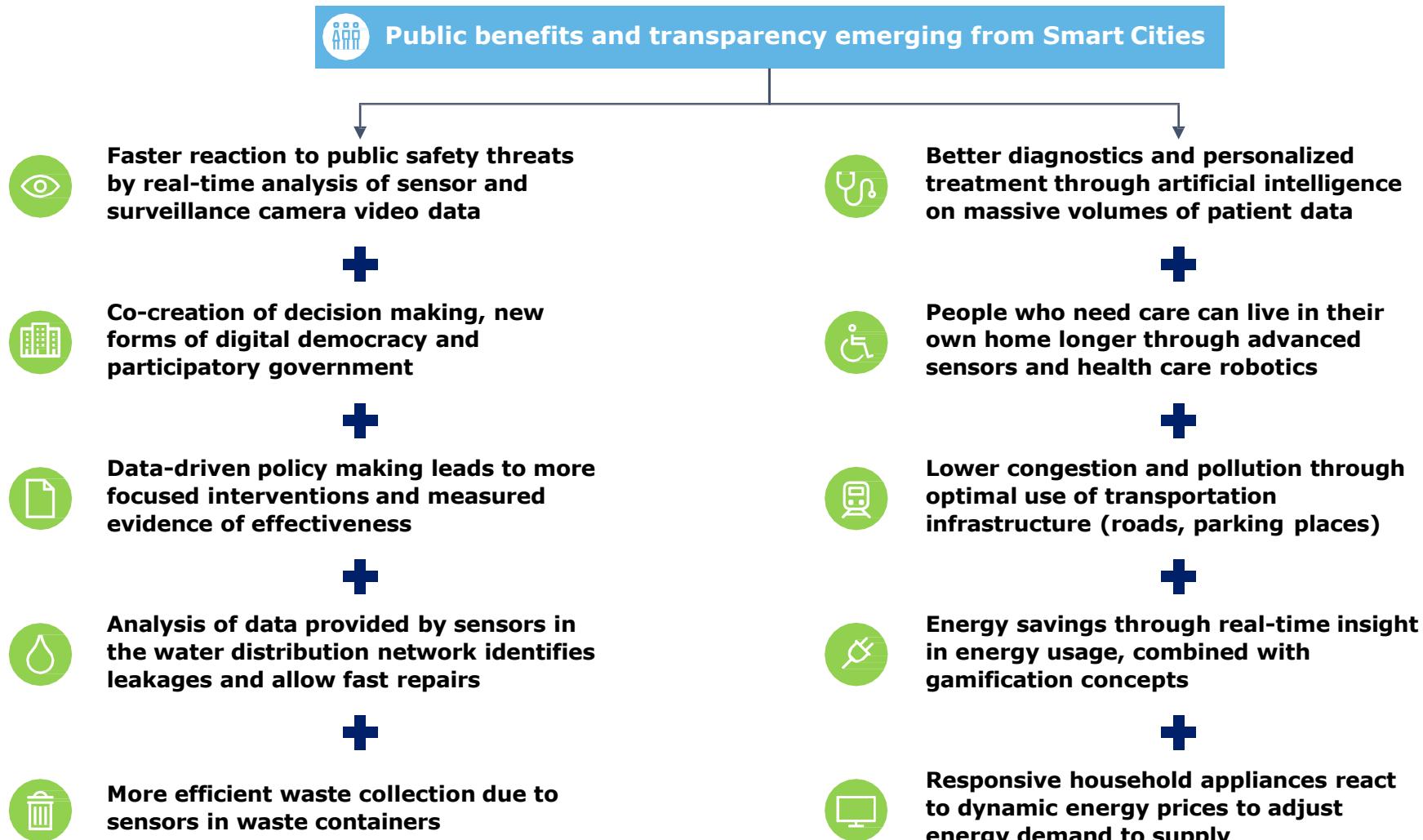
*Smart energy includes – Smart Grids and Smart Water & Waste

	+1.0%	Lower unemployment rate (% points) recorded by cities that invest in smart grid technology and infrastructure* ¹⁰
	+0.7%	Higher GDP growth rate recorded by cities that invest in smart-grid and infrastructure* ¹⁰
	+2.5%	Higher office occupancy rate recorded by cities that invest in smart grid technology and infrastructure* ¹⁰
	+1.0%	Growth in GDP growth, resulting from every 20% increase in ICT investments ¹¹

*Based on Jones Lang LaSalle's analysis of the GDP growth rate, unemployment rate and office vacancy rates of the top 10 Smart Grid Cities in America (US News Report) as compared to the national average

...and enhance quality of public services through adoption of smart solutions

The end objective of Smart Cities is to enhance the quality of life for citizens. A robust Smart City ecosystem helps enable efficient and sustainable urban living.



Driven by ICT infrastructure, European smart city initiatives appear the most efficient with most already in the implementation phase

Smart cities adoption is also witnessing significant traction in Asia, due to the increasing interest from emerging countries, including China and India.

	Smart city initiatives	Objective	Challenges	Investments
Asia Pacific	Singapore's Smart Nation	To cater urbanization issues	High population density and aging workforce	USD3.1 B
	Songdo International Business District	To support Seoul in managing urbanization issues	Lack of proper implementation and sustainability roadmap	USD40 B
	China's Smart City Action Plan for Guangdong, Hong Kong, and Macao	To boost China's economy	Policy paralysis	USD160 B
	India's Smart Cities Mission	To achieve greenfield and Re-development, and upgradation of city infrastructure	High population density and structural inefficiencies	INR508 B
	Australia smart city initiatives	To develop connected and sustainable infrastructure	Lack of proper implementation roadmap	USD150 M
Middle East	Smart Dubai	To be smartest and happiest city by 2020	Losses in water and electricity distribution	~USD15.6 B
	Lusail (Qatar) & Masdar (Abu Dhabi)	To enhance infrastructure and sustainability	Scarce natural resources and an unfavorable business environment	USD67 B
Europe	Smart City Barcelona	To provide smart services to citizens	NA	USD100 M
	Amsterdam Smart City	To become energy efficient and sustainable city	Cybersecurity	USD128 M
Americas	US Smart City Action Plan	To provide sustainable solutions for urbanization issues	NA	USD160 M
	Chile and Brazil Smart City initiatives	To enhance city infrastructure	Inadequate financing and lack of coordination among city administrators	USD40 M for Brazil initiatives



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