

# Office perspective: Smart cities

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## Smart cities are pioneering innovative infrastructure that will change how we work, live and connect

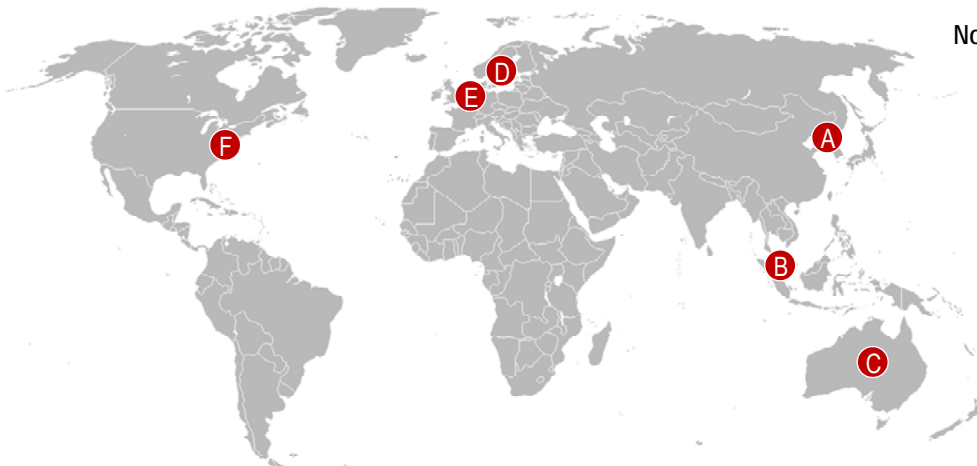
Over the past century, the physical and economic makeup of cities has shifted markedly, from the compact, dense urban cores in the early 20<sup>th</sup> century that gave way to rapid post-World War II suburban development, only to swing back to an inner-city renaissance driven by shifting preferences for walkability, access to amenities and more efficient mass transit. Local governments across the United States have embraced this changing paradigm, but it is the accelerated pace of technological innovation that will fundamentally alter city planning, development patterns and interaction between individuals, ultimately leading to structural shifts in the real estate market across property sectors.

The 21<sup>st</sup> century has seen the patchwork evolution of “smart cities,” a term used to describe the integration of new technologies in both existing cities and master-planned communities. The concept of a smart city can range from a completely new business district totaling millions of square feet to incorporating real-time traffic management systems, making smart cities difficult to define. The Smart Cities Council defines smart cities as those that have “digital technology embedded across all city functions,” while the Institute of Electrical and Electronics Engineers (IEEE) describes them as “bringing together technology, government and society” across the economy, mobility, environment, people, living and

governance. Broadly speaking, smart cities take technology and incorporate them fully to augment economic growth, transportation of goods and services, living standards and public-sector response.

The implications for this level of technological implementation are vast, particularly in the United States, where movements to densify urban cores and suburban hubs are bringing about new opportunities to test and implement “smart” technologies and policies. Smart cities can bring about hyper-connected workplaces in fully integrated business districts, while drawing from a much larger talent pool. Similarly, smart technologies can push down operating expenses through lower energy costs and simplified maintenance. For the public sector, automation of currently manual activities can allow capital to flow elsewhere as needed and ensure greater financial flexibility, while at the same time improving infrastructure in times of greater demand.

In order to take advantage of these opportunities, however, both the public and private sectors will need to be actively prepared to make large investments in retrofitting and future-proofing existing assets as well as develop longer-range plans for implementation of new technology, some of which may not be fully developed.



### Notable smart city developments and frameworks

- A Songdo Int'l Business District
- B Virtual Singapore
- C Australian Smart Cities Plan
- D Stockholm GreenIT
- E Amsterdam Smart City
- F Gramercy District (Loudoun)

## Songdo International Business District

Situated in the Seoul satellite city of Incheon, the Songdo International Business District is one of the largest master-planned business districts in the world. Costing more than \$35 billion, upon full build-out, it will contain 40 m.s.f. of office space, 10 m.s.f. of retail and more than 20,000 residential units. The Songdo IBD's advanced pneumatic waste collection system and extensive network of sensors significantly reduce both municipal costs and wear-and-tear on infrastructure, while enabling it to achieve emissions up to 70 percent below those of peer business districts.

Among the reasons for the Songdo IBD's continued development is proximity and infrastructure, which have become necessary across both smart and traditional cities to retain both employers and employees as well as increase competitiveness as mobility is expanded globally. The IBD's high-density spine is built on top of Line 1 of the growing Incheon Subway and the city is within quick reach of Incheon Airport and the urban core of Seoul. The IBD is estimated to be within a 3.5-hour flight of roughly one-third of the world's population, giving it a competitive advantage in a fast-growing economic region.

## Virtual Singapore

Singapore is a leader in the development and implementation of smart city technologies. Scarce on land and facing population growth pressures, it has undertaken numerous initiatives along with a raft of infrastructure investment. Sensors embedded throughout the city to monitor traffic flow, climate, pedestrian activity, stormwater and waste feed data into a 3-D modeling system known as Virtual Singapore. Developed by the Singaporean government and Dassault, it uses inputs from these sensors as well as base data from the Urban Redevelopment and Singapore Land Authorities to create a simulated city with unparalleled precision.

Virtual Singapore's wide reach can improve citizens' health, quality of life and ability to move and communicate through the city. The incorporation of land use and transportation is of particular importance to real estate: data entered and analyzed in the system will allow planners and developers to determine optimal schemes for redevelopment projects by studying the fine-grained movement of people and goods and using these results to make transportation, energy use and planning more efficient, with the goal of lowering costs while making the city more adaptive to rapid change.

## Australian Smart City Plan

Australia is one of the most urbanized countries in the world: 72.3 percent of its population resides in its 10 largest cities. Sustained economic and population growth has resulted in densification within major cities, putting strain on already overloaded infrastructure. At the same time, the country faces numerous climactic challenges, meaning that investments must take into account climate mitigation and adaptation. To tackle these issues, the Australian government put together the Smart Cities Plan to create a common set of priorities for urban development an action across housing, transportation, employment concentration and the environment.

The plan is one of the first high-profile examples of national guidance for policies that directly pertain to smart cities. It is also a demonstration of the need for the public and private sectors to work together to achieve better outcomes. The plan's emphasis on fostering partnerships between universities, cities and employers will further many of the technological R&D aims found elsewhere in the program. Similarly, real-time and open-source data will catalyze far-reaching solutions to a range of urban issues and improve citizen participation in the evolution of cities.



## Stockholm Green IT

Green IT is a core component of Stockholm's Vision 2030 long-term development plan that looks at both environmentally conscious planning as well as using technology to realize greater efficiency gains and more aggressive carbon emissions and pollutions targets. The city identifies eight "action areas" for eco-tech activity: buildings, visualization of energy consumption, transportation, digital interaction, e-services, processing activity, waste IT procurement and data centers and communications. Green IT has been recognized as a leading policy initiative; Stockholm was named the European Green Capital by the EU in 2010.

Stockholm's emphasis on eco-friendly travel and transportation are particularly relevant as the city is one of the fastest-growing in Europe but its additional capacity is constrained by geography. The creation of a smart transportation network, in tandem with rail and road improvements, will open up new districts for development, relieving pressure on the core. At the same time, the city is a leader in innovative technology; partnerships with the private sector will likely feed back into the smart grid and foster organic growth and demand for real estate across property types.

## Amsterdam Smart City

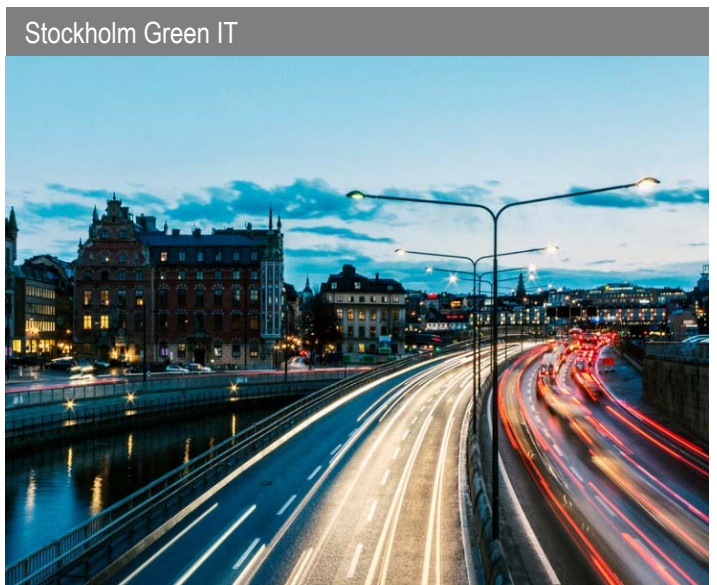
The Amsterdam Smart City initiative was established in 2009 as a government-hosted and citizen-led think tank of ideas for ways to revolutionize all aspects of city living and functioning through new technologies. ASC takes the smart city movement to a more comprehensive level, encompassing the goal of becoming a circular city ("closing the loop of production, consumption and distribution" through aggressive recycling and reuse targets) as well as active citizen engagement.

Amsterdam Smart City broad and varied reach extends into most facets of daily life. In doing so, it has created a new economic and research engine that will diversify the city's economy and that has established is as a disproportionate contributor in technology, digital media and research and development. Coupled with a highly stable economy and transparent property market, Amsterdam's status as a European gateway for capital and educated pool for talent will continue to grow. Investors and tenants alike will benefit from advanced technology in many cases being first to market, lowering operating costs and increasing digital reach.

## Gramercy District (Loudoun County)

The Gramercy District masterplan represents one of the largest and most high-profile attempts to develop a smart city in the United States. A partnership between 22 City Link, Microsoft and a group of engineering and technology companies, it will comprise 2.5 million square feet of residential, office, retail, hotel and other commercial real estate in the Northern Virginia suburb of Ashburn. It will be seamlessly linked together through an "intelligent living platform" that includes inter-building and integrated infrastructure communications technology.

In addition to applying smart city principles to a new, suburban development, the design of the Gramercy District embodies many of the elements that make specific submarkets desirable and that allow them to thrive. It is located near the country's densest concentration of cybersecurity developers as well as Dulles Airport to retain a competitive edge for relocating tenants and drawing employees, it has been designed with Metro access in mind and will incorporate numerous property types to improve resilience against macroeconomic cycles and will establish a sense of place to move away from a traditional nine-to-five model.



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# Smart city attributes and real estate implications

## LOCATION

Smart cities in geographically favorable locations benefit from reduced infrastructure costs, greater competitiveness and more use from residents and visitors alike. As urbanization continues, proximity to major transportation hubs and businesses will be critical in differentiating leading and lagging submarkets and micromarkets.

## ▼ THE REAL ESTATE IMPLICATIONS

Tenants opting for smart cities with local, domestic and international access are able to source from a larger talent pool. A combination of locational advantage and integration of technology will see assets register longer-term return on investment, particularly those that capitalize on access by public transportation and nearby airports.

## DATA-DRIVEN

Extensive data collection, monitoring and analysis are necessary for fully realizing the benefits of smart cities. Results can be used to determine optimal balance of uses in large developments with flexibility in terms of property types and outcomes. Vehicular and foot traffic and building materials are some of the additional areas of focus for data analysis.

## ▼ THE REAL ESTATE IMPLICATIONS

Planners and developers should incorporate lessons from existing smart cities with high levels of data aggregation such as the Virtual Singapore model as well as integrate data-collection systems into longer-term plans in order to better accommodate growth as well as shape new concepts for smart developments.

## GUIDANCE

Proactive creation of guidelines for smart cities is increasingly important as the rate of technological adaptation and innovation in the sector accelerates. Standards provide a consistent platform for both the development of new technology as well as its implementation. Successful guidelines are flexible enough to deal with localized issues.

## ▼ THE REAL ESTATE IMPLICATIONS

Departments at multiple levels of government should collaborate with the private sector as well as others who have overseen the creation of smart cities and implementation frameworks. Streamlined and consistent standards reduce the costs of both planning approvals and development, while making smart technologies more appealing to investors.

## ENVIRONMENT

Technologies used in smart cities are increasingly focusing on environmental impact and the need to mitigate and adapt to problems posed by climate change and environmental degradation. Plans to reduce waste and emissions as well as improve resiliency are now considered standard and in some cases mandatory.

## ▼ THE REAL ESTATE IMPLICATIONS

Although environmental regulations and planning procedures can increase the upfront costs for smart city development, they have been shown to reduce longer-term costs. For smart cities and major developments in environmentally sensitive areas, such as Hudson Yards and the core of Stockholm, environmental planning is critical for disaster risk management.

## CITIZEN ENGAGEMENT

Active participation from residents has been shown to be highly successful in smart city leaders such as Amsterdam, which have begun to export knowledge of smart city development to markets around the world. Engagement is likely to only further grow as smart cities become commonplace.

## ▼ THE REAL ESTATE IMPLICATIONS

Ensuring that data is available for the public to analyze and extrapolate into applications has a multiplier effect on research and development, creating diversified economic hubs as well as deeper talent pools. Developers of smart cities can capitalize on this trend by luring incubators as anchors for the office components of larger, mixed-use developments.

## U.S. IMPLEMENTATION

Few truly smart cities or smart developments have emerged in the United States, although the first major one – the Gramercy District in suburban Washington, DC – is currently advancing through the planning process. The project, partially funded by Microsoft, will be a test of the implementation of smart city planning in the United States.

## ▼ THE REAL ESTATE IMPLICATIONS

Although the United States has yet to see a significant proliferation of smart cities, there is a slew of large-scale, mixed-use, master-planned developments such as Hudson Yards (New York), Transbay (San Francisco) and the Seaport District (Boston) that stand to benefit from incorporating smart city technologies and policies.



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