



Areté Advisors
THE EXCELLENCE EDGE

SMART CITIES - MORE THAN JUST INFRASTRUCTURE AND TECHNOLOGY

Mukesh Khandelwal & Animesh Jain

THE NEED FOR SMART CITIES

The 21st century has seen Indians transforming into an urban species with ever-growing demand for better lifestyles and more resources. This has resulted in large-scale migration from villages to cities, and marks the beginning of a social evolution in the country. Thus far, cities have absorbed the pressure of this migration – on housing, physical and social infrastructure, urban services and governance – by growing organically and often rather haphazardly. However, the emergence of mega-cities such as Delhi, Mumbai, Bangalore and Pune has thrown up a host of challenges across areas such as urban mobility, pollution and air quality, crime and security, employment, social services and the like.

It is the authors' contention that these challenges will not be overcome by continuing to follow the urban growth path of the last decades, nor even by accelerating

'development' down this path. Yes, cities will have to grow spatially, urban infrastructure will have to be developed, and service capacity will have to be created. In addition, however, there is one more facet of urban development that is critical to cities' livability today – cities will need to become 'Smart'.

In order to meet the pressing urban challenge, the Government of India has announced an ambitious plan to establish 100 smart cities in the country by 2022. A large business opportunity is available for urban developers and for providers of ICT services that can gear up to offer solutions in this space.

Worldwide, there is no consistent definition of the term 'Smart City'. We define a Smart City as a city that deploys smart planning, demand management, citizen education, enforcement and political will in addition to infrastructure and technology to deliver multiple urban services in a better and more efficient manner from the perspectives of its various stakeholders. At the core of this definition is the set of urban services that smart city technologies seek to enhance – we therefore start this paper with a discussion on what defines a high quality urban environment, before moving on to the question of what a smart city entails.

What makes a city 'Great'?

We believe great cities are made up of the following six attributes:

1. High quality of life:

Great cities provide a great quality of life through reliable and sufficient basic infrastructure such as electricity, water, housing, telephony, educational facilities, healthcare, etc. Equally importantly, they focus on quality of life infrastructure such as public parks and spaces, museums and libraries, theater, music, night-life, etc.

2. Efficiency:

Great cities of this age are efficient in their own operations and ensure that citizens have a productive life by saving their time, enhancing their productivity and reducing their cost of living. One hallmark of an efficient city is an extensive, efficient and cost-effective public transport system. For example, New York complements its exceptional subway system with buses and ferries for mass transit, and taxis for point-to-point personal transit. The city's mass transit systems are integrated through a public transport network that provides real-time data on schedules, congestion and other information useful to citizens to plan their transit. Similarly, Singapore operates one of the most efficient road transport systems in the world by implementing a vehicle quota system, imposing steep congestion charges on private vehicles and through parking guidance systems.

4. Sustainable:

Great cities are sustainable on multiple dimensions;

- Financially strong: They stay firmly in control of their fiscal health by creating multiple sources of income and maintaining a high degree of fiscal discipline in their expenditures.
- Environmentally sustainable: Great cities minimize their environmental footprint by setting stringent standards for environmental protection, enforcing these standards rigorously, recycling waste, reducing energy consumption, shifting to eco-friendly solutions such as solar power and recycled water, encouraging eco-friendly citizen habits such as walking and cycling, etc. Singapore's NEWater initiative, which recycles all waste water to drinking water quality standards, is an excellent example of urban environmental responsibility.
- Resilient to calamities: Great cities protect their citizens from natural and man-made disasters, both by protecting against these events and through rapid and effective response capabilities in the event of an incident. For example, Rio de Janeiro, a flood and landslide prone city, has adopted a three pronged approach to deal with this problem:
 - > Establishment of an advanced operation centre responsible for collecting real-time data feeds on weather, traffic, water, energy and police and medical services
 - > Analysis of this data to forecast and predict heavy rain enabling the authorities to improve their disaster preparedness
 - > Dissemination of information of general public through 300 screens installed across the city enabling them undertake precautionary measures

3. Resilient and vibrant economy:

Financial growth and stability are critical aspects of an urban citizen's life. Great cities of the world need to provide their residents an economy that meets their financial and professional aspirations. They should not only have a thriving economy but also an environment that fosters innovation and therefore supports economic resilience through economic cycles and technological changes. New York again provides a great example of a vibrant and resilient economy. Always known for its global leadership in financial services, in the last decade the city has also developed its high-tech innovation ecosystem to become USA's second-largest hub for the tech sector (after Silicon Valley, which has a nearly 4-decade head-start). The 500,000 jobs created by the Tech sector in the last 7-8 years was one of the factors that allowed the city to bounce back rapidly from the financial services crash of 2008-9.

5. Safe & secure:

In recent times urban safety has emerged as a critical concern in public consciousness. Urban citizens demand secure work and living environments – regular surveillance of public places, patrolling, rapid emergency response are on expectations list for any great city. London, for example, is estimated to have nearly 500,000 CCTV cameras. New York dramatically decreased crime rates in the 1990s through aggressive policing and law enforcement even for minor misdemeanours such as graffiti – as a result of this crackdown, between 1990 and 1999, homicides dropped 73%, burglaries 66%, assaults 40%, and robberies 67%.

6. Inclusive:

Great cities are inclusive. They are able to accommodate with equal ease residents and visitors of different nationalities / cultures, income levels, age groups, educational backgrounds, sexual orientations. The City of London, for example, publishes a supplement to its plan documents that focuses on planning for equity and diversity in the city, through legislative measures, physical planning, community engagement, housing provision, etc.

Great Cities of the future will leverage technology, in addition to the underlying infrastructure, to deliver a quality urban experience

Historically, in order to achieve excellence in each of the six attributes listed, cities have relied on a back-bone comprising strong physical and social infrastructure, efficient governance and involved citizens. However with increasing demands, these traditional elements are no longer sufficient to deliver a great urban experience. In today's

environment of high urban growth and rapid change, it is imperative to deploy technology to connect and integrate across various layers of urban infrastructure (physical, social, economic and governance), so that high quality and efficient services can continue to be delivered to its citizens.

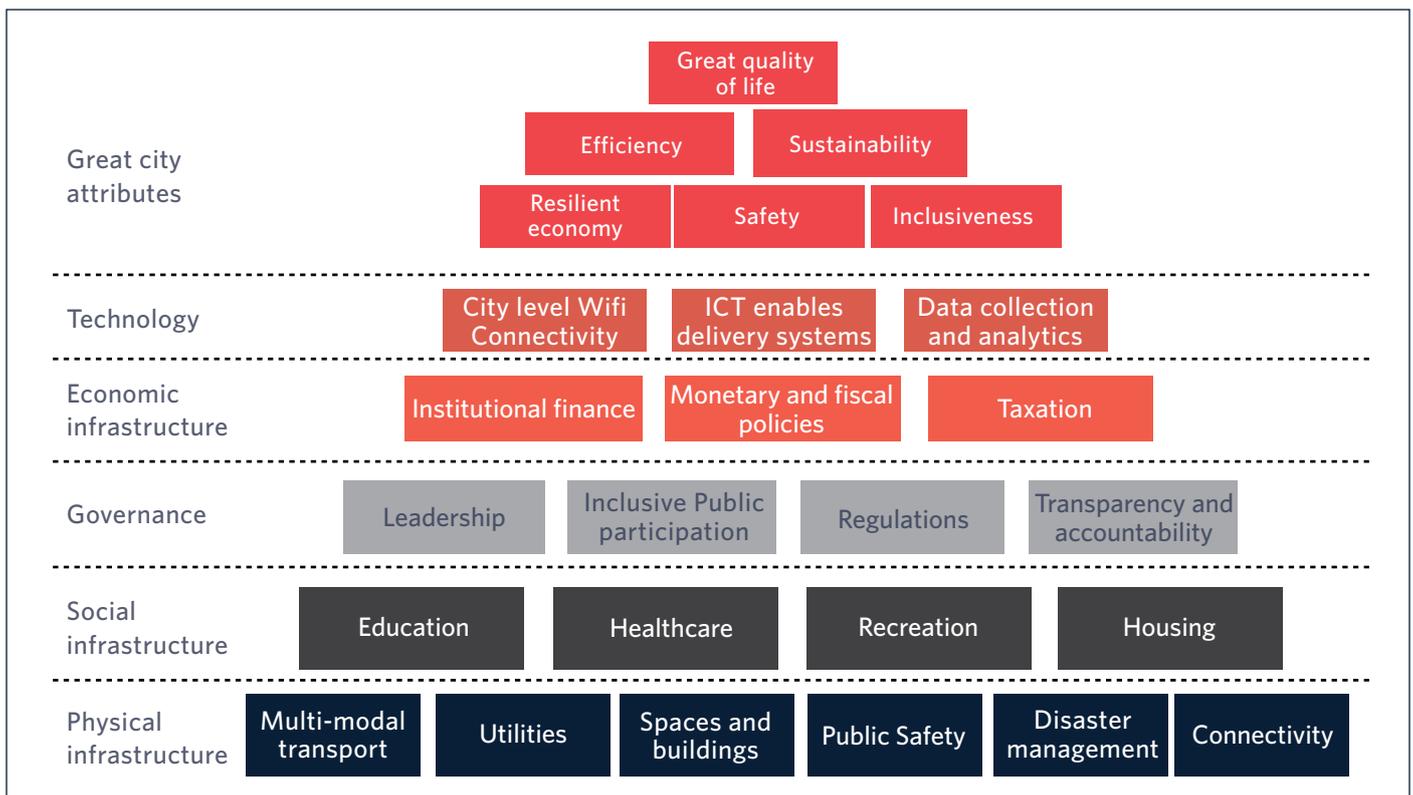


Figure 1 : Framework for a Smart City

SMART TECHNOLOGY DEPLOYMENT FOR MODERN CITY MANAGEMENT – AN EXAMPLE

How smart city technology can (and does) enable delivery of a great urban experience in modern cities is best illustrated through an example – smart transit system management.

Historically, the provision of good quality transit services to urban citizens has involved the development of infrastructure – high-capacity arterial road networks, public transportation facilities such as subways and buses, traffic lighting systems operating as per pre-defined cycle time, enforcement and incident management capabilities.

With increasing urban populations – the megapolises of Delhi-NCR and Greater Mumbai are already at more than 20 million residents – city sizes have increased, meaning that not only are more people transiting, they are also transiting ever increasing distances. The old world solution of creating more infrastructure has proven to be unequal to the challenge of meeting this demand – for example, there has been no appreciable increase in traffic speed on Delhi roads despite development of an extensive metro rail network and investment in dozens of flyovers.

Clearly, the urban transit problem in India’s cities calls (screams) for smart interventions – many, but not all of these require the deployment of technology:

	TECHNOLOGY-DRIVEN INTERVENTION	NON-TECHNOLOGY - BUT SMART NONETHELESS - INTERVENTION
Infrastructure / Services		<ul style="list-style-type: none"> ▪ Pedestrian overbridges ▪ Dedicated lanes for slow traffic ▪ Off-lane bus bays ▪ Point-to-point / last mile connectivity
Demand management	<ul style="list-style-type: none"> ▪ Congestion tolling for private vehicles using inner-city areas in peak hours 	<ul style="list-style-type: none"> ▪ Promote walk-to-work / live-work townships ▪ Awareness campaigns for public transportation usage ▪ Staggering of work hours to even demand across time-of-day
Adaptive traffic management	<ul style="list-style-type: none"> ▪ Advanced Traffic Management Systems (ATMS) deployment ▪ Variable speed limit systems 	
Driver / User information systems	<ul style="list-style-type: none"> ▪ Route / congestion advisory ▪ Multi-channel dissemination – radio, smartphone, variable messaging signs 	

Monitoring and surveillance	<ul style="list-style-type: none"> ▪ Congestion monitoring ▪ Road condition monitoring ▪ Incident monitoring ▪ Violations monitoring
Training and enforcement	<ul style="list-style-type: none"> ▪ Enforcement of traffic rules and penalisation of violations ▪ Road user training, certification [beyond prevailing license regime] ▪ Stray animal management (collection, animal shelters) ▪ Enforcement of traffic rules and penalisation of violations
	<ul style="list-style-type: none"> ▪ Electronic tolling / payment mechanisms ▪ Rapid response – to incidents, road condition issues, etc.

What is obvious from the above example is that smart city solutions need to go far beyond physical and technological infrastructure implementations. A wide range of other interventions - across urban planning, demand management, citizen education, enforcement and political will - are equally central to their success.

A recognition of this multi-dimensional nature of Smart Cities is the first step towards their successful roll-out.

Areté Advisors LLP (Areté) is a boutique, sector-focused management consulting firm with offices in New Delhi and Mumbai, India. Arété works with corporate clients in the Agriculture & Foods, Construction, Healthcare, Logistics, Real Estate and Retail sectors.

Mukesh Khandelwal is a Partner, and Animesh Jain an Associate Consultant in Arété's Delhi office. They have worked extensively in the urban development and city operations spaces in India.

For more information,
visit www.arete-advisors.com

Contact: enquiries@arete-advisors.com
