

SMART CITIES INDIA READINESS GUIDE

The planning manual for building tomorrow's cities today

Smart**Cities**Council **India**
Livability | Workability | Sustainability



TABLE OF CONTENTS

1. Introduction to smart cities
 2. How To Use The India Readiness Guide
 3. Universal
 4. Smart People
 5. Built Environment
 6. Energy
 7. Telecommunications
 8. Transportation
 9. Water And Wastewater
 10. Waste Management
 11. Health And Human Services
 12. Public Safety
 13. Finance And Payments
 14. Ideas To Action
- Appendix

Through the India Readiness Guide, the first and foremost goal is to give you a 'vision' of a smart city, to help you understand how technology will transform the cities of tomorrow and how people will contribute in enhancing and realising the transformation.

The second goal is to help you construct your own roadmap to that future. It suggests the goals to which you should aspire, the features and functions you should specify, the best practices that will gain you the maximum benefits for the minimum cost, at reduced risk, and the collaborative environment you should create to envisage and assimilate all aspects of smart cities together.

The India Readiness Guide is intended for mayors, city managers, city planners and their staffs. It helps cities help themselves by providing objective, vendor-neutral information to make confident, educated choices about the technologies that can transform a city.

Cities around the world are already making tremendous progress in achieving economic, environmental and social sustainability, in the creation of 21st century jobs. All of these are excellent ways to improve city living standards and economies. The concept of smart cities doesn't compete with these efforts. Instead, smart city technologies can support and enhance work already underway.

This introductory section defines smart cities and then explores the current environment and drivers of smart cities in India. Then it looks at the various supporting government missions. And, then it discusses some of the barriers cities may face and benefits it will bring.

Taking a holistic view of 'city'

Before we define the 'smart' piece, however, we should first deal with the word 'city'. Real-world smart city examples are rarely a city in the strictest term. Many are more than a single city, such as a metropolitan region, a cluster of cities, counties and groups of counties, a collection of nearby towns or a regional coalition. Other examples are less than a full-scale city, such as districts, neighbourhoods, townships, villages, campuses and military bases. Indeed, many municipalities are taking a neighbourhood-by-neighbourhood approach to modernisation. This Guide is designed to address all of these human ecosystems.

Because it is in common use, we will continue to use 'city' throughout this Guide. But we use it to mean all relevant examples big and small. Regardless of size, we are taking a comprehensive, holistic view that includes the entirety of human activity in an area,

including city governments, schools, hospitals, infrastructure, resources, businesses and people. As you'll read, smart technologies have matured to the point that cities of all sizes can afford and benefit from their implementation. For example, new cloud computing offerings allow even the smallest city to affordably tap into enormous computing power. So the lessons of this Guide apply regardless of size and you'll see real-world examples in the case studies featured throughout.

The transition to smart cities will be a long and gradual one. Ten years from now, the transition will have been made in the minds of citizens and decision-makers. We will have many smart city pilots providing new insights for future projects and developments.

The definition of a smart city

The advancement in technologies and open, collaborative partnerships will drive the speed and magnitude of changes. Collaborative innovation and integration is the key to transformation of smart cities, today and in the future.

A smart city uses information and communications technology (ICT) to enhance its livability, workability and sustainability. In simplest terms, there are three parts to that job: collecting, communicating and 'crunching'. First, a smart city collects information about itself through sensors, other devices and existing systems. Next, it communicates that data using wired or wireless networks. Third, it 'crunches' (analyses) that data to understand what's happening now and what's likely to happen next.

Collecting data. Smart devices are logically located throughout the city to measure and monitor conditions. For instance, smart meters can measure electricity, gas and water usage with great accuracy. Smart traffic sensors can report on road conditions and congestion. Smart GPS gear can pinpoint the exact locations of the city's buses or the whereabouts of emergency crews. Automated weather stations can report conditions. And the mobile devices carried by many city dwellers are also sensors that can — when specifically authorised by their users to do so — collect their position, speed, where they cluster at different times of the day and the environmental conditions around them. Smart phones also gauge an always-local, perpetually renewable but inherently limited natural resource — radiofrequency spectrum — that smart cities depend on and will ultimately need to manage.

A smart city, then, is one that knows about itself and makes itself more known to its populace. No longer do we have to wonder if a street is congested — the street reports its condition. No longer do we have to wonder if we're losing water to leaks — the smart water network detects and reports leaks as soon as they occur. No longer do we have to guess the progress of the city's garbage trucks — the trucks report where they've been already and where they are headed next.

Communicating data. Once you've collected the data, you need to send it along. smart cities typically mix and match a variety of wired and wireless communications pathways, from fibre-optic to cellular to cable. The ultimate goal is to have connectivity everywhere, to every person and every device. Interoperability is a key requirement.

THE THREE CORE FUNCTIONS OF A SMART CITY



Figure 1.1

- 1 Collect**
Information about current conditions across all responsibility areas (power, water, traffic, weather, buildings, etc.)
- 2 Communicate**
Information, sometimes to other devices, sometimes to a control center and sometimes to servers running powerful software.
- 3 Crunch**
Data, analyzing it to present information, to predict/optimize operations and to predict what might happen next.



Smart cities collect, communicate and crunch data:

The city of Rio de Janeiro collects information from 30 different city departments about transportation, water, energy, weather, and other conditions. Then it communicates those conditions to powerful computers, which crunch the data and present it in a unified control center the city developed with IBM. Not only does the city gain full situational awareness, it can even predict some conditions in advance, such as where floods will occur during severe storms.

Crunching data. After collecting and communicating the data, you analyse it for one of these three purposes: 1) presenting, 2) perfecting or 3) predicting. If you've read about "analytics" or "Big Data," then you may already know about the astonishing things that become possible by analysing large amounts of data. Importantly, analysing data turns information into intelligence that helps people and machines to act and make better decisions. This begins a virtual cycle wherein data is made useful, people make use of that data to improve decisions and behaviour, which in turn means more and better data is collected, and thereby further improving decisions and behaviour.

1. **Presenting** information tells us what's going on right now. In the aerospace and defence industries, they call this "situational awareness." Software monitors the huge flow of incoming data, then summarises and visualises it in a way that makes it easy for human operators to understand. For instance, a smart operations centre can monitor all aspects of an emergency situation, including the actions and locations of police, fire, ambulances, traffic, downed power lines, closed streets and much more.
2. **Perfecting** operations uses the power of computers to optimise complex systems. For instance, balancing the supply and demand on an electricity network, or synchronising traffic signals to minimise congestion, or selecting the ideal routes for a delivery fleet to minimise time and fuel costs, or optimising the energy usage of an entire high-rise to achieve maximum comfort, or to balance the grid with the optimal mix of renewable and traditional power sources at any given point of time.
3. **Predicting** what's next is perhaps the most exciting part of analytics. Singapore uses data to predict traffic jams while there is still time to minimise their effects. Rio de Janeiro predicts just where flooding will occur from a particular storm, so emergency crews know just where to go.



Livability, workability and sustainability are the goals:

OTHER SMART CITY DEFINITIONS

The Council defines a smart city as one that “uses information and communications technology (ICT) to enhance its livability, workability and sustainability.” Other organizations have their own definitions. For instance, Forrester Research emphasizes the use of computing to monitor infrastructure and improve services: “The use of smart computing technologies to make the critical infrastructure components and services of a city – which include city administration, education, healthcare, public safety, real estate, transportation and utilities – more intelligent, interconnected and efficient.”

The U.S. Office of Scientific and Technical Information also stresses infrastructure, explaining that “a city that monitors and integrates conditions of all of its critical infrastructures -including roads, bridges, tunnels, rails,

subways, airports, seaports, communications, water, power, even major buildings – can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.”

Meanwhile, in 2010 IBM’s Journal of Research and Development paid particular attention to the wide range of smart devices that collect information, calling it “an instrumented, interconnected and intelligent city.”

These and other definitions are valid and helpful understandings of what smart cities are. The Council stands behind its comprehensive definition. But we mention these others so that cities that have planned and invested under these and other models will understand that we share complementary, not competitive, views of the smart city.



Livability, workability and sustainability are the goals:

Smart cities use information and communications technologies to achieve them. Seoul, South Korea – pictured here – is often cited as one of the world’s most vibrant, sustainable cities.



Achieve inclusivity:

DRIVING FINANCIAL INCLUSION THROUGH SKILL DEVELOPMENT

The National Skill Development Corporation (NSDC), a Public Private Partnership initiative of the Government of India aims to promote skill development by funding 'for profit' vocational training institutions that provide skills-based training to the youth making them employable. NSDC has set an ambitious target of skilling 150 million youths by 2022.

Under its National Skills Certification and Monetary Rewards Scheme, NSDC encourages skill development in youth by providing monetary rewards for successful completion of approved training programs. The scheme strives to achieve standardisation in certification process and creation of a registry of skills. Under this scheme, successful candidates receive Rs. 10,000 on an average for courses that run for nearly 4-6 weeks. At an estimated total cost of Rs. 10,000 million, about 1 million youth were targeted to benefit from this.

NSDC collaborated with Council member MasterCard to devise a model to facilitate electronic disbursement of this benefit. MasterCard brought in a bank partner with a trusted name to participate in the program. The bank opens current accounts for training institutions as well as zero-balance savings accounts for trainees.

As a part of the account opening kit, the bank issues MasterCard Debit Cards to the trainees. Keeping the program construct in mind, trainees' accounts are created with a hold that is equal to the course fee and a provision of one-time auto debit.

Upon successful completion of the course NSDC transfers scholarships to trainees' bank account. Due to the hold, the fee amount then gets auto-debited from the accounts and credited to the training institutions' current account.

Achieve inclusivity:

The program has been a big success with about two-thirds of the candidates getting employed after passing out. The program achieves financial inclusion by opening bank accounts for underprivileged youth trainees and succeeds in building a lasting relationship between the bank and these beneficiaries.

The hold on the trainees' accounts is automatically released thereafter. There after the accounts get classified as Payroll accounts for receiving salary/payment credits.

NSDC supports the economics of this business model by making a limited period fixed deposit with the bank. Other sources of income for the bank include balances in current accounts opened for training institutions and continuing credit balances in trainees' accounts.

The innovative program construct has enabled efficient disbursement of benefits thereby reducing leakage.

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The benefits of smart cities

Running today's cities is becoming increasingly complex and challenging. But the integration of innovation and ICT interconnecting the various systems in the cities is opening up new opportunities. Let's look at why it is so worthwhile to overcome those barriers and take advantage of the technology advances described earlier that allow you to re-imagine your city.

With the right vision, planning and investment, government leaders can make our cities more liveable, more workable and more sustainable. Let's examine those overall goals, which are the very purpose of becoming smart.

Enhanced livability means a better quality of life for city residents on a day-to-day basis and during major events or crises. In the smart city, people have access to a comfortable, clean, engaged, interconnected, healthy and safe lifestyle. Some of the most highly valued aspects include inexpensive energy, convenient mass transit, good schools, faster emergency responses, clean water and air, low crime and access to quality green spaces, entertainment and cultural options. Smart cities improve lives of people today and in the future.

Enhanced workability means accelerated economic development. Put another way, it means more jobs and better jobs and increased local GDP. In the smart city, people have access to the foundations of prosperity

— the fundamental infrastructure services that let them compete in the world economy. Those services include clean, reliable, inexpensive energy; broadband connectivity; educational opportunities; affordable housing and commercial space; and efficient transportation.

Enhanced sustainability means giving people access to the resources they need without compromising the ability of future generations to meet their own needs. Merriam-Webster defines sustainability as a method of using a resource so that it is not depleted or permanently damaged. When the Council uses the term, it refers not only to the environment, but also to economic realities.



Connect devices with
citywide, multi-service
communications:

PALAVA BUILDS SMARTER CITY FOUNDATION WITH IBM

Strategically located at the junction of Navi Mumbai and Dombivali, Palava is envisaged to become the largest ever private, completely planned development in urban India. Envisioned as a city of opportunity and spanning over 4,000 acres, Palava would not just offer an unparalleled quality of life to its citizens but also become an ecosystem—nurturing business, creating jobs and delivering growth.

Lodha Group partnered with Council member IBM to develop the vision and detailed roadmap for building and managing smart city infrastructure for Palava. Lodha Group incorporated IBM's smarter cities technology using advanced, data-driven systems to integrate information from all city operations into a single system — this unified view will improve efficiency and deliver an enhanced quality of life for residents. IBM implemented the following solution:

Participative Governance. Citizens can interact with the city administration and manage various services offered by the city, with mobile and social technology using the IBM service platform. This will enable city officials to better handle citizen concerns, rapidly gather feedback, and effectively manage city resources.

Intelligent Operations. A central command and control centre will monitor the health of major city systems and take coordinated action to handle any disruptions or emergency situations. This will also facilitate the use of Big Data Analytics, enabling the city to predict and prevent issues that could affect quality of life, ranging from traffic congestion to emergencies.

Public Safety. Centralised city operations will allow for real-time monitoring of incidents and enable public safety personnel to take quick, coordinated actions.



Connect devices
with citywide,
multi-service
communications:

A central command and control centre will monitor the health of major city systems and take coordinated action to handle any disruptions or emergency situations.



The world's first smart island:

MALTA: WHY NOT A SMART ISLAND?

Located in the heart of the Mediterranean and known for its stable economy and pro-business government, Malta is a group of small islands 50 miles to the south of Sicily. Home to roughly 400,000 people, it has the highest population density in Europe, putting a genuine strain on power, gas, waste management, and other essential services.

In 2008, the national energy and water providers partnered with Council members IBM, Itron and other suppliers to gradually roll out smart meters for all electric and water customers. The utilities are saving money by not employing meter readers. What's more, the metering data is integrated into new back-office applications for billing. It is also used for analytics that locate problems and determine when and whether to expand the grid.

So far, results have been very successful. For instance, the new smart water grid has increased theft detection, while also introducing new pricing options for customers that reward conservation.

With those smart grids in place, Malta has the foundational elements for a smart island. And the government is taking things even further in one aspect. It is transforming an industrial park into a state-of-the-art information technology and media city. The goal of smartcity Malta is to put everything a high-tech company needs to succeed in one place, including state-of-the-art ICT infrastructure along with a host of IT, media and production services. Melita, one of Europe's oldest cable operators, is providing a seamless broadband service for Malta with Council member Cisco's Universal Wi-Fi.

The world's first smart island:

Thanks to its smart water and electricity networks, Malta is the world's first smart island. It is also the home of smartcity Malta (shown here), a cutting edge development designed to attract high-tech industry.



Achieve smart transportation:

HYDERABAD METRO PROVIDES MULTI-MODEL CONNECTIVITY FOR GROWING DEMAND

Spread over 650 square kilometres, Hyderabad is one of the largest metropolitan areas in India. As investments in manufacturing, R&D, IT and biotech industries have flocked to the fourth most populous city in India - population over 7.8 million, it has strained the existing infrastructure of the city. As the proactive response, Hyderabad has come up with a metro rail project with multi-modal connectivity under public-private partnership (PPP).

The project is being implemented not as a simple mass transit system, but as an urban redesign concept with emphasis on last-mile connectivity, room for cycling and other non-motorised transport, pedestrian facilities, green areas and public spaces with an eye for aesthetics.

The project uses state-of-the-art technology with stringent technical specifications, performance criteria and safety standards. For example, a communication-based train control (CBTC) system is being introduced as a signalling system, which can accommodate much greater frequency of train traffic than the distance-to-go system.

A revenue model has been carefully worked out, with a mix of affordable and predictable passenger fares and lease rentals and real estate development at the metro stations. This business model based on transit-oriented development makes metro stations hubs of economic activity, increases metro ridership, reduces road congestion, and improves financial viability of the metro system.



Achieve smart transportation:

This business model based on transit-oriented development makes metro.



Reducing response times:

TECHNOLOGY AND E-APPLICATION SYSTEM IMPROVES SAFETY IN SURAT

The world's fourth-fastest growing city, Surat, with a population of 5.5 million citizens and rapidly growing, was facing a problem of shortage of staffing in its police force. The approximate ratio of 93 policemen/1 lakh citizens in the diamond processing capital was putting pressure on the police force to reduce the crime rate and keep citizens safe. To protect its citizens, the Surat City Police Department needed to find a way to better monitor and manage city activities.

To bridge the gap between policemen and city growth, the Surat City Police Department started the 'Safe City Project', an initiative striving to reduce the city's crime rate. To use technology as a force multiplier, the department collaborated with Council partner Microsoft in developing advanced surveillance connecting over 6,000 CCTV cameras and keeping vigilance on the entire city from a remote command and control centre.

Surat became the first Indian city to engage with Microsoft CityNext, using 60+ digital solutions. The department created a data centre using Microsoft Dynamics, SQL Server and Windows 7, to monitor street activities by tapping into state and national surveillance grids. To improve the existing process of tracking citizen requests, the department created an e-application system that allows the public to view the status of their submissions.

Since the safe city project's inception, Surat has lowered crime rate by 27% in surveillance zones, with enhanced traffic management, improved police response time, and increased transparency on the status of public requests. According to the non-profit Janagraha's survey, Surat is the top-ranked city in citizen satisfaction and the perception of local government.

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