



Exhibitions India Group

Envisioning urban India @ 2047

**Select imperatives
and catalysts**



March 2022

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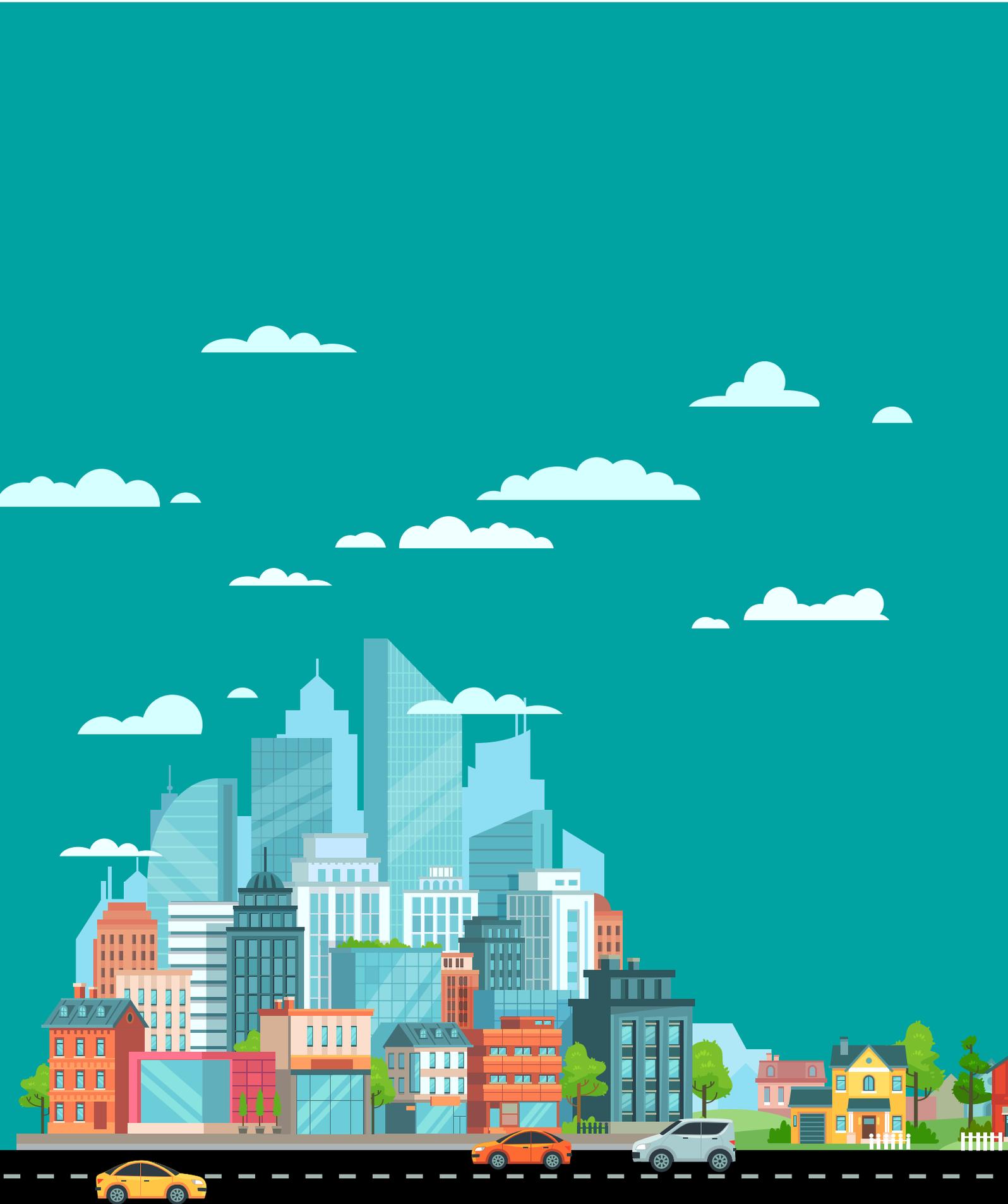


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Foreword

Hopefully, India is on a pathway to recovery from the COVID-19 pandemic, while the government is at work on crafting a 25-year blueprint for a 'future ready, self-reliant India' to facilitate a much better quality of life for India, including its projected urban population of around 820 million.

The realization of our vision for urban India will need concerted efforts spanning many aspects and sectors, including upgradation of local capabilities and capacities. We will need to work across a broad swathe of domains ranging from housing, water, sanitation, schools, hospitals, to transportation and technology infrastructure, while also creating a policy and regulatory environment. This will enable and incentivize the private sector and government to work shoulder to shoulder in pursuit of our national goals in the urban space.

In the context of this compelling national priority to transform our cities into engines of economic growth, better locales to live in, and into providers of sustainable livelihoods for all, we are proud to share with you this report delineating the nine key pillars of development that will be key to attaining these goals.

It is hoped that the basic framework presented in this document will foster insights and thinking in pursuit of the vision of inclusive and sustainable urbanization.

We welcome you to Smart Cities India Expo 2022. We are hopeful that the discussions at this forum will go a considerable way towards refining and aligning thinking that will help us on our journey towards the urban India of the future.



Elias George
Partner and Head
Government and
Public Services
KPMG in India

Foreword

Prime Minister Narendra Modi's vision to recast the urban landscape of India is gaining impetus all over the country. The Smart Cities Mission, launched in 2015, focuses on growth, innovation and sustainability and aims to improve the quality of life of the citizens. An important takeaway has been the ability to do more with less – to make the most of the limited resources available to us.

As learnings from the Smart Cities Mission percolate throughout the country, future generations will experience superior, and more sustainable, living conditions in urban areas across the country. Digital technologies are enablers, of course. What is needed, though, is a radical solution to a uniquely Indian situation – with smart thinking and smart solutions.

Today, a certain quality of life is expected by all strata of society. An efficient way of development is to build from the bottom up. Villages need to be self-sufficient and independent in providing welfare services and employment. At the same time, they need to be connected with the entire country through varied modes, as well as the rest of the world. Therefore, emphasis on urban transformation in India should be inclusive and development proposals must include smaller towns and villages in peri-urban areas, where urbanization is already taking shape. If this is acted upon, over a period, these urban areas will become self-sustainable and will contribute to the country's economic growth.

Such meaningful engagement, as the 7th Smart Cities Expo 2022 provides, is a foundation stone towards achieving a future in which we create a more sustainable blueprint for society. This is a dynamic time, where the Indian technology landscape is thriving and achieving sustainable and resilient development which is necessary to realize our vision for a world that is safer and healthier for all people. As the latest innovations aim to improve the quality of life, it is the Indian citizen who benefits from advancements in technology and planning.

The blueprint for India@2047 will set in motion a 25-year roadmap that is aimed at taking India to its next phase of growth through digital transformation, a transition to clean energy, and a push towards modern infrastructure.

With the building blocks in place, as we work towards the vision of an independent nation that's strong and responsible, this next phase of development must be inclusive and shared. Moreover, sustainability needs to be more than just a buzzword!

Let the challenges of the past few years be a lesson to us all. There is no better time than the present to start building a future that we can all be proud of – a future that must be built from the ground up.



Chandrika Behl
Managing Director
Exhibitions India
Group



Preface

India@2047 is envisioned to be 50 percent urbanized and the world's most populous country. Imagining the two facts together, presents us with immense possibilities in the coming 25 years, coupled with the pressures of urbanization and economic development that need to be provisioned in the years to come. Transformation of our urban landscape with cities as powerhouses of economic growth is enviable, however ensuring basic minimum infrastructure including access to quality housing, reliable power, good connectivity (people, goods and data), water supply and sewerage, education, healthcare facilities to estimated 820 million inhabitants shall be of prime importance. We envision that major reforms in our developmental approach shall pave the way and help us get closer to the desired state.

We at KPMG in India take this opportunity at 7th Smart Cities India Expo 2022, to bring to your focus imperatives and aspirations to shape our society in the coming years. Through our shared experiences of supporting and working closely with various government and private sector entities at the ground level, we have made a humble attempt to develop a framework of ideas, aspirations and some probable solutions in select domains that can facilitate, as well as accelerate the change, and hopefully enable a 'just transition' that we owe to our future generations. Among other areas, this document touches upon some key themes around the importance of retaining a city's identity, its cultural heritage, need for a sustainable and inclusive framework to enhance liveability and quality of life of its citizens; facilitating economic development through integrated planning and reforms; exploring alternate and future ready mobility solutions, fostering climate resilience, exploring innovative financing solutions for infrastructure development and leveraging the power of digital. We firmly believe that these approaches shall facilitate fast paced growth and development of our cities and urban centres.

As equal stakeholders, citizens and practitioners, our present choices and resultant discourse has the ability to play a major role in defining the future course of action, led primarily by government policies and programs, and implemented jointly by centre, state and regional players - public as well as the private sector. Extending what we believe in and stand for at KPMG, together we can inspire confidence and empower change, in helping transform urban India, or the new age Bharat @ 2047!



Puneet Narang
Partner and Head,
Major Projects
Advisory
Co-Head,
Infrastructure Sector
KPMG in India

Setting the Context

Growth Story

At the brink of the 75th year of Independence of India on 15 August 2022, the celebration of Azadi Ka Amrit Mahotsav, our country stands at a cusp of rapid urban transformation cradling the aspirations of its 1.4 billion citizens. It is, therefore, imperative to pause, reflect and chart the course of a sustainable and equitable growth story for the next 25 years i.e., the 100th year of our Independence.

India's population is projected to be 1.64 billion by 2047, of which nearly 0.82¹ billion (~50 percent) shall be residing in urban areas. India is also poised to become the most populous country in the world, surpassing China by 2027. Urbanization has always been considered as boon for a country's economic development. Urban areas constitute only about 3 percent of the total land area but contribute to over 70 percent of the Gross Domestic Product, indicating a high level of economic productivity. In line with rapid urbanization, Indian economy is also expected to grow from USD3.1 trillion to USD20² trillion by 2047, securing its place amongst the top three largest economies in the world by 2047. In this journey of high paced urbanization and economic development, cities shall play a pivotal role. Our cities shall significantly grow to serve economic powerhouses and magnets for large scale rural population. It is imperative to ensure that economic growth leads to balanced development across all regions and sectors.

Urban Challenge

With India's unprecedented growth and its cities and urban centres bursting at their seams, the key question at this juncture is 'are we adequately equipped to handle this scale of growth? And will our future cities be livable spaces that generate a sense of community to provide an equitable platform to the cross section of its inhabitants?'. Our rural settlements are already transforming to peri-urban areas to Tier-III and IV towns. They have begun to display characteristics similar to those witnessed in urban areas. Whilst these centers may be flourishing

with a vibrant economy, the challenges of dilapidated infrastructure and services are prominent.

In addition to the transformation trends of rural settlements, our mega-cities are also witnessing growth of informal sector in form of slums and unorganized economic activities, overcrowding, deterioration of quality of civic infrastructure, traffic and transportation inadequacies, mismanagement of supply chains, and an increasing disconnect with our culture and heritage. The last two years of the pandemic, with a heightened awareness around physical and mental well being, have accentuated these issues and have further tested the resilience of our urban systems.

It is important to note that rapid urbanization also implies a high demand for goods and services, along with requirement of efficient systems of urban development, management, and governance. With plenty of room for improvement in existing cities to facilitate citizens with basic services and infrastructure, accommodating 0.82 billion urban citizens by 2047 which will be far more challenging than anticipated.

Amrit Kaal – Plan for next 25 Years

Referring to the next 25 years up to 2047 as 'Amrit Kaal', Prime Minister Narendra Modi had in 2021³ said, "In the next 25 years, during Amrit Kaal, the nation will move forward towards attaining resolutions made for Aatmanirbhar Bharat". Therefore, Government of India has embarked the journey to set the course for India @ 100.

The crucial journey of next 25 years has been termed as the Amrit Kaal, with an objective to enhance the lives of citizens, reducing the urban-rural divide and embracing technological advancements with infrastructure development. It is interesting to note the Budget 2022-23 seeks to lay the roadmap and gives a blueprint to drive Indian economy for Amrit Kaal. A paradigm change is envisioned for our cities with introduction of PM Gati Shakti - National Master Plan, Aatmanirbhar Bharat, National Infrastructure

Pipeline and National Monetization Pipeline to boost infrastructural and economic development.

Aligning ourselves with the journey of urban transformation, we at KPMG in India realize the need to define the focus areas for Urban India of future. We take this opportunity at the 7th Smart Cities India Expo 2022 to channelize together imperatives and catalysts across key focus areas to be implemented over the next 25 years to realize sustainable urban development and high quality of life for citizens.

Envisioning Urban India @ 2047

Envisioning Urban India @ 2047 is an attempt to bring to your attention imperatives and catalysts for development of Urban India in the next 25 years. We believe our efforts of sustainable urbanization and economic development are to be concerted across pillars of Economic, Social, Technological and Environmental Development.

The focus areas for envisioning Urban India are identified across these pillars:

- **Social:** preserving, retaining and enriching the 'soul' of our cities by adopting a two-pronged agenda, i.e. 1) adopting principles of sustainable

development, ensuring high standards for quality of life for citizens by meeting aspirations of livability of our cities; and fulfilling our social commitments towards balanced and equitable development. And 2) tap into the vernacular as well the rich cultural heritage, given our historic diversity and richness of most of the Indian cities/regions.

- **Economic:** identifying innovative financing streams for infrastructure development in our cities, taking a services approach while developing physical assets, with a long term approach and embedding sustainable infrastructure development through excellence in program management.
- **Environment:** development of a focused approach for climate resilience; and exploring, adopting and integrating alternate mobility and utilities solutions, while driving citizen behavior through a balanced services and performance driven model
- **Technology:** adopting new age technologies towards delivering citizen services and development of infrastructure.

This document is intended only as a preliminary base framework/guide for an assessment and



understanding of a directional focus to be adopted, at times continued to be carry forward on a well-established path of implementation, enhance the core requirements and responsiveness or in some cases put a halt to certain present unsustainable practices.

We firmly believe developing focused action plans towards the identified strategies around focus areas shall help us success in this period.

Theme 1:

The soul
of the city

Hear the heartbeat

'Soul'

Every city is a unique combination of its streets, buildings, customs, language, history, and natural features along with its people and their vocation, in essence a juxtaposition of the built and natural, of human life over space and time. It provides both the inhabitants and visitors with unique experiences lending a certain distinct character to it. Cities with unique history and culture, take for example Rome, Jaipur, Paris, Rio de Janeiro, Prague etc. have a distinct character. These cities leave people in awe, command repeat visits, create strong memory associations, fierce loyalties, and strong identification by its citizens. Cultural capitals closer home in India such as Kolkata or Pune have their own admirers as if these were living breathing beings while historical cities such as Athens and Delhi are akin to outdoor museums with not just personal but civilizational memories.

In this context, a one-size-fits-all approach to Urban Planning focused on utilitarian efficiency ignoring uniqueness of a city's culture and history will lead to mindless construction of boxes placed in uniform grid iron blocks. That would be akin to promoting machines to live in, not places to remember. It is memory and identity, achieved through the human touch, which turns a house into a home and a 'space' in the city into a 'place'. Be it the India Gate or the Sydney Opera House, a well-known place ultimately defines the image of the city.

Why search for the city's soul?

To recognize the 'soul' of a city is not just an esoteric exercise with no practical value. Unique and vibrant cities are more livable and are likely to have higher recall value from commercial and institutional investors. Identifying a city's uniqueness through a prism of differentiating factors should be the basis on which Vision Documents and Master Plans should be developed. The Pune Metropolitan Regional Development Authority (PMRDA) for example, has developed a theme-based Development Plan for the Pune region which has caught the attention of investors. Delhi has long had an Urban Arts Commission to develop and preserve the aesthetics of the city.

As the urban growth advances to housing nearly 0.82⁴ billion (~50 percent) in urban areas by 2047, our cities will compete to attract talent, businesses, and tourists to keep up with the economic aspirations of its citizens. The citizens and business will then choose a place to call it home based on what best resonates with their own spirit and liking. Of the 7,935⁵ Indian the larger million plus cities (projected to be ~65 to 70 by 2050) most likely be the immediate recipients of opportunities. But then will the other 7,000 plus towns house people who will only aspire to live in cities they resonate with? Hence, there is a need for smaller urban centers to develop as unique places which citizens cherish as homes, not temporary shelters before they can move to a big city.

How to find the city's soul?

Developing vibrant public places, also known as Placemaking, attracts people to use and interact in both scripted and non-scripted manners. This usually can extend beyond formal public plazas to clean, well-lit and aesthetically pleasing sidewalks and street corners un-encroached by squatters or rendered unusable by parking and/or dumping of waste. Public places that act as open theaters for life accommodating street musicians, temporary stalls selling street-food, books, handicraft/art etc. lend a certain vibrancy to it not felt from inside a vehicle on the road, like the Sarafa Bazar in Indore. Such walkways naturally create long term memories for its users of the city and its neighborhoods.

Formal approaches to develop “Places” through Placemaking or informal approaches through “Tactical

Urbanism”, almost always pay economic dividends back to the community. Be it world famous Places such as the Time Square in New York or lesser-known places such as the Millennium Park in Chicago, investment in placemaking has given multifold returns to its investors while pushing up adjacent property prices. We are beginning to see some early attempts like the Chandni Chowk revamp in New Delhi and similar streetscape/ placemaking also as a part of the Smart Cities initiative.

Besides placemaking, city-wide events including festivals, define a city's culture and drives experiential tourism; be it immersive festivals such as La Tomatina in the Spanish town of Buñol, the Ganesh festival in Pune, or the classical dance festivals of Khajuraho in India. City planning needs to induce, reinvent, if necessary, and promote events that define its character.



Imperatives for 2047 and Strategies to achieve them



Every Indian city and town will be a vibrant place to remember

For achieving a physical vibrancy, we need more public plazas with higher person to person interactions. Human

beings develop better memories through in-person interactions. Hence we also need to create more walkable cities by promoting well designed streets with wide, functional sidewalks, Non-Motorized Transport (NMT) facilities and Public Transport instead of private vehicles, as well as re-densification of the city following Transit Oriented Development (ToD) principles. Additionally, each major city must have at least one central place offering a sense of identity and arrival e.g., Connaught Place in Delhi, Fort area in Mumbai, Sarafa Bazar of Indore, Marina Beach in Chennai or the Maidan area in Kolkata.



Citizen engagement will be the key for planning and sustaining the City's vibrancy

Local city governments will be complemented by actual participation of the common man through civic engagements

by independent community-based organizations and NGOs. They will promote civic and human rights education and training programmes to make residents aware of their rights, remove barriers that block participation of socially marginalized groups, promote inclusivity, empathy and tolerance, and create enabling vibrant local environment for equal participation of women, youth, vulnerable and disadvantaged groups in planning for a vibrant urban-scape.



Historical towns will celebrate revitalized heritage centers reflecting its unique character

To connect the young generation to the rich history and culture of the country, heritage precincts across

cities should be identified and restored e.g., Kashi Vishwanath temple complex at Varanasi. The scope of Heritage City Development & Augmentation Yojana (HRIDAY) by Ministry of Housing and Urban Affairs (MoHUA), should be extended from the 12 urban centers undertaken in 2014 to all other cities in the country which have heritage buildings and precincts. It should use this opportunity to identify core heritage areas of the city where motor vehicle usage along with construction activities needs to be capped.



Every major urban centre in India will celebrate a cultural uniqueness

To achieve this, a city should focus on supporting social events and cultural markers through administrative

and financial support e.g., the carnival at Rio or the annual film festival at Cannes. A public relation exercise is needed to promote an exhaustive list of cultural locations, artifacts, events, natural features, accomplished personalities for all urban centres as per Census which the citizens are proud of. Further, local architectural themes and local materials will be beneficial to promote uniqueness. For this, new guidelines should be formulated and updated to include i) vernacular architectural styles, and ii) use of local materials. To encourage the practice of adhering to aesthetic architectural guidelines that resonate with the local culture, waivers on building plan approval fees and/or discount on property taxes including ring fencing of funds for maintenance of the aesthetic value may be introduced.

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When you look at a city, it's like reading the hopes, aspirations and pride of everyone who built it.

Hugh Newell Jacobson,
American Architect⁶

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Dull, inert cities, it is true, do contain the seeds of their own destruction and little else. But lively, diverse, intense cities contain the seeds of their own regeneration, with energy enough to carry over for problems and needs outside themselves.

Jane Jacobs,
Canadian Journalist and Author⁷

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**Kolkata's Durga Puja Festival –
Now an UNESCO Heritage**



**Millennium park, Chicago –USD500
million investment added USD1.4
billion in Real Estate Prices**



Theme 2:

Aspirations
for Liveability

Live and let live

What is Liveability?

Creating liveable cities has now become a global priority with every country developing its own Livability Index like Australia's Livability Report, India's Ease of Living (EoL) Index Report, Global Liveability Index by Economist Intelligence Unit (EIU) for 140 cities around the world.

As per the Liveability Index adopted by the Government of India, 'liveability' is a function of Institutional, Social, Economic and Physical parameters that define a city e.g., health and education, governance standards, employment opportunities, assured water supply etc. However, it is a much broader term influenced by cognate notions such as sustainability, equity in access, cultural richness, ecological diversity and robust infrastructure – all contributing to a high quality of life

World's most liveable cities – What can India learn?

Four of the world's ten most livable cities are from Australia. This can be attributed to plenty of space, warm weather, economic prosperity, efficient and affordable public transport and availability of a range of cultural and entertainment options. Tokyo and Singapore are also one of the most livable cities owing to superior infrastructure, low pollution, safe neighborhoods, good public transport all leading to a great quality of life.

From an Indian context, the cultural issues play a significant role on influencing several of these indicators. It would be prudent to examine whether the issue with an indicator is pertaining to the cultural influences and hence categorizing it into the "cultural" category. For instance, malnutrition in children is a factor of the maternal health, which in turn is affected by cultural biases of male dominance, especially in the economically disadvantaged masses. Bucketing of these indicators in the right category is important to

identify and treat the root cause. Although the EoL has "recreation" as a parameter in quality of life, it currently does not have the "cultural" category. Analysis shows that the "economic opportunities" ranked the lowest among all the categories followed by "recreation" for Indian cities. Hence, the need for equitable opportunities across cities also becomes paramount.

Why Liveability goes hand in hand with Social Commitment?

A socially responsible milieu can address issues of a citizen's personal growth which in turn aid in a responsive character of a city and its fabric. Touching upon education, employment, access to affordable housing and healthcare – most important parameters of a society's commitment to its individuals, we observe that Liveability standards play a vital role in sustaining them.

India's literacy rate was 74⁸ percent in 2011. While it is likely that literacy has risen in the last decade, there is still need for upscaling to tap into the potential of its masses. The male-female gap in literacy still remains in double digit percentage points. Enrolment rate across the senior classes is quite low with higher dropout rates for girls in comparison to that of boys at primary and secondary levels. Good infrastructure such as roads and schools apart from availability of water and electricity with peaceful neighborhoods are basic ingredients towards better educational outcomes.

The unemployment rate⁹ in India stood at 8.1 percent in February 2022, of which the estimated number of unemployed in Urban India was at 7.55 percent. Again, a more liveable city offers better opportunities of employment through local economic activities.

Healthcare standards of the topmost liveable cities in the world such as Singapore leave no one behind when it comes to access to healthcare. There are 2.5 beds per 1000 people in Singapore¹⁰ whereas India has only 0.5¹¹ beds. Additional three million beds will be needed for India to achieve the target of 3¹² beds per 1,000 people by 2025. Additional 1.54¹² million doctors and 2.4 million nurses will be required to meet the growing demand for healthcare and maintain advisable doctor-patient ratio.

Re-purposing Liveability

A socially responsible city provides equal opportunity to all its citizens in education, employment, housing and healthcare. This naturally makes it a highly liveable city too. It would not be an exaggeration to say that a liveable city is a Socially Committed city and vice versa. Hence regular tracking of the defined liveability parameters can help us achieve the goals of Social Commitment utilizing an objective, measurable approach.

Imperatives for 2047 and Strategies to achieve them



Visualisation of a socially inclusive Nav Bharat or New India

It is envisioned that by 2047, India will be recognised as a New India which has grown holistically on the principles of equity, opportunity and social justice by ensuring accessible, affordable, quality and well governed systems and facilities with larger transparency and successful delivery. Social inclusiveness will be non-negotiable.



India will deliver on common aspirational goals for basic civic services by reducing inequity and regional disparities

India will be able to deliver on its ambitious target of delivering universal access to its citizens to services like water, sanitation, waste management, affordable housing, power and electricity etc in line with short and medium horizon goals set out by current initiatives of the government including fulfilment of Sustainable Development Goals (SDG). In this direction, provision of quality education for all, 100% Net enrollment (NER) in school education, Affordable 'pucca' housing for all, 100 percent digital inclusion by digitizing all government services and ensuring last mile connectivity/ Wi-Fi connectivity, 100 percent of waste generated to be recycled or reused, 100 percent coverage of underground drainage network and storm water drains by all Municipal Corporations/Urban Local Bodies (ULBs) would be delivered effectively.

"No one is left behind" will be mantra of the day.



100 percent coverage to affordable and reliable health care systems will be achieved

Umbrella health coverage for all with access to affordable, quality and reliable health care systems will be necessitated for the wellbeing of the society. This will be required for increase in life expectancy and less than 1 percent neo-natal, infant and maternal mortality rates to be achieved by successful delivery systems. It is envisaged that health systems will be fully enabled for guarantee of 10-min ambulance service/ fire and other emergency services. It will also be ensured that special focus on mental health programs will be bolstered along with community welfare initiatives or centres to ameliorate social vices and substance misuse.



By 2047, India will achieve equitable employment and sustainable livelihood opportunities

This will be achieved through skilling, upskilling and social interventions for inclusive empowerment, so as to reap optimum demographic dividend. Employment and entrepreneurship opportunities will have to be catalyzed by the cities by creating the right business environment to attract anchor companies. Incubation centers supported by local industry associations and domain experts as mentors and market facilitators would be essential in developing a thriving economic and employment market.



India will reach in Top 50 in Human Development Index

United Nations' Human Development Index (HDI) is a cumulative social indicator which measures parameters related to holistic health; education/ livelihood; income/ spending capacities and overall wellbeing of citizens. It will be a testament of all impetus that is being envisioned for India to reach HDI score – 0.9+ (Rank <50) by 2047 from HDI score – 0.645 (Rank 131 in 2022) with a medium-term goal of HDI score – 0.78+ (Rank <80) in 2035.

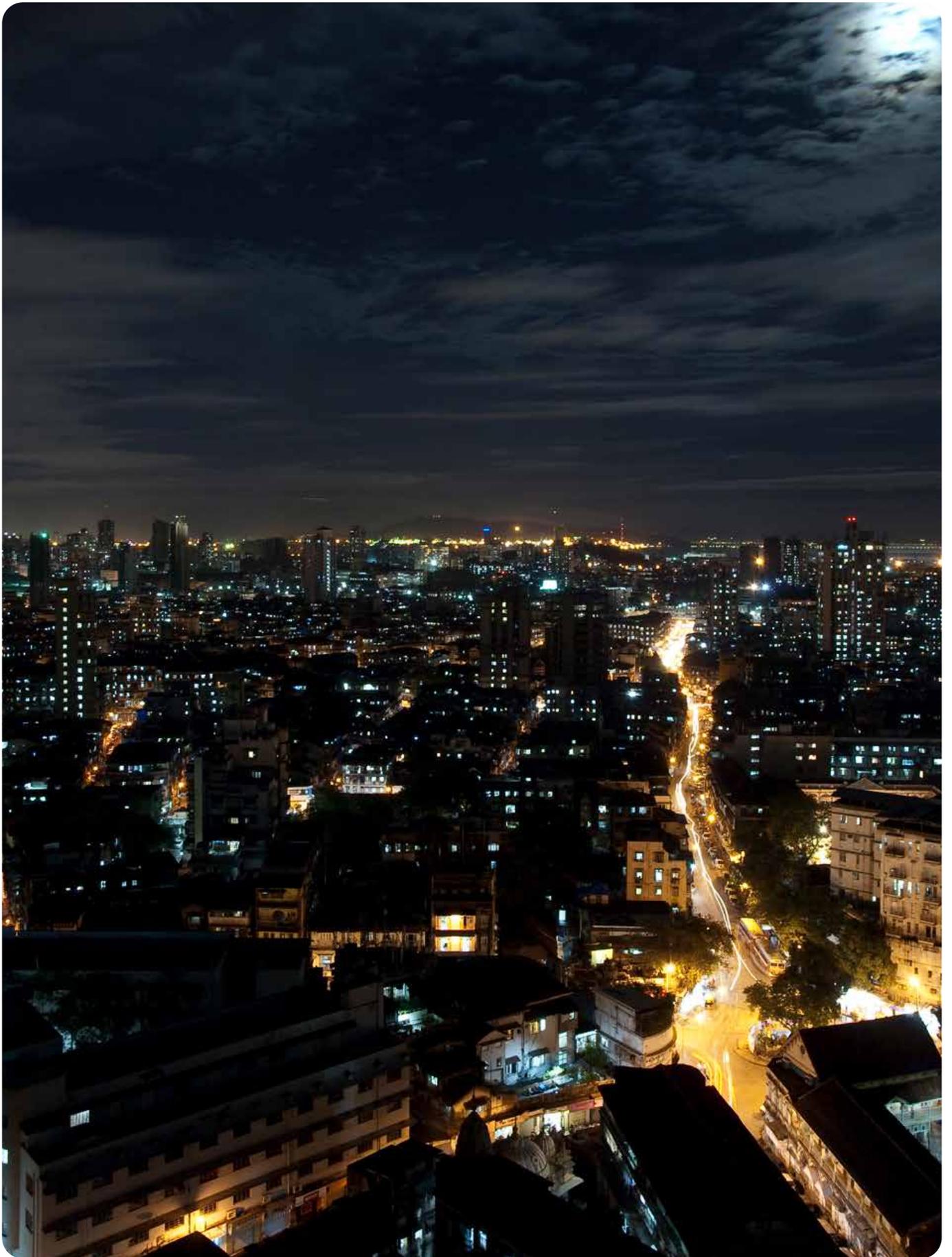
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The concept of community resilience, together with community-based development, significantly affects the ability to fight against the crisis at the local and community levels. In addition to improving urban livability, today's urban development in Indonesia must also struggle to overcome various pressures due to natural disasters. Community resilience is considered a bottom-up solution to address these problems

**AY Surjono, & Deni A. Setyono,
Jasmine C Putri¹³**
Brawijaya University; Indonesia

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Theme 3:

Economic
urban vitality

Urbanism to Lead Economic Transformation

Economy and the City

Cities are home to more than half of the global population and this share is projected to reach 68 percent¹⁴ by 2050. By some estimates, 70 percent of India's GDP comes from its cities¹⁵. India's nominal GDP in the year 2021-22 is estimated at INR232.15 trillion¹⁶ and is projected to be close to INR1,260 trillion by 2047. This translates to an economic opportunity of almost INR880 trillion contribution to GDP from cities in India by 2047.

Up to a certain level of economic development (GDP per capita), residents in cities record a higher life satisfaction than people in towns and rural areas. As people continue to migrate to urban spaces in the search of a better life, economic planning cannot remain a centralized agenda, missing the local on-ground factors to both tap the opportunities and overcome the challenges. Most big cities in India have wide economic disparity, with expansive slums and a large urban poor population. It is critical for regional and local governments to actively give direction to the market forces for development of certain economic activities which have a high propensity to prosper in the region and ones which are required by citizens to counter inequality and inflationary pressures.

Today, economic planning is a less emphasized factor in the development plans in India. The development and regional plans are based on Town Planning Acts which focus more on Physical Planning. The requirements for these plans are relatively less driven by data with voice of the common man being limited in required participatory process of planning. Hence, as is often the case, the pockets of economic development spur lopsided development triggering congestion and livability issues.

The Economic Path Forward

The need of the hour is to have an economic framework overlaid on city planning efforts, making identification of economic triggers for each sub-region

as a major goal. This would need detailed economic survey data at a city level, followed by detailed analysis to draw inferences. Basis the inferences, projects which will act as economic triggers need to be identified and supported. Developmental projects such as Bandra Kurla Complex in Mumbai, Central Business District in Navi Mumbai, DLF in Gurgaon, Hinjewadi & Magarpatta in Pune are examples of such economic triggers which have seen success. Besides large developmental projects, smaller initiatives such as wise use of amenity spaces; tax incentives for certain types of businesses; development of natural geographical features such as river/ lake fronts; innovative place-making for cultural activities; can all add to the economic vitality of the sub-regions.

To enhance the productivity gains, cities should look at provisioning of shared infrastructure or inputs which typically involve high capex, development of labor market connect platforms, technology collaboration and transfer, and associated mechanisms.

As highlighted in the National Infrastructure Pipeline, an estimated INR 19 lakh crores capital expenditure through central and state sponsored schemes is estimated between FY20-FY25 in urban infrastructure¹⁷, translating to about INR 2,700 Crores per year, considering that top 100 cities would attract the bulk of this investment. The ability of a city to absorb and apply such huge levels of investments in addition to its own budgets needs to have a proper framework and planning to allow for a structured development. Around 21 percent of this capital expenditure is proposed to be funded through private sector participation. Public Private Partnerships would be suitable options if the overarching larger economic benefits to the region are kept in mind while structuring the projects. Cities should also look at leveraging their cash flows and reserves to raise capital to spur this economic development. Several private equity funds and pension funds would be interested if risks are structured appropriately.

Imperatives for 2047 and Strategies to achieve them



Economic planning will be an integral part of development planning based on data

Socio-Economic surveys driven by a cadre of economists in the urban administration could be undertaken in a 5-year planned process. Based on these surveys, economic triggers for sub-zones/ wards of the urban areas can be identified using data science to simulate and choose the right economic trigger.



Cities to seek public investment and policy to fund future development

Local governments will actively guide the economic growth of the city through privatisation of assets, monetisation of revenue streams, cluster development, municipal bonds, wise and innovative use of amenity spaces, place-making and geo-feature development with economic intent in mind. The use of value capture finance will enable funding of the economic growth projects. Land value tax, Tax increment financing, Development charges (Impact fee), Vacant land tax and Betterment levy will become strategic tools to mobilize finance for public projects.



Cities transform their physical landscape to harmonize with natural environment while boosting economy

This will be achieved through strategic investments in development leveraging the natural geo features, development of mixed-use downtowns, pedestrian friendly neighborhoods, cultural vibrancy through historic districts and buildings, adjoining rivers and lakes and other natural assets of cities.



Open and innovative society with supporting infrastructure

Platform for exchange of ideas, infrastructure to support experimentation, city innovation labs and incubation centers will be an essential part of cities focused on solving public problems and charting a path for future development.





Cities will focus on growth, culture and prosperity having met its basic provisioning needs

With the Central and State schemes effecting fruition along with the Urban Local Bodies (ULB's) own efforts, the basic amenities, accessibility, mobility, and affordability are expected to have been taken care of. The cities in 2047 will then be more focused on furthering economic prosperity, cultural heritage, and sustainable growth.



Cities will model Gender inclusive economic growth

Female labour force participation in urban India stands at 18.5 percent vis-à-vis 24.7 percent in rural areas and women's unemployment rate in Urban India stands at 8.9 percent vis-à-vis 2.6 percent in rural areas¹⁸. Reasons vary from lack of economic opportunity to concerns over safety. To realize their full potential, cities will need to focus on increasing women's economic participation. This can be effectively achieved through women centric programs, technology based safety and surveillance, mixed-use zoning offering more women opportunities to engage in the workforce, and change management for shared responsibilities.



Cities will provide an integrated entrepreneurship ecosystem

Technology enabled centers connecting academia, administration, local community and enterprises will spur entrepreneurship. These will host a mix of universities, incubators, R&D centers and plug and play offices to maximize knowledge spillovers and linkages.



Skill development and employment centers will be developed in partnership with private sector

Urban Governments will enable outcome-oriented skilling based on industry demands. A robust and real-time database will be provisioned for the public to access information on the demand and supply of skilled manpower. Strategic partnerships with industrial powerhouses in the local economy will strengthen the linkage between relevant skill development and employment opportunities.

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India has to improve its urban areas to achieve objectives of economic development.

Prof. Chetan Vaidya,

Former Director, SPA, New Delhi and NIUA, New Delhi¹⁹

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Theme 4:

Future of mobility



Urban Mobility at Crossroads

Quo Vadis?

India is facing several urban mobility challenges owing to rapid urbanization, densification of private vehicles, outdated infrastructure, recurrent road congestion and transportation related emissions in its million plus cities.

The Next 25 years of Amrit Kaal in Urban India are expected to witness drastic changes in the urban mobility requirement, pattern and structures. Wheeled vehicles are still likely to roam city streets, and existing transit networks will remain highly utilized but the way in which the mobility services are propelled, driven, inter-connected, paid for and managed will get transformed. This transformation is already underway thanks to development in infra tech, autonomous vehicles, electric vehicles, smart monitoring and control solutions, etc. briefly highlighted as below.

- Fueling sustainable mobility:** There is a fundamental shift in consumer behavior and an increasing inclination towards electric vehicles (EV) as exemplified in INR 1,100²⁰ crore sale of e-scooters by Ola last year. Public transport authorities have already adopted electric buses in their fleet. India is poised to take forward the EV revolution to next level with further improvements in the charging infrastructure and battery technology. Green hydrogen production at commercial scale will be another game changer. A shift towards rapid usage of flex engines for usage of use of alternative energy sources and biofuels which have a significant impact on the environment
- Air-taxis / Drone taxis taking on Indian skies:** India's first air taxi service was launched in Haryana in 2021. With the fast-paced innovation in the sector and new drone policy²¹ providing for increased load up to 500 kg, it is envisaged that urban residents will be able to enjoy this silent, pollution free and fast mode of transport within the next 5 to 7 years.
- From vehicle ownership to Mobility as a Service (MaaS):** Over a billion Indians do not own a vehicle due to limited purchasing power. So, when mobility is provided as a service, the need for owning a car fades away. With MaaS, people will be able to fulfill and manage their mobility needs on demand, based on their preferences and journey specific needs. The current success of ride aggregators will see a scaling up and broadening of service offerings with which MaaS system in India aims to improve system efficiency for transport providers as well as convenience for the end users. Also, with manufacturers becoming service providers, there will be increased competition and paradigm shift in the market conditions bringing down the cost for the common man.
- Driverless driving in future cities:** AV technology is poised to transform the travel experience forever with self-driving cars reducing accidents caused by human errors. Connected AVs can reduce traffic congestion and provide hassle-free comfortable trips besides allowing differently abled people to commute without much assistance. Adoption of 5G technology in India coupled with changes in the regulatory environment will be critical enablers for AV adoption.
- Common Mobility Cards:** With the National Common Mobility Card (NCMC), the citizens will be able to use one card for making payments for their travel needs apart from shopping, banking transactions etc. The data generated through the connected payment network will further revolutionize the service offerings in various sectors. To enable interoperability and implement a multimodal ecosystem, there are certain additional contemplations, besides the smart card based future ecosystem, that need to be taken care of in the future like Host Card Emulation (HCE), QR Code based payments and open API standards that will further benefit user experience.

- **Paving the ways for Smart Highways:** Through advanced digital integration of the road with the vehicles, smart roads can power smart cars, empower drivers, and provide governments with unprecedented visibility and control over the living fabric of motor-based traffic. The concept holds tremendous potential for India considering its road network carries almost 80 percent of its passenger traffic. Innovation in commercial use of self-healing concrete, large scale EV charging lanes / smart pavement would not only help to increase roadway safety but also serve as the Wi-Fi platform for cars and other future mobility services.
- **Urban mobility solutions to improve logistics performance:** India is one of the fastest growing major economies. However, at 14 percent of gross domestic product, its logistics costs are high relative

to the 8 to 10²² percent that is typical of most advanced economies. Urban mobility in cities plays a vital role (as they provide for last mile connectivity) in improving the overall logistics performance. Online ordering of goods has increased exponentially and customers are expecting more control and faster deliveries. With more delivery vehicles on city roads the inner city traffic is expected to seriously get disturbed in upcoming years if serious interventions are not made in time.

Appropriate policy and regulatory support and availability of funding and early adoption of technologies like 5G, Artificial Intelligence (AI) and Machine Learning (ML) will create the foundations for augmented and autonomous driving besides connected vehicles. The sectoral landscape for urban mobility experience in India is poised for a dynamic and rapid transformation.

Imperatives for 2047 and Strategies to achieve them



Indian cities to have less than 100 fatalities annually due to vehicular accidents

To achieve this, annual safety audits and regular improvement of road geometrics is required for all large cities to weed out all accident-prone zones. Additionally, traffic calming measures are to be used extensively especially in lower hierarchy urban roads. There is also a need to create more pedestrian only or pedestrian cum Non Motorised Transport (NMT) zones. Lastly, Autonomous Vehicle technology must be mainstreamed at the earliest to eliminate driver error.



Indian city dwellers need no longer own private vehicles freeing up a majority of real estate devoted to parking

This can be achieved using MaaS platforms which will provide increased reliability and minimal waiting time.



Impact of vehicular traffic movement on environment will palpably lessen

This will be achieved through promotion of non-polluting fuels such as Electricity, Hydrogen etc. utilizing tax breaks and/or subsidies.



Indian cities will not have average trip length time of more than 30 minutes

To achieve this aspiration, land use needs to be optimized through re-densification using Transit Oriented Development principles. This will provide a very high degree of accessibility to Public Transport to all



Major City roads to have an optimum balance of public and private vehicles which has a positive effect on speed and safety

Optimum urban road volumes on Arterial and Sub-arterial roads are desired to be achieved through ensuring that more than 50 percent of total vehicular trips in a city use Public Transportation. By making public transport easily accessible and keeping ticket prices affordable using innovative financing techniques (e.g., Land Value Capture), this objective may be achieved.



A reduction in cost up to 4 percent²³ from logistics cost and savings of INR 311 lakh crore cumulatively over the next three decades:

Gol recognizes the contribution of logistics sector for the economic growth, the need for improvement in last mile connectivity and decongesting cities. It has made multiple interventions like rolling out of PM Gati Shakti scheme, development of Dedicated Industrial Corridors and Freight corridors etc. to significantly improve the situation. Further initiatives by the state governments and central government in development of Counter Magnet Areas (CMA) will strengthen the regional connectivity, tackle population migration and improve economic activity. Apart from government intervention large private players in logistics sector and technology startups are coming together and developing innovative models driving the improvement in logistics performance. Urban logistics will boom at a rapid rate by the massive advancement in technologies and newer solutions witnessed in recent years in areas like artificial and augmented intelligence, advanced analytics, and automation.



Sustainable Urban Transport in the cities

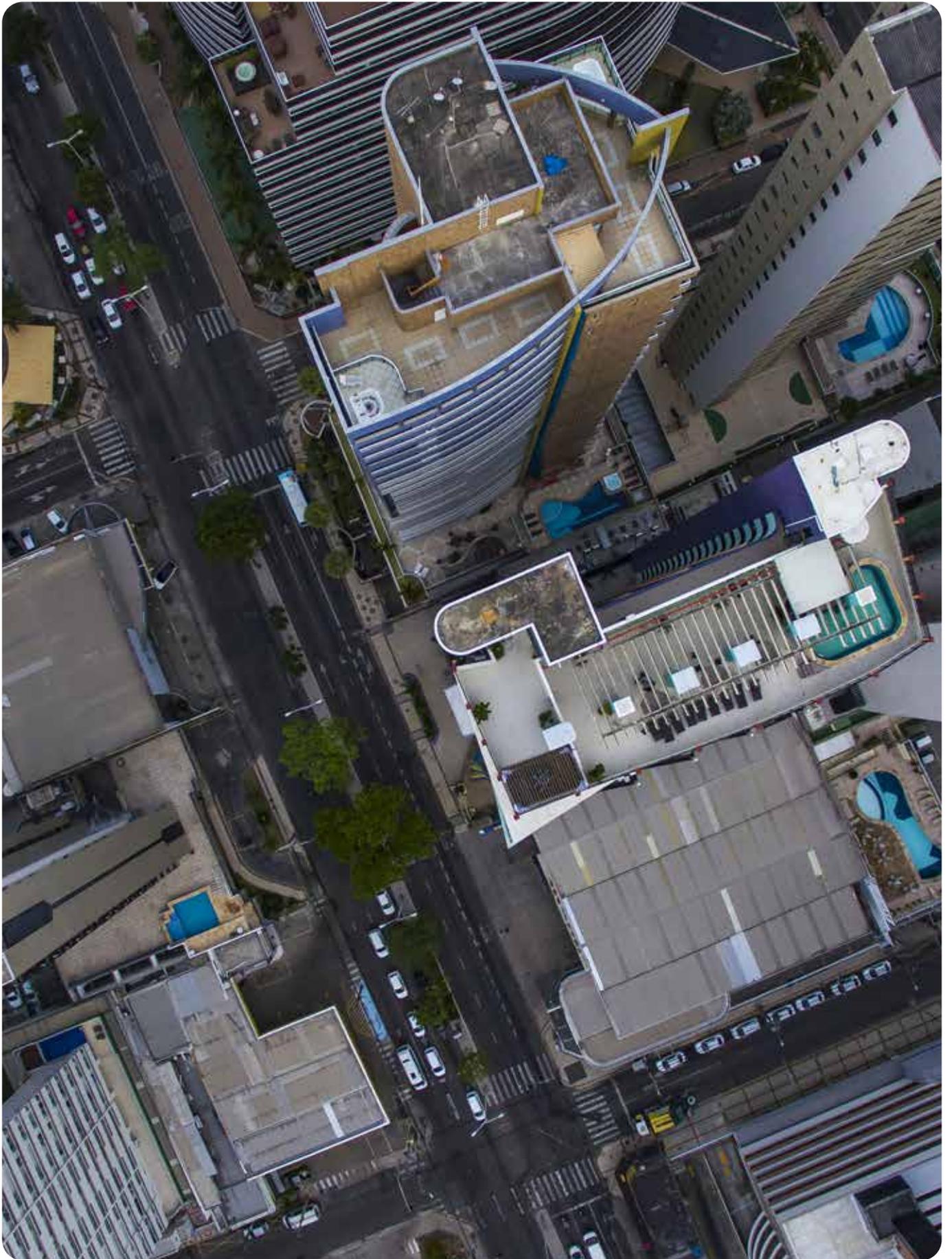
The National Metro Policy of India already has encouraged cities with more than 2 million population to plan projects related to mass transit systems. In the current scenario, cities in India are having projects related to Rapid mass transit systems in various stages of implementation. Going forward, it is suggested that all mass transit systems slowly shift towards renewable and efficient sources of power. All cities would also need to have a sustainable public transport with last mile connectivity. Urban areas and corporates would have to imbibe the lessons that COVID-19 pandemic has taught, making work from home, or satellite offices, shared workspaces or hybrid mode as permanent options, which is likely to have a significant input into future network planning and alternate modes

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If you listen carefully, you can learn what the future is telling you

Glen Hiemstra, Futurist,
Founder and Futurist Emeritus, [Futurist.com](https://www.futurist.com)²⁴

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Theme 5:

Citizen driven governance



Making the Citizen the Star

Focus on Citizens

Post the two years of COVID 19 pandemic, we have come to realize that there are a lot of gaps in the service delivery aspects in urban areas that need to be supplemented. The situation emphasizes a critical need for government reforms and policies to offer delivery of services at the doorstep of citizens. It is imperative that primary focus of citizen driven governance should lie on the needs of people while making the services easily accessible, flexible and secure in the Government to Citizen (G2C) scenario, while making the system transparent to inculcate more trust. The ultimate objective here is to make citizens play a direct role across the entire service delivery value chain. For a nation to act and respond smarter, engagement of its citizens by having their say in creating the solutions as a part of the urban ecosystem is necessary.

Citizen Centricity on the Rise

One of the recent initiatives, National Urban Governance Platform (NUGP) under the flagship National Urban Digital Mission¹⁹ of the Government of India, envisages to institutionalize a citizen centric and eco-system driven governance with enhanced ease of living, business and service delivery for all citizens across cities and towns in the country. The platform that is built on open architecture, currently offers 9 citizen services and will also allow potential data users, data providers, Urban Local Bodies (ULBs) to share the data sets and open-source codes across cities, urban governance, and urban service delivery. This aims to utilize and explore huge amount of generated data, thereby strengthening the capacity of the entire urban ecosystem and drive it towards speed and scale. However, a Citizen-Centric approach towards governance should not just limit itself to promoting a service offering or making it accessible to citizens but moving beyond delivery and awareness to an ecosystem of co-creation.

Another critical aspect for driving the change towards an effective citizen driven governance in the coming times, would be a new mindset underlying a substantial behavioural change, where the focus shifts from just so called 'residents' to 'citizens' via co-creation of innovative solutions and services and how these are delivered to the masses. This again re-emphasizes the fact that a city should be an ecosystem and that can be achieved through citizen driven focused action cluster enabling the initiatives and projects as development propositions and not just an offering.

Integrating ICCCs

Further, the rapidly expanding Smart Cities have Integrated Command and Control Centres (ICCCs), siloed systems, sensor-based devices and other sources, which generate unfathomable amounts of citizen-centered big data which has a potential value in supporting citizen-centered decision-making in city governments in terms of analytics. There is a wealth of existing conceptual research, but more operation proven frameworks to establish specific ways to implement such data for governance decisions using analysis algorithms suitable for future needs are required. Integrating regional data and city big data technology along with strengthening and streamlining urban data collection, data systems and data governance mechanisms through systems, sensors and devices for cities and institutions is a priority to direct budgets towards the priority initiatives for maximum impact.

All the above aspects need to be supported with a solid regulatory framework not only to assess the impact of the emerging new platforms and technologies but to also develop and foster economies. There needs to be a shift from bringing in new technologies within the government regulations to creation of innovative sandboxes under anticipatory regulations.

Promotion of Smart Urban Governance

In view of the above, we understand that the development of a framework for promoting smart urban governance intelligence from the two perspectives viz. urban governance issues and data analysis algorithms by leveraging big data analytics is going to be a big game changer. This framework consists of three main layers emphasizing value of an analytical approach from citizen-centric big data to decision making which can be validated in a case study of governance on a specific record:

1. A data fusion layer that creates anonymized, aggregated citizen-centric 360-degree data points, for each citizen by merging citizen-centric data from multiple sources in a common city portal;
2. A knowledge layer that uses various statistical analysis techniques, machine learning, and other econometric methods to demarcate citizen profiles including demography etc. at both individual and as a group; in related to the provision of public services and participation of citizens within the city; and
3. A decision support layer that uses an ontology model to standardize governance-related attributes, citizen profiles, and associations to support governance decisions through data mining, BI and statistical analysis technologies.

Imperatives for 2047 and Strategies to achieve them

Setting up of State Level Urban Observatories



Urban Observatories should be looked upon as an initiative to manage data as the most important asset and an enabler for data driven governance. The data being generated from various systems and ICCCs across cities would feed into these Urban Observatories on a real-time basis, which will help in generating some key outputs for stakeholders including government institutions, academia and industry through data mining and analytics for effective decision making. MoHUA already has set up an Urban Observatory to provide key insights on the cities across various parameters, while other states such as Uttarakhand, Kerala and Union Territory of Chandigarh aim to establish the same in the near future. However, in the interest of budgets and time, this initiative may be taken up by strengthening the select ICCCs to generate value driven insights from available data.

Data Governance including Big Data and Analytics for Planning, Governance and Performance Monitoring will be the call of the day



The importance of data management viz-a-viz data availability, relevance, consistency, usefulness and accuracy further includes how data is managed, integrated, and disseminated using statistical methodologies to unleash the power of data available. New technology solutions associated with platforms such as Big Data, Artificial Intelligence, etc. will provide us with the opportunity to overcome the challenges of climate change, the readiness of our resilient infrastructure challenges, and make data driven decisions to address our biggest vulnerabilities. This will make cities capable of identifying patterns in a dataset, using predictive analysis for generating insights basis past experiences and will also provide outcomes and inputs for taking decisions in future. Initiating evidence-based planning and monitoring of multi – disciplinary projects in order to measure and improve physical and financial progress will also help to fulfill the budgetary requirements under various Centrally and State Sponsored Schemes.

Development of Urban Policy Labs for Area, Regions or Network of Cities



Urban Policy Labs should be set up to enable policy development for authorities and stakeholder institutions for data management and effective collaboration across cities, regions or a network of cities. These Policy Labs can bring together government authorities, cities and other stakeholders with academia, policymakers and industrial associations within the urban ecosystem to define the way to align funds to benefit the communities while having Return on Investments (Rois) and create a positive impact. These can be set up across cities instead of one per city - keeping in view the population, area coverage, and complexities. Maybe, a state in the beginning, can have a network of city labs to leverage and slowly bring more urban areas into the fold. Barcelona has already set up itself an example of how a country can utilize a city to act as an innovation ground for new policies and solutions within urban space.

Collaboration on Innovative solutions would be a steadfast requirement



Cities will have to collaborate on the innovative solutions and direct funds appropriately for an effective overall impact. This may also involve citizen participation in order to suggest effective and innovative solutions surrounding various areas including their suggestions on policies and guidelines. One of such examples could be MyGov platform of Government of India which provides an opportunity to citizens not just in the country but globally to engage with the government stakeholders. 'Engage Victoria', a web portal provided by the Australian state government and the Portugal Participatory Budget web portal could be two other examples of how governments are enabling people to provide feedback on policy decisions.²⁵

Periodic revision of governance vision



A periodic refinement of the governance vision to progress towards data-based decision-making, in order to generate maximum value and prioritize efforts towards the critical services and schemes is to be adopted. This review may happen on a yearly basis to begin with, under a Committee that may be set up at a Ministry level with state government departments including key stakeholders as a part of the same.

Digital Twins will be adopted for robust and effective policymaking



Powered by data from IoT sensors, GIS mapping, drones and other sensors, these city twins will be used for range of uses, from assessing risks of natural disasters like flooding, to testing the impact of new infrastructure projects. Cities will leverage this technology to test future performance and assess possible risks of policy decisions in a cost-effective manner and take informed decisions. As data matures over a period of time, to choose the right economic triggers and policies, the cities should look at leveraging the digital twin technology to simulate their effect of proposed economic triggers on the sub-region and the city as a whole.

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Digital India on the back of artificial intelligence (AI) is the future of e-governance in India

Nandan Nilekani,

Former Unique Identification Authority of India (UIDAI) chief and non-executive Chairman of Infosys²⁶

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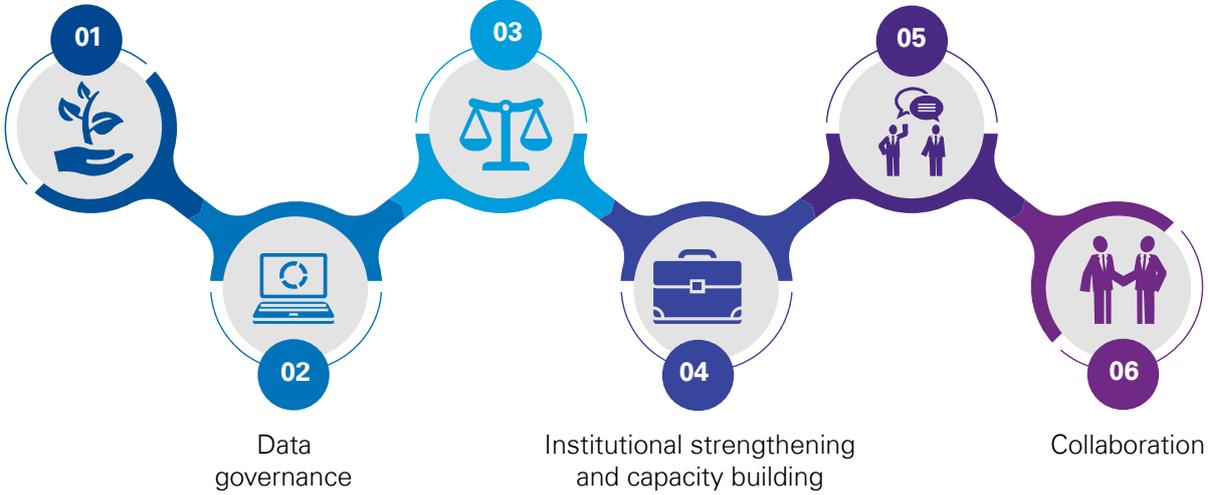


Key drivers of Citizen driven Governance of the future

Co-creation ecosystem

Policy / regulations

Behavioural change



Theme 6:

Climate change and Resilience



Turning the clock back

Climate change is already happening

Urban floods, heat waves, droughts, and landslides have been more frequent in recent past than before. The effects of global warming are more than evident, and it is obvious that cities are the largest contributors to as well as the most affected by this. Several studies estimate that close to 70²⁷ percent of the greenhouse gases and carbon footprint are contributed by the cities. Vehicular pollution is next only to energy pollution in cities. This should not be alarming since cities are meant to be densely packed pragmatic engines of economic value creation buzzing with activity. India contributing 6.5 percent of global GHG emissions increasing at the rate of 6 percent annually; and being ranked 6th among the 10 most affected countries makes it imperative that Climate Change becomes the paramount agenda.

What are we doing about it?

In India, the Central Government, in 2008, launched 8 missions under National Action Plan on Climate Change (NAPCC). Of these, the Solar Mission, Sustainable Habitat, Green India Mission and Energy Efficiency missions are most relevant for Urban India. The first steps of consolidating data and giving Climate Change a focus, are in the right direction. The COP-26²⁸ took special interest in negotiating on the climate change effects and commitments to be made by cities in tackling the same. Being the largest contributors as well as the affected party, the local action by cities to a global problem is what will define the future of humanity's existence. While national policies and international call for action and commitments will be the guiding forces, enabling environment and accessible finance, the commitment, long term strategy, and actions will have to drive at the local level. OECD states in one of its reports that the incremental costs for

climate resilient construction of infrastructure would not be more than 10 percent. If the impact savings are considered, the savings would surpass the incremental cost also.

Urban Resilience Unit Established in collaboration with 100 Resilient Cities (100RC) Program of the Rockefeller Foundation, the Urban Resilience Unit (URU) at the National Institute of Urban Affairs (NIUA) has proposed Urban Data Observatory, a platform which will serve as a repository for accurate and frequently updated city specific spatial and non-spatial data that could be used as a decision support system. Globally accepted frameworks, strategies and planning tools has proven insufficient in the context of Indian Cities mainly due to their diverse characteristics associated with the Environmental, Social and Governance (ESG) aspects and lack of clearly defined data management framework which provides critical inputs for decision making processes.

Every country which is a signatory to the Climate Change Conference (COP21) in Paris in 2015 agreed to establish Nationally Determined Contribution (NDC) as a part of the action plan to cut emissions and adapt to climate impacts and update the same every 5 years. At the Climate Change Conference (COP26) in Glasgow in November 2021, Prime Minister Narendra Modi announced that India would achieve Net Zero by 2070.

The Way Forward

It is necessary that city leaders agree on a sustainable and climate resilient framework to be applied in each decision that they take. The strategy should necessarily have immediate, medium-, and long-term targets and interventions identified and committed to. Most cities are continually faced with the challenge of raising market capital funds due to the credit ratings. It may be necessary to devise a different framework to assess

the credit worthiness of cities; one which assesses the commitment, nature of projects, ability to expend the funds received in a timely manner, the governance structure, and the impact to funding ratio.

Beyond the much-needed funding, cities have several tools that they can look at leveraging to commence their climate resilience journey. Buildings itself provide a large opportunity for roof top non-renewable energy. Cluster development initiatives provide a chance to remodel large areas within the cities for vertical densification, thus allowing more open green spaces. Then, there are central government schemes for creating less-polluting transportation, such as Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME). At local level, urban planning policies for sustainable construction material usage and investment policy tools can help deliver substantial carbon savings. Urban forestry should be driven by the

ULBs through the support of NGOs, with the public taking ownership of maintaining the green cover.

Protecting water bodies cannot be more emphasized when the basis of civilization has been on the availability of water. Today, most water bodies in urban are polluted. They need to be rejuvenated to the extent of being fit for recreation. Programs such as Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and Swachh Bharat Mission (SBM) all strive to drive this outcome, however, political will, public commitment and behavioral change are imperative for its success.

It will be even more important now that cities have strong program management units and institutional mechanisms put in place to monitor and report the progress of these initiatives. Announcing these commitments publicly and publishing its progress report will bring in the much-required accountability and keep the pressure on the commitments.

Imperatives for 2047 and Strategies to achieve them



City Action Plans should ensure to exceed the Nationally Determined Contribution (NDCs)

With urbanization poised to grow rapidly, every city would need to put in place an action plan immediately and has to be more ambitious than the NDCs committed by India.



Cities to develop a comprehensive climate data inventory by 2047

It is necessary that city administrations focuses on the development of GHG emission inventory in an endeavor to become climate-resilient, and chalk out a plan on reducing GHG emissions to sustainable limits in a time bound manner



Cities to have at least 30 percent green cover by 2047

Globally cities appreciated for their green cover have 25 to 35 percent green cover. With most cities having less than 20 percent cover in India, it is imperative that good quality tree cover be increased to the maximum possible for carbon sequestering and minimizing the heat effects.



Access to Green Finance for cities

Cities in India have still to take a more strategic approach to have access to green finance for investment in climate resilient infrastructure and sustainable development. It is imperative to work towards financial autonomy of cities, create institutional mechanisms for bilateral/ multilateral channels for climate-resilient city finance, align city priorities with national priorities, and introduce instruments to help cities gain access to financial institutions and global green finance.



Decarbonization as a tool for Climate Sustainability

At the beginning of the COP26 conference on climate change in Glasgow in November 2021, India announced that it aimed to achieve net zero emissions by 2070. Cities consume²⁹ 60-80 percent of energy production globally and account for 70 percent of Carbon dioxide (CO₂) emissions. Reducing virgin material and fossil fuel demand through design and process optimization and circularity will be the key drivers for lowering Greenhouse Gases (GHG) emissions. Repurposing existing buildings, refinement and enforcement of green building codes such as Leadership in Energy and Environmental Design (LEED) and Green Rating for Integrated Habitat Assessment (GRIHA) and choice of procurement of goods and services that promote sustainable goals will help corporates and governments achieve sustainability goals.



Cities to obtain self-sustenance for the availability of freshwater

In India, major cities are dependent on piped water supply from reservoirs where the water levels are primarily governed by rainfall patterns in the catchment areas. In the Union Budget 2022-23, the Finance Ministry has provided budgetary provisions to Jal Shakti Ministry's Drinking Water and Sanitation Department. The majority outlay under this budgetary allocation is for providing tap water connections to 3.8 crore households in 2022-23 alone. While more such government allocation would come in the future, it is also necessary that projects such as water harvesting, channelizing urban stormwater through appropriately designed drainages into major reservoirs and rivers, and recycling and reusing of wastewater are planned and financed in all the cities by 2047.



All city administrators should have climate change and sustainability as their core guiding principle

To achieve this sustainability filters needs to be included in each decision taken by the city administration. They should have stricter norms mandating green buildings & construction technologies and should publicly commit to targets on tackling climate change besides report it annually. The city administration should also undertake Brownfield Cluster redevelopment programs for re-densification and creation of strategic open spaces



All million plus cities have at least 75 percent of its power generated from renewable energy sources

Given that India has already committed to fulfilling 50 percent of its power demand through renewable energy by 2030, cities should adopt more ambitious targets and should aim at receiving 75 percent of its total power requirement from renewable sources. To achieve this the city must promote renewable sources of energy with committed targets and timelines through tax breaks and /or subsidies. It should also create a funding pool and ring fence it for climate change initiatives.



Climate resilient infrastructure:

The most affected by climate change will be the economically underprivileged. Hence, it will be necessary to create climate resilient infrastructure as part of readiness for eventualities along with a disaster management cell within the city administration. For example, decrease in net water wastage, normalizing 100 percent renewable energy without landfilling waste and further reducing absolute CO2 emissions, while improving production capacity and efficiency through strict monitoring and enforcement would be solutions for cities to focus on.



Creating awareness among the wider population

All the systems are successful if only the citizens of those countries accept them and take the ownership. It is necessary that extensive awareness drives on climate resilient cities are carried in the coming years. One option could be communicating the infrastructure plan to stakeholders to help them participate in the decision making. For example, local knowledge of climate related events may be leveraged to plan a wider scope of infrastructure development.

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We have a single mission. To protect and hand on the planet to the next generation on the planet to the next generation³⁰

Francois Hollande,
former President of France

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Theme 7:

Urban infrastructure delivery



Build a resilient backbone

Where do we stand?

At present, India's urban cities occupy only 3³¹ percent of country's land but contribute to 60 percent of India's GDP. Consequently, our cities also have a substantial GHG footprint, with the top 25³² cities contributing to more than 15 per cent of the total GHG emissions in the country.

India's rapid urbanization has also brought in host of other challenges that include unplanned and unstructured urban sprawl, depleting green cover, aging and stressed infrastructure, increased congestion levels and lack of adequate civic amenities such as such as drinking water, sewage, and electricity. For example, 65 percent of the 7,933³³ urban settlements do not have any master plan. Cities like Chennai and Mumbai have a meagre 0.46 sq.m. and 0.12 sq.m. of green space per capita respectively³⁴, as opposed to UN recommended standard of 9 sq.m of green space per capita. Furthermore, 30³⁵ Indian cities, including Jaipur, Indore, Amritsar, Pune, Srinagar, Kolkata, Bengaluru, Mumbai, Kozhikode, and Vishakhapatnam, are likely to face acute water shortage in the next few decades, whereas almost 60³³ per cent of India's growth in expected energy consumption is directly related to projected urban growth. Global warming will make it worse. India ranks among top five countries in terms of air and water pollution in our cities, with its top 25 cities also having 40 per cent higher per capita emissions than the national average.

Government of India has undertaken various initiatives to address these challenges and to improve the livability in the urban India through targeted initiatives and schemes and to improve physical infrastructure and livability in the urban India. Creation of industrial corridors, the likes of Delhi Mumbai Industrial Corridor (DMIC) project and Chennai Bangalore Industrial Corridor (CBIC), has been one such initiative with a vision to spur growth of adequate infrastructure and

create manufacturing destinations in these regions. Housing for all, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities Mission (SCM), Heritage City Development and Augmentation Yojana (HRIDAY), Pradhan Mantri Awas Yojana-Urban (PMAY-U) and Swachh Bharath Mission (SBM) have been other initiatives in this direction. Recognizing the importance of better planned urban areas in the country and prevent unstructured urban sprawl, Budget 2022-23 also lays out the roadmap for a 'paradigm change in urban planning to prepare for 2047'. An expert panel will be set up to suggest policy interventions, capacity building, governance and implementation for sustainable urban development to keep up with rapid urbanization.

Where are we headed?

Importantly, translating this vision of new Urban India however, will also require substantial investment and efficient delivery of urban infrastructure projects. Given, the historical performance of delivery of infrastructure projects, special focus on enhancing project delivery capabilities shall be required. As per the Ministry of Statistics and Programme Implementation which monitors³⁶ infrastructure projects worth INR 150 crore and above of the 1,670 such projects, 438 reported cost overruns and 563 were delayed. The average time overrun in these 563 delayed projects is 47 months, and cost overruns totaling more than INR 4.3 lakh crore.

Timely and within budget completion of these projects is paramount for realizing the vision for develop quality, reliable, sustainable, and resilient infrastructure for urban India. By harnessing new age Digital technologies, data driven decision making, adopting sustainable approach to infrastructure development and putting a robust governance, cities can progressively meet their sustainable growth objectives as India becomes a high performing economy by 2047.

Increase in infrastructure investments is key to revising the virtuous cycle of consumption and investment. The multiplier effect of infrastructure spending on growth is

extensive. Besides a timely completion of infrastructure projects helps reduce the logistics cost and increase economic competitiveness.

Imperatives for 2047 and Strategies to achieve them

Building Information Modelling (BIM) and Digital twin for future city development

BIM and digital twin technology provide a host of opportunities for the development of urban infrastructure projects. India can gain significantly by adopting these technologies for shaping the future of urban transformation. Countries like UK and Australia have launched ambitious programmes for the adoption of Digital Twin technologies. These focus on High-quality, secure digital data that can improve how infrastructure is planned, built, managed, operated and eventually decommissioned. Interconnected digital models minimize coordination issues, enable offsite production, enhanced monitoring and proactive maintenance of these capital-intensive projects.

UAVs and GIS solutions for operational efficiency, productivity and real time monitoring

Drones and geospatial solutions provide operational efficiency, productivity improvement, and real-time progress monitoring based on actual site conditions strengthening project management capabilities. Govt recognizes the importance of drone technology and has announced the PLI scheme for the Indian drone industry in September 2021, allocating Rs.120 crore over three years for drone manufacturers, component makers and software companies. It offers a 20 percent bonus on value generated by each company in the drone space.

Automation and 3D printing for project execution

One area that 3D Printing is being touted to address is that of affordable housing. Shorter long-term costs, the speedy printing of walls, and a lower margin of error have been identified as advantages of 3D Printed buildings, advantages that are key to creating truly affordable housing that do not compromise on good design. The major driving factors that support the exponential growth of 3D printing include - the development of new and improved technologies, financial support from governments, large application areas, rapid product development at a low cost, and ease in development of custom products. With advancement in technology and scaling up of operations, the cost of equipment and manufacturing are expected to come down that are currently impeding the growth of 3D printing technology.

Prefabrication for faster development

Use of prefabrication components involves increased efficiencies, construction sequencing, reduced lead times and better safety for workers. These time savings contribute to lower interest during construction and have the advantage of commencing commercial activities far earlier than anticipated. The optimization of raw material reduces the material cost of the building, and the lighter weight of the structures brings about significant savings in the foundation cost. Avoiding complexities, a pre-engineered concrete building efficiently replaces conventional methodologies of constructing a building.

Resilience of Urban infrastructure is vital for urbanization and economic growth

India is home to 13³⁷ out of world's 20 most risk-laden cities. In the aftermath of such disasters, the governments must divert public funding to rebuild, instead of investing in new infrastructure to make up for existing deficits creating an Infrastructure Trap that not only halts the economic growth but also disrupts / reverses the progress already made. Dynamic 3D model driven approaches for design, engineering, construction and operation are a must to allow simulation, visualization and analysis for all connected components of urban system. The aspect of resilience should be the considered right from the concept development stage and be an integral part of planning, designing, construction and maintenance of infrastructure.

Application of connected devices provides for improved safety, optimized resource management and budgeting, waste management and real time monitoring of projects along with improvements in design and engineering process.

Reducing virgin material and fossil fuel demand through design and process optimization and circularity will be the key drivers for lowering GHG emissions. Repurposing existing buildings, refinement and enforcement of green building codes and choice of procurement of goods and services that promote sustainable goals will help corporates and governments achieve sustainability goals.

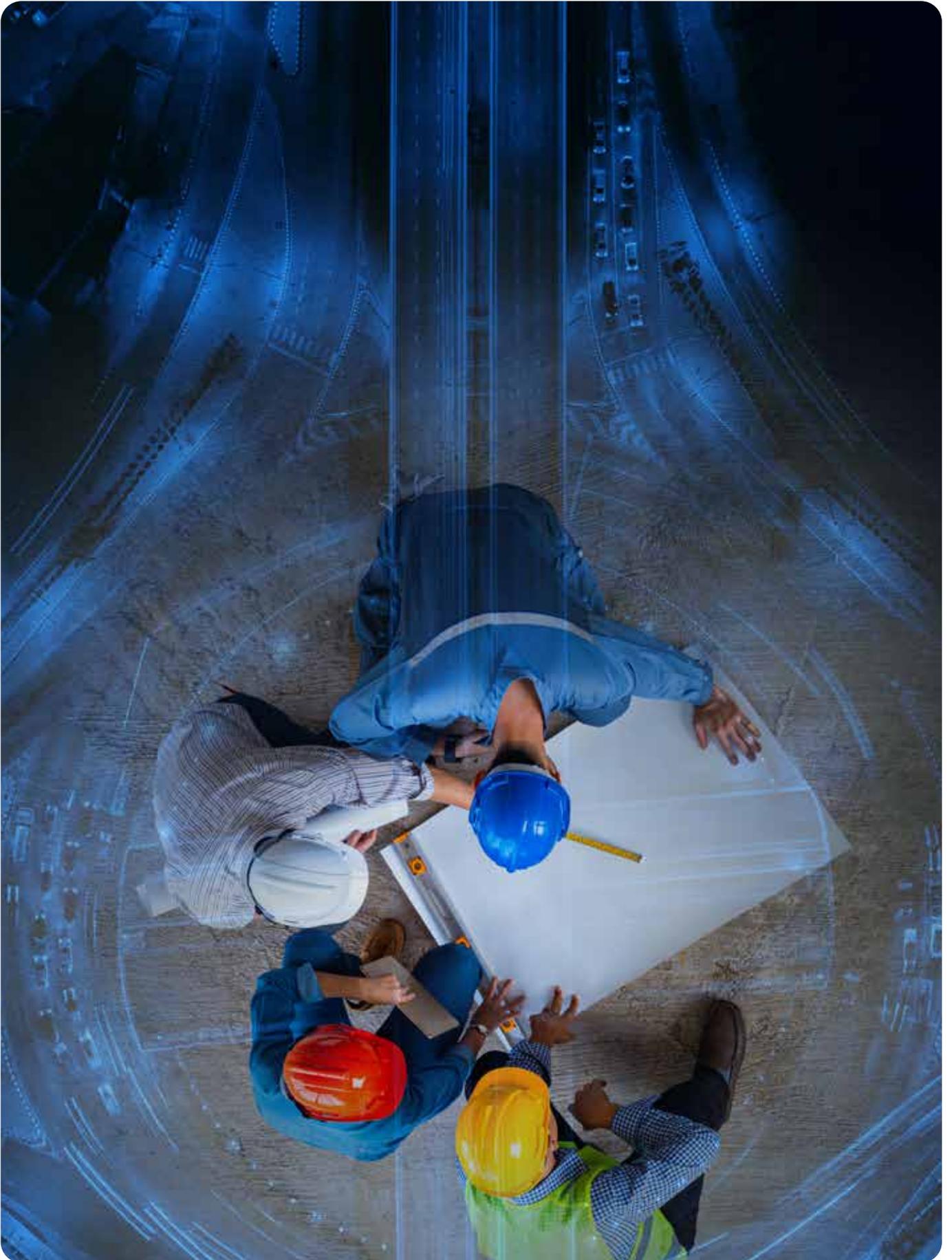
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City growth has caused climate change, but that growth is also what's going to get us out of it.

Matthew E. Kahn,³⁸
rovost Economics Professor, USC

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Theme 8:

Financing the change



Capital to Capitalise

Transitions and Moves

Since the days of the Balance of Payments crisis of 1991, the ensuing LPG (Liberalization, Privatization and Globalization) reforms, and business friendly policies introduced in the decades after, India's transition from a command-and-control setup to a mixed, and increasingly, market economy saw its marquee capital projects developed primarily through budgetary sources, assistance from Multilateral Development Banks (MDBs) and domestic public deposits with its bank. While there was a fleeting period which saw state owned Development Financial Institutions (DFIs) bankrolling the long gestation capital expenditures, it could not take off as planned.

The Shift in Stance

Given the Centre's pronounced measures and the track of increased inflow of foreign capital in markets, the coming years are likely to find the sovereign leveraging the newer DFI avatar (NaBFID - National Bank for Financing Infrastructure and Development) intended to de-risk retail banks from lending to infrastructure and non-recourse assets and addressing the age-old ALM (Asset Liability Management) mismatch issues for long term financing with short term savings. Additionally, revamped Model Concession Agreements (MCAs) Public Private Partnerships (Build-Operate-Transfer, Hybrid Annuity, Toll-Operate-Transfer etc.) that incorporate learnings from the late 2000s, and modern investment vehicles such as Real Estate or Infrastructure Investment Trusts (REITs or InvITs) will help ensure a more balance sharing of risks for the country's urban development over the next 25 years.

By the latter half of this decade, the success of the upcoming national 'Bad Bank' is likely to be seen – through the National Asset Reconstruction Company (NARCL) and India Debt Resolution Company (IDRCL). These sovereign ARCs are expected to subsume bad (non-performing and stressed) assets in our banking system in swoops, clean up their balance sheets, and increase their lending ability towards better rated proposals, Small and Medium Enterprises (SMEs), and short gestation projects. This can potentially avoid a recurrence of the 'Twin Balance Sheet Crisis'³⁹ that erupted in the mid-2010s. As part of its more recent initiatives aimed at tapping internal sources of finances, the PSU Disinvestment targets (strategic sale of Government stake) coupled with a recently launched National Land Monetization Corporation (NLMC) and assets identified in a master National Monetization Pipeline (NMP) till 2024-25 will help in sell-off or lease-out brownfield projects, surplus land, and building assets owned by Government agencies.

Redefining the Road Map

As India refines its roadmap towards the commitments made at COP-26 in Glasgow and promotes sustainable sources of energy while softening the blow from transitioning from the conventional fossil fuel sources, an integrated planning model designed to deliver connected and resilient infrastructure, with citizen centricity and a services orientation is the need of the hour. To deliver this on the urban front, the INR 2.05 trillion Smart Cities Mission (SCM) launched in mid-2015 targeting 100 Smart Cities (initially planned for completion by 2023) is likely to be expedited, with intended objectives realized only by the latter half of this decade.

Imperatives for 2047 and Strategies to achieve them



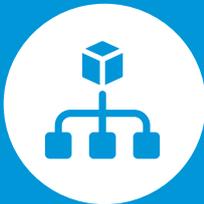
Focus on Creation of Sovereign Funds

Creation of theme-based collective investment vehicles to draw patient foreign capital directed towards financing of Environment, Social and Governance (ESG) causes and vital undertakings by the State for capital expenditures aligned with India's COP 26 commitments will be the need of the hour.



Institutional Framework for Green Financing

While the Budget 2022 alluded to raising capital through Sovereign Green Bonds, it is imperative that operating guidelines for investors and investees (in both, the public sector and private corporations) from the Ministry level to the regulators (RBI, SEBI) and exchanges, to enable transparent and predictable fund raising via instruments such as Green Bonds, are structured and formalized.



Realignment of Program and Project Pipe for Goal Mitigation

Realigning and reprioritizing projects identified in the INR1.02 trillion (now INR1.97 trillion) National Infrastructure Pipeline (NIP) announced pre-COVID – to meet goals related to mitigations for climate change impacts, disaster resilience, emission reductions, renewable power capacities, and others, in line with the COP-26 and other warnings as per the latest IPCC Assessment Reports is needed to build a master project pipeline that caters to the above commitments. This master stream of public initiatives will help central agencies, as well as states, to chalk-out robust and definitive annual plans using the newly launched 'Gati Shakti' platform through better co-ordination, swift approvals and debottlenecking project execution.



Operationalizing DFIs (including NaBFID) for Fund Mobilisation

Expediting the setup of NaBFID and finalizing the framework for other private DFIs that have the potential to mobilize funds for strategic projects and unlock the equity capital stuck in PPPs or other private assets by acquisitions is necessary.



Monetization by States through Alternate Source

Encouraging states to list their own InvITs or REITs or, alternatively, propose their commissioned projects or undertakings for sale to existing InvITs/REITs can potentially increase the state's capital receipts, decrease dependence on GST revenue allocations, and direct monies towards state sponsored schemes.



Healthcare Investments to Mitigate Future Shocks

The CoVID-19 pandemic presents the opportunity to address the healthcare infrastructure and capacity across the country – from improving key indices such as doctor-patient ratios, bed availability, health centers per region, to manufacturing and logistics for life-saving drugs, and focus on research and development. This could be actioned by incentivizing investments to manage the impacts of future outbreaks of air-borne and vector borne diseases and improving minimum service standards and quality.



Forex For Development

Mobilizing the country's vast foreign exchange reserves (which stood at ~USD622 billion in March 2022)⁴⁰ towards development of physical and social infrastructure will help leverage off-budgetary sources for fixed capital formation and keep the fiscal deficit in check.



Encouragement to Municipal Bonds

Creating an environment to encourage issuances of municipal bonds or 'Munis' by urban local bodies to finance public projects in their jurisdiction would help diversify the pool of fixed income products available for institutional and retail investors in the market. To meet the debt obligations, the local bodies can exhibit increased accountability through greater efficiencies in levying and collecting of fees, innovative pricing for services and monetizing of services and assets.



Reviving Public Private Partnerships (PPPs)

Balancing the risk sharing between the public and private sector parties with suitable improvements over past instances of failed Urban PPPs (Metro Rail, Real Estate, Utility Distribution, Parking) – such as novel non-fare revenue sources, revenue shortfall support, liberal termination payments, interest rate and price inflation buffers, among others – can help bring in private sector entities achieve desired service levels while restoring the confidence of financiers to private sectors while avoiding or deferring public monies through budgetary sources.



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By encouraging foreign capital flows, reducing tax on infrastructure investment, creating institutions like NIIIF, Gift City, new DFIs, we have tried to accelerate financial and economic growth

Narendra Modi

Prime Minister of India⁴¹

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Theme 9:

Technology as the
common fabric

Weaving Together Innovative Threads

IT as the Enabler

Information Technology has become an omnipresent enabler of smart services due to its penetration in providing citizen services and good governance. This includes enterprise initiatives, mobile computing, all forms of cloud, cybersecurity, and more. In today's world, technology has become ubiquitous and has pervaded all walks of life allowing ease of access, monitoring, measuring and more real-time and accurate decision making. A look around our daily lives reveals that internet technology and software tools have become an integral part of our lives. We often start our day by opening the web pages of our favorite online newspapers and reading the headlines to find out what's happening across the world; checking apps to connect with multiple facets of social, business and cultural life; use text, audio, video for multiple channels of interaction and information sharing along with, connecting remote locations thereby addressing diverse needs for variety of purposes.

All of this happens, not realizing that State-of-the-Art information technology has created an open, virtually networked environment. This opens up almost endless possibilities for retrieving, storing, sharing, and interacting across time and space. The most important advantage of technologies and software tools is that they help you acquire, use, and leverage the knowledge generated throughout the innovation process. As a result, we increase the effectiveness of a solution by shortening the cycle time of innovation, improving the quality of solution, and increasing the value of solution towards customer centricity.

Digital Aspect of Everyday Life

The effectiveness of technology as a fabric for providing citizen centric services is today visible by the fact that every solution/service has a digital aspect to it, to make it successful and accessible. From a city perspective, it is possible to monitor and measure the KPIs of all

services as long as you add the 'smart' perspective to it through use of digitilisation. Rise of sensors and IoT devices is not only giving enough digital information but also improving the accuracy and sufficiency of data points to allow meaningful analysis. The first wave of digitilisation has matured to allow ease of plugging and playing devices collecting different kinds of data. The second wave is on the way which will now focus on processing the ingested data – structured or unstructured. The next stage is when the data 'speaks' and allows an analytical output to aid decision making and results. All this in the back end with the developing ecosystem matures into a useful service, only through ease of adoption for end users.

The future of cities lies in its ability to manage assets and resources more efficiently. This requires data from multiple data capture points through various integrated devices for instantaneously transmitting information to a central server. The IoT enables the platform and systems for the data collection and transfer, as well as the resultant analysis and intervention. These devices may include applications, standalone systems, Sensors, Devices, ICCCs and more. The potential applications for these are endless and can be used to revolutionise asset management, service delivery and resource allocation, among other areas.

From a consumer perspective also, the consumption of technology undergoes the cycle of emergence, acceleration and maturity, creating not only a market demand for 'smart' services but allowing to create a lever for further innovation. Adoption and maturity of technology happens only when it addresses a social, economic, cultural or political need. Access to accurate information at the quickest pace has always been the lever of success through generations. Technology as a common thread aims to satisfy this need through all innovations and integrations with human life. The ease with which information for a service can be collected, processed and acted upon makes it more desirable for end user utilisation.

Challenges to the Benefits

Human mind has surprised us through centuries and shall continue to do so with technological innovations. At every stage when we feel that we have reached the pinnacle of creativity and effectiveness, a new thought helps improve and accelerate the innovation. Successful implementation of technology is part in time when technological innovation ecosystem built over time improves the output of consumer demands. To make a service successful, it must course the cycle of development till it matures, addressing multiple challenges during the journey.

To reap the benefits of omnipresence of technology, the major challenges which need to be addressed are:

Human Challenges: Information, knowledge and ideas are important values in the information society, but people are the power to create them. People inside and outside an organization need to participate in dialogues about products and services and use their knowledge to improve performance.

Information and Knowledge-Ideas: Standards for improvement of any services today are high due to high expectations of end users. The right solution for the right problem identification is the first milestone of a successful implementation. For instance, today the Internet makes it possible to store and access large amounts of information about customers, clients, competitors, current trends in the industry, current developments, and more. For a smart solution, the differentiator lies in how we use this data to generate new ideas and put them into practice.

Technical Challenges: Shelf life of ideas is small and hence the agility with which data is converted to information holds the key to successful enterprise. Business success depends not only on what you know about your customers and their needs, but also on how quickly one can acquire that knowledge and how quickly one can act upon it. Analytical layer defined basis the specific set of understanding is very important in processing large amounts of data and extracts the knowledge needed to generate innovative ideas.⁴²

Imperatives for 2047 and Strategies to achieve them

Technology is omnipresent and is the engine which is driving the changes in social, economic and financial world. The path to success will involve adaptation of various aspects allowing innovation, institutional research, outcome-oriented use cases solving real-life problems and capacity building to create and disseminate the advantages of the solution.



Need of the hour is to build a powerful technology system

Technology systems can aid in identification and addressal of the risks of forced and debt employment throughout the supply chain and service industry. This will enable industries and supply chains in makeover shift to perception of workforce. Capacity creation while allowing innovation and skilled workforce and increase in the number of senior management women and minority groups by ensuring technology-driven promotion and incorporating comprehensive leadership practices and accountability into our culture around the world will bring revolutionary change in workforce participation.



Proven technology driven tools will improve effectiveness, quality and solution

This will reduce overall turnaround time for innovation. A shift from plug and play devices to data analytics and processes with the capabilities to generate value out of huge amount of data available.



New Age Technology will focus on outcome-oriented use cases solving real life problems

According to an estimate, 1.35⁴³ million people die each year as a result of road accidents. The idea is to work with industry and ecosystem partners to drive the adoption of technology-neutral safety standards and reduce road accidents around the world. Pandemic-enabled responsive solution with rapid access to the technologies, required to counter current and future pandemics and the applicability of tools that minimize the impact of such pandemics in the future.



Institutional Research will be vital for addressing the demand

Partnership between institutions, academia, industry experts and researchers around the world to prepare people with relevant skillsets keeping up to anticipated requirements is strongly required. Developing innovative incubation centers along with Community awareness programmes to help flourish the right talent and capacity building by collaborating with practitioners, institutions, and governments across the globe will be essential for this.



Efficient Management of Connected devices and data driven decision making

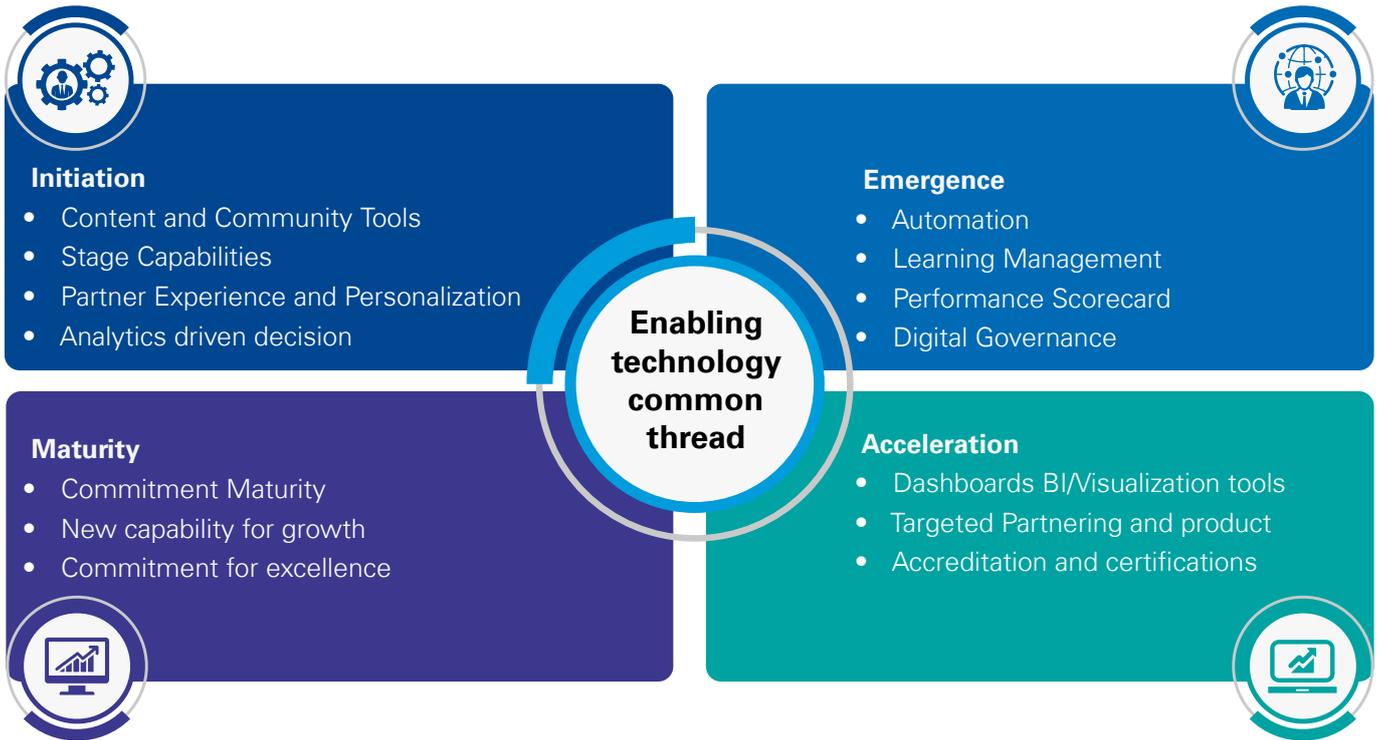
The future of cities lies in its ability to manage assets and resources more efficiently. This requires data from many thousands of data capture points – so called ‘connected devices’ – to instantaneously transmit information to a central server. The IoT forms the platform and network for this data collection and transfer, as well as the resultant analysis and intervention. These devices include water and electricity meters, environmental sensors, flow meters, level sensors, parking sensors, a variety of tracking devices, RFID readers and more. The potential applications for these are endless and can be used to revolutionise asset management, service delivery and resource allocation, among other areas.

“

Amongst other things, digital technology has increased the productivity of workers and businesses, improved the quality of products and services, and reduced prices

Australian Information Industry Association⁴⁵

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Ruvneet Kang
Sumit Gehani

Markets Team

Arun Choudhary
Anupriya Rajput
Satyam Nagwekar
Venkatesh R



KPMG in India contacts:

Elias George

Partner and Head

Government and Public Services

T: +91-124-336-9001

E: eliasgeorge@kpmg.com

Manish Agarwal

Partner and Head

Energy & Infrastructure M&A

Head - Special Situations Group

T: +91-22-6134-9200

E: manishaggarwal@kpmg.com

Nilachal Mishra

Partner and Head

Government Advisory, India

Government and Public Services

T: +91-120-386-8000

E: nilachalmishra@kpmg.com

Puneet Narang

Partner and Head

Major Projects Advisory

Co-Head, Infrastructure Sector

T: +91-124-336-9071

E: puneetnarang@kpmg.com

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KPMG Assurance and Consulting Services LLP, Lodha Excelus, Apollo Mills Compound, NM Joshi Marg, Mahalaxmi, Mumbai - 400 011 Phone: +91 22 3989 6000, Fax: +91 22 3983 6000.

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