

The journey of urban India: from conventional policy implementation to disruptive transformation

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Foreword

Technology has become the prime enabler for Urban Transformation. One of the highlights of Smart City Mission has been promotion of technology for enabling city administration and to enhance efficiency and cost optimization. As a result, the urban sector witnessed a tremendous influx of technology in non-conventional areas.

This report **"The Urban Saga: From Conventional Policy Implementation to Disruptive Transformation"** talks about the shift in the urban ideology from traditional and conventional methods of policy implementation to a disruptive transformation. Digital data is the pivot of the urban transformation process. Data has been regarded with paramount importance in the process of planning history in India. However, the Smart Cities Mission revolutionized the premise of data utilized for operations monitoring and decision-making of city administrations. Under the contemporary Urban Transformation Approach, cross-functional integration transcends beyond conventional boundaries to explore institution of new specialized establishments like Special Purpose Vehicles and Public-Private Partnerships.

The report focuses on some of the key transformations happening in the urban space in India. The new approach has resulted in formulating innovative models which result in cost optimization and better monitoring of projects. Amidst all the technological transformation going on, the role of citizens, industry, NGOs and academia are also experiencing a change. The report also highlights the changing role of cities and the citizens in the policy formulation process and valuable insights about the ongoing urban transformation with data, technology and digital disruption at the core.

I hope you will find this report interesting and informative.



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Foreword

Ernst & Young (EY), in association with Federation of Indian Chambers of Commerce & Industry (FICCI), is pleased to present this Thought Leadership on disruptive transformations in the urban sector in India.

With the launch of the Smart Cities Mission, India embarked on a transition from a conventional urban development paradigm to a contemporary real-time, evidence-based paradigm. The Smart Cities Mission revolutionized the urban development landscape by introducing the idea of utilization of data for operations monitoring and decision-making by city administrators.

Today, it has been acknowledged that technology and digital are going to be amongst the prime enablers of urban transformation. Combining the smartness of operational technologies, Robotic Process Automation, Machine Learning and Internet of Things with clean data lakes, Geographical Information Systems along with non-Information and Communication Technologies enabling a variety of development subjects such as Green Buildings and data-derived transparent policies, we can transform into a more citizen-centric, human-development-based paradigm.

The technological disruption has also brought with it a change in how different stakeholders such as municipalities, citizen, industry, academia, Non-Government Organizations, etc. interact and steer the journey of urban development. Earlier, municipalities used to act as the initiator, decision maker and the main actor in this landscape, with other stakeholders being the beneficiaries of the process. Now, every stakeholder is emerging as an active participant. Informed citizens have started demanding and actively contributing towards the urban landscape they want to inhabit. The industry is proactively taking serious steps towards driving sustainabile behaviour and promoting diversity aiding the development agenda. Start-ups are partnering with the government to bring in cutting-edge urban technology to devise localized smart solutions tailored to address specific problems of the city. The academia is conducting social research and bringing in relevant insights for pertinent policy formulation.

Meanwhile, the municipal entities' approach to urban governance has also changed. Capacity augmentation through industry and Non-Government Organizations is being considered to meet the ever-growing and on-demand need of varied skillsets within the departments. Non-conventional assets are being identified for monetization; and a re-design of public service delivery is being undertaken.

Advent of the COVID-19 pandemic has further transformed the municipality's role and its position in the lives of an average citizen. Municipalities started shouldering a wide range of responsibilities – from health-care to more socially-oriented activities – such as providing temporary shelters and ensuring uninterrupted food supply.

Amid this changing, dynamic landscape of urban development, this Thought Leadership report captures characteristics and highlights of this disrupted scenario in India's history of Urban Development while identifying the underlying themes of change and highlighting the critical areas within the Urban Development agenda that require further action.



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1

Shift in urban development ideology

Since its inception after India's Independence, the Urban Development Paradigm of the India we know today, has witnessed a drastic shift in ideology. Immediately after the Independence, the First Five Year Plan focussed on rehabilitating the huge population influx to its major cities such as Delhi, Bombay, Ahmedabad and Calcutta. The Second and Third Five Year Plans shifted their focus on undertaking planned development through preparation of City Development Plans for the four original metropolitans and providing better civic amenities. During this phase; from the First to Third Five Year Plans, slums were perceived as a 'national problem', and eradication or at least inhibition of growth of these slums was a focus area.[1]

However, a complete shift in ideology from that prevalent in First to Third Five Year Plans occurred with the launch of the Fourth Five Year Plan. During this phase starting from the Fourth Five Year plan to Seventh Five Year Plan, creation and development of geographically spread smaller cities and towns to inhibit the influx of population to four Metropolitans, and privatization in the field of housing through policy dominated the ideology. During this phase, with respect to slums, the outlook shifted from eradication of slums to development of slums by provisioning basic amenities in slum areas and generating employment opportunities for the urban poor. And hence, all urban policies and programmes during this phase were influenced by a common underlying theme of Planned City Development, Poverty Eradication and Housing.

The phase starting from the Eighth Five Year Plan marked a true revolution in the Urban Development ideology. During the Eighth Five Year Plan, cities were granted autonomy in driving their overall development through enactment of the 74th Amendment of the Constitution. So, in addition to the continuing centralized focus on urban development, supplementary localized context-specific efforts towards urban development were now not only instituted but also formalized through policy. Also, the first 'India Infrastructure Report' was published during the Eighth Five Year Plan and Urban Infrastructure Development was designated as a separate development subject since the outset of Five Year Plans. During the Ninth Five Year Plan, after the economic liberalization of 1991, Foreign Direct Investments were allowed for development of Urban Infrastructure. These effort towards development of Urban Infrastructure were escalated to the next level through the launch of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) during the Tenth Five Year Plan. JNNURM focussed on water supply and sanitation, solid waste management, road network, urban

[1] Batra, Lalit. A Review of Urbanization And Urban Policy In Post-Independent India. Working Paper Series: Centre for the Study of Law and Governance Jawaharlal Nehru University, New Delhi. CSLG/WP/12. April 2009. https://www.jnu.ac.in/sites/default/files/u63/12-A%20Review%20of%20Urban%20%28Lalit%20Batra%29.pdf

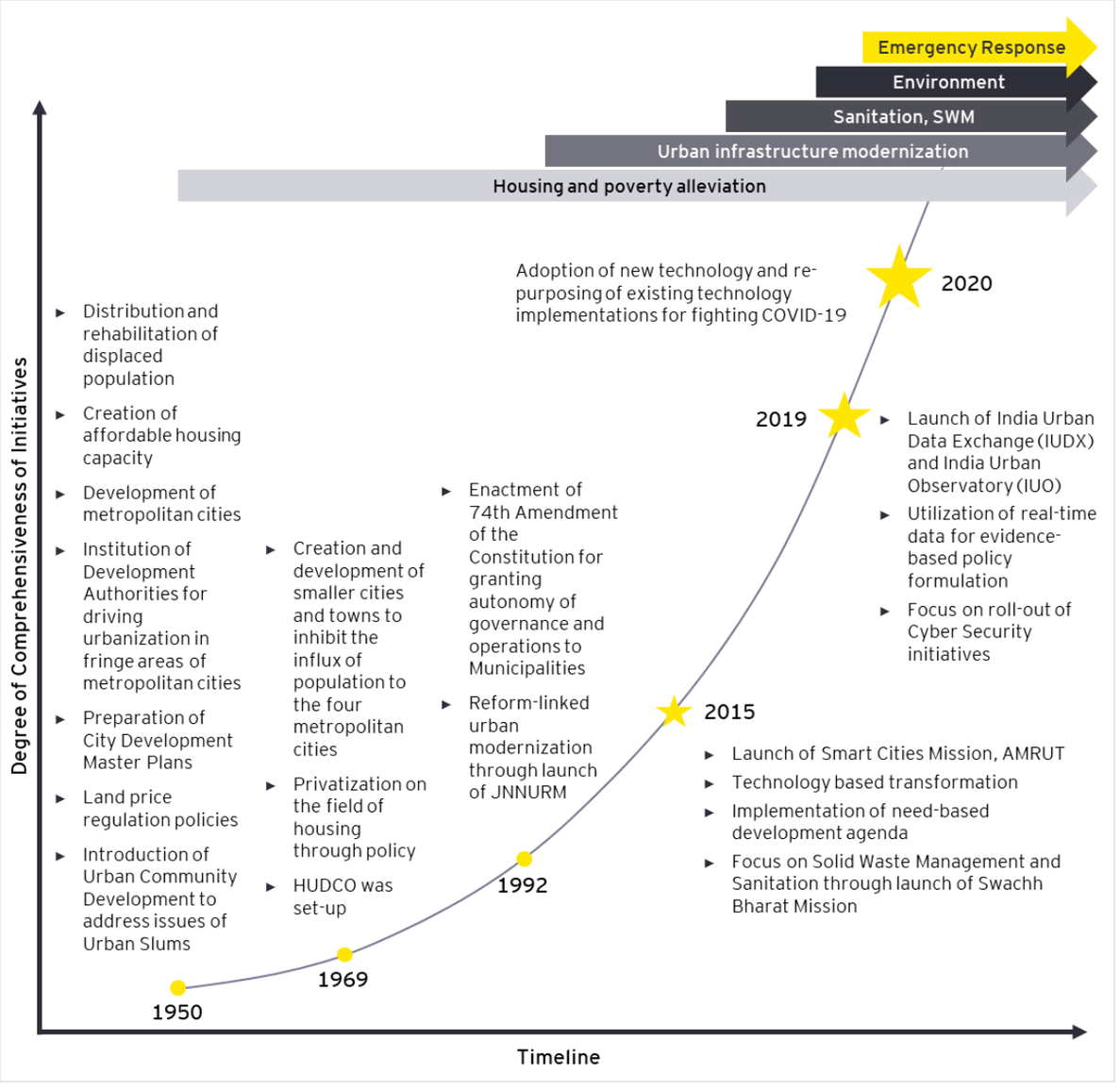
transport and redevelopment of old city areas through its dedicated 'Urban Infrastructure and Governance' sub-mission and actively linked roll-out of urban reforms relating to improvement in urban governance process for availing grants from Central Government. [2]

But India attained the summit of the revolution in urban development history on June 25, 2015 during the Twelfth Five Year Plan. Even though the Smart Cities Mission focussed on creating only 100 'Smart Cities' at the onset, the idea was very clear. City residents would be invited to define their development agenda and City Administration would chart an implementation plan that would be in accordance with the 'local' social and cultural context driving city governance and operations. The Central and State Governments were to provide the initial seed capital and city administrations would be allowed complete autonomy to structure their finances; howsoever innovatively. Special Purpose Vehicles were required to be set up for laterally infusing the requisite industry talent into main-stream municipal operations, augmenting the inherent capacity and allowing cross-functional integration for accomplishing the enormous agenda at hand. Scope of development stakeholders and beneficiaries was to be extended from mere citizens to including Industry, Non-Governmental Organizations (NGOs), Community-based Organizations (CBOs) and Academia. And, the 100 'Smart Cities', thus built, were to become Centres of Excellence that would act as light-houses for guiding other cities in the nation for undertaking 'their' respective development agenda. Ideology shifted from performance to excellence, from merely executing development initiatives to leadership through example, and from passive planning to data-driven, technology-enabled disruptive decision-making.[3]

And these achievements were tested by the advent of the COVID-19 pandemic in early 2020 in the nation where Cities of India were witnessed disruptively embracing new technology and re-purposing their existing technology to plan and execute counter measures against the COVID-19 pandemic.

[2] Srivastava, Rahul. Planning the Past: History of India's Urban Plans. InfoChange News & Features. January 2005. http://infochangeindia.org/214-urban-india/backgrounder/6110-planning-the-past-history-of-indias-urban-plans

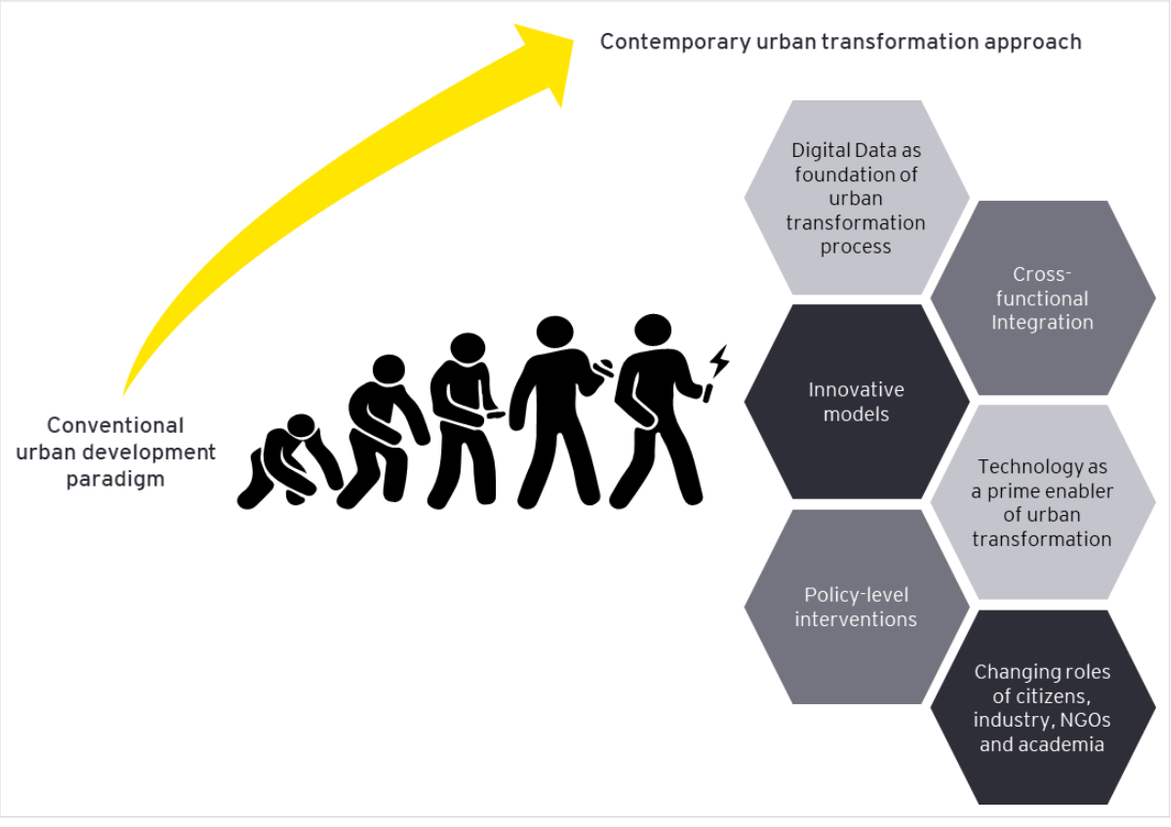
[3] Smart Cities Mission, Ministry of Housing and Urban Affairs, Government of India. June 2015. Smart Cities: Mission Statement & Guidelines. Last updated on: 26-09-2017. http://smartcities.gov.in/upload/uploadfiles/files/SmartCityGuidelines(1).pdf (accessed on 03.01.2021)



Source: *Batra, Lalit. A Review of Urbanization And Urban Policy In Post-Independent India. Working Paper Series: Centre for the Study of Law and Governance Jawaharlal Nehru University, New Delhi. CSLG/WP/12. April 2009.* *https://www.jnu.ac.in/sites/default/files/u63/12-A%20Review%20of%20Urban%20%28Lalit%20Batra%29.pdf*

It is evident that there has been a disruption in the ideology of urban development. Today, it is no longer a typical development paradigm, but a transformative approach focussing on all elements with the 'Character of the City' and its 'People' at the centre stage. Unlike the erstwhile development paradigm, contemporary urban transformation approach now focusses on:

- Digital data as foundation of urban transformation process
- Technology as a prime enabler of urban transformation
- Innovative models
- Policy-level interventions
- Institutional over-haul
- Cross-functional Integration
- Changing roles of citizens, industry, NGOs and academia





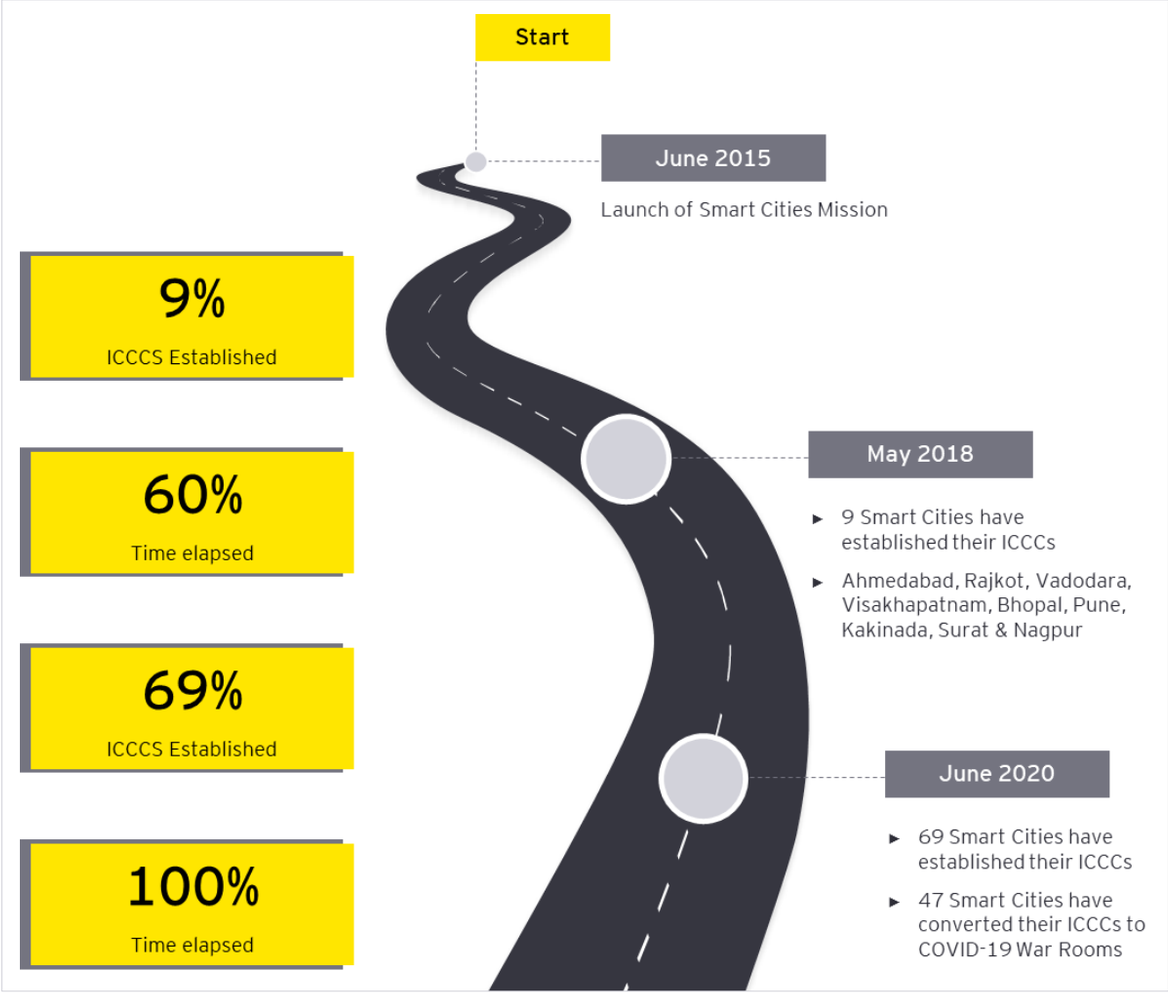
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Digital data as foundation of urban transformation process

Data has been regarded with paramount importance in the process of planning history of India. However, the Smart Cities mission revolutionized the idea of data utilized for operations monitoring and decision-making of city administrations.

At outset, the mission envisioned that a wide variety of data; including video data and geo-graphically referenced data, was supposed to be digital and to be generated and utilized in real-time. Cities included elements of IoT sensors and CCTV (Closed Circuit Television)-based security surveillance systems for enabling data collection, and data analytics, video analytics including facial recognition, and GIS-based platforms for enabling data processing and visualization. Additional data was expected to be accessed from third-party IoT sensors and invited from citizen and business-created data sets. Integrated command and control centres were conceived as the core of this data-driven operations regime. Towards the end of initially charted mission roadmap, 69 Cities have established integrated command and control centres while the remaining cities under the purview of the mission have made progress in varying degrees.[4]

[4] Ministry Dashboard of Ministry of Housing and Urban Affairs, Government of India. Integrated Command and Control Center (ICCC) under Projects Grounded / Completed of Smart Cities. http://dashboard.mohua.gov.in/ (accessed on 03.01.2021)



Source: *1. Ministry of Housing and Urban Poverty Alleviation, Government of India. Smart Cities Mission - projects worth INR 27,000 crores have been completed, work orders worth INR 1,25,000 have issued and projects worth INR 1,66,000 have been tendered. Press Information Bureau, Government of India. 2020.06.25. https://pib.gov.in/PressReleasePage.aspx?PRID=1634268 (accessed on 03.01.2021)*

2. Ministry Dashboard of Ministry of Housing and Urban Affairs, Government of India. Integrated Command and Control Center (ICCC) under Projects Grounded / Completed of Smart Cities. http://dashboard.mohua.gov.in/ (accessed on 03.01.2021)

Witnessing the progress made by cities, the mission upgraded the degree of disruption in its approach to urban transformation from 'Smart Cities' to 'Data Smart Cites'. It was estimated that approximately 2,000 to 6,000 Terabytes of data would be generated from traffic systems, video surveillance cameras, water flow sensors and other sensors. Works worth INR 13,000 crores for digitization of existing paper-based data had already been awarded and were under varying degrees of execution. And this enormous influx of data was to further converge into integrated control and command centres of cities. So, as a logical next step, the mission introduced the 'Data Maturity Assessment Framework' in 2019. This framework was envisioned to provide directives on data curation through preparation of City 'Data Policy' and collation of data for identifying trends in city data. Nagpur came out with a City Data Policy and Pune organized a cyber security hackathon in partnership with Data Security Council of India.

The framework also attempted to institutionalize the eco-system around city data by providing advices on building a City 'Data Cell', identifying departmental 'Data Champions', appointing of a city 'Chief Data Officer' and pushing for 'Data Alliances'. Even though cities are at different stages with respect to developing their

'Data Smart' eco-systems, all cities have reported to have completed the appointment of their respective 'City Data Officers' as of date.[5]

In addition, as part of the initiative under the framework, India Smart Cities Open Data Portal and India Urban Data Exchange (IUDX) were also initiated. India Smart Cities Open Data Portal was planned to utilize the Open Government Data Platform of Ministry of Electronics and Information Technology (MeitY), Government of India (GoI) for providing single source of truth for open access to authentic data to various categories of consumers through proactive release of the data available on identified urban parameters under multiple themes. The intention of introducing this initiative was to allow leveraging of the potential of data for solving complex urban problems impacting city residents by not just the city administration, but also other development participants such as industry, academia and citizens themselves. Further, the initiative also allows for various participants to integrate with selected data sets through API integration. So as and when a data set gets updated, the new data is consumed by the systems of participants and up-to-date information is available for action.[6] Pune and Surat were the torch-bearers of this initiative.[7] The rest of the participant Cities have caught up by publishing a total of 2,999 data catalogs at 'Open Data Portal: India Smart Cities' as of date.[8]

However, the 'Open Data Portal: India Smart Cities' initiative allowed only one-to-many relationship and availability of new data is dependent on the proactivity of the data owner in publishing the data. To leverage the opportunities presented by 'Data Smart Cities' in the true sense, enabling a secured, authenticated, authorized and managed data exchange between disparate data platforms in real-time with many-to-many relationship was essential. Also, implementation of ICT-enabled systems under the Smart Cities program comprised of diverse technologies and platforms. To address this aspect of facilitating multi-directional data sharing between varied systems within a city, between cities and other government departments, and other private development participants instantly, the India Urban Data Exchange (IUDX) was launched.

India Urban Data Exchange envisions to create common data sets and standardized APIs for enabling seamless data exchange without the need of modifying systems for consuming data from a variety of sources. In a nutshell, India Urban Data Exchange intends to create a platform with middle-ware functionalities that will allow a multitude of systems under various controlling authorities to share data with each other under complete control of the data owner.[9]

India's first urban data exchange pilot

Pune was the first Smart City to utilize the India Urban Data Exchange to launch its pilot urban data exchange in collaboration with IISc, Bengaluru and Smart Cities Mission. The Pune Urban Data Exchange (PUDX) pilot was launched in December 2019 and exposed approximately 850 datasets through standardized IUDX APIs.[10]

[5] Sinha, Debjit. Smart cities in India to get data-driven governance! Check Modi government's mega plan. Financial Express. 2019.07.29. https://www.financialexpress.com/infrastructure/smart-cities-in-india-to-get-data-driven-governance-check-modi-governments-mega-plan/1659254/ (accessed on 03.01.2021)

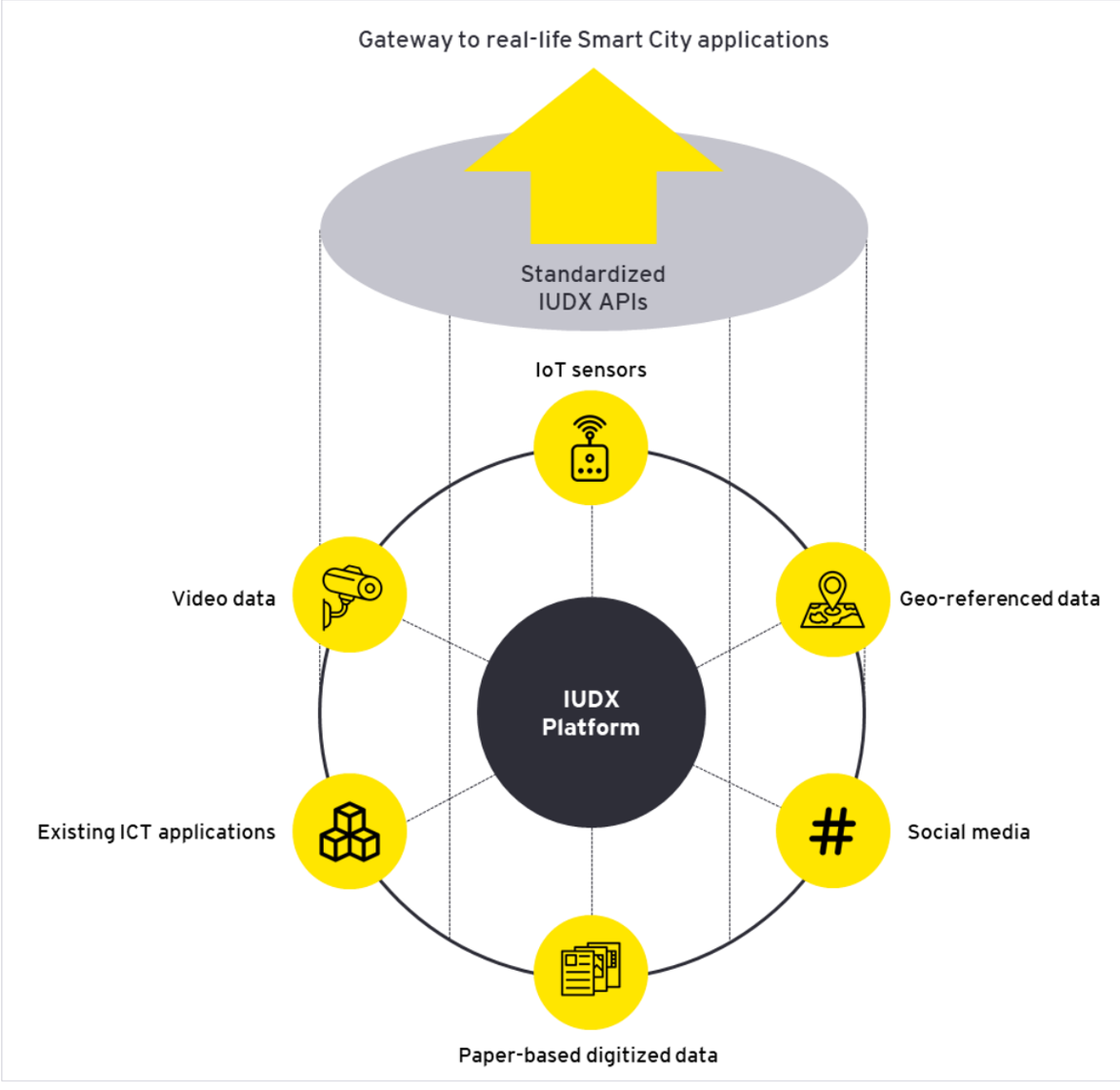
[6] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Chapter I: Contours of DataSmart Cities. DataSmart Cities: Empowering Cities through Data. https://smartnet.niua.org/sites/default/files/resources/datasmart_cities.pdf (accessed on 03.01.2021)

[7] Hawken, Scott, Han, Hoon and Pettit, Chris (eds.). Open Cities | Open Data: Collaborative Cities in the Information Era. Corrected edition 2020. ISBN 978-981-13-6604-8. Page No. 377. Singapore: Springer Nature Singapore Pre Ltd.

[8] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Open Data Platform: India Smart Cities - Engaging Communities through Open Data. https://smartcities.data.gov.in/ (accessed on 03.01.2021)

[9] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Annexure I: India Urban Data Exchange (IUDX). DataSmart Cities: Empowering Cities through Data.

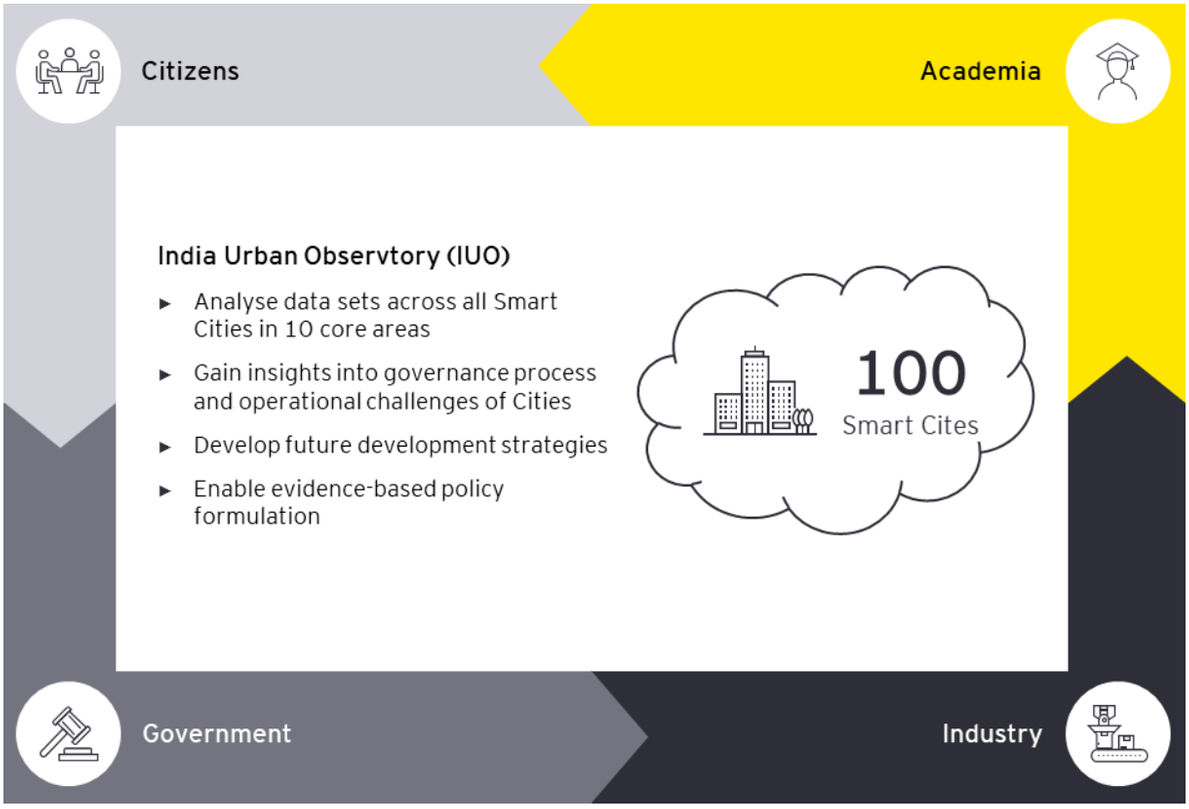
[10] Pune becomes first Smart City to use IUDX to launch its pilot urban data exchange. Elets Smart City. 2019.12.17. https://smartcity.eletsonline.com/pune-becomes-first-smart-city-to-use-iudx-to-launch-its-pilot-urban-data-exchange/ (accessed on 03.01.2021)



Source: *Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Annexure I: India Urban Data Exchange (IUDX). DataSmart Cities: Empowering Cities through Data.*

Another disruption to the approach towards Data Smart Cities can be witnessed through the pioneering initiative of India Urban Observatory (IUO) of the Ministry of Housing and Urban Affairs, Government of India. Through the India Urban Observatory, the Ministry aims to collect data from all possible sources and integrate it into the Integrated Command and Control Centres for analysing the collated data sets across all Smart Cities in 10 core areas; such as solid waste management, water management, mobility, education and health. This data analytics is anticipated to gain insights into governance process and operational challenges of cities and utilize these to develop future development strategies and enable evidence-based policy formulation. The India Urban Observatory envisions to change the mind-set of typical conventional urban governance to an innovative data-driven regime through intelligent use of data for handling complex urban challenges, optimizing city operations, improving governance and enhancing economic performance of cities across the nation. In essence, India Urban Observatory aspires to transform 'Data Smart Cities' to 'Intelligent Cities' by leveraging on advanced data analytics and emerging technologies to enable intelligent decision-making and enhanced operational efficiency. Considering the scope and coverage of the initiative, India Urban Observatory is expected to be the largest urban development lab across the globe once it gains critical momentum. One of the

first cases to be taken up by the India Urban Observatory is the investigation of air pollution in Delhi City based on data received from 18 environmental sensors installed by the New Delhi Municipal Corporation.[11]



Source: *India Urban Observatory: Using data for cleaner, efficient cities. Hindustan Times. 2019.09.08. https://www.hindustantimes.com/delhi-news/india-urban-observatory-using-data-for-cleaner-efficient-cities/story-cAAppKhvWZ4SGsz1kkDKxK.html (accessed on 03.01.2021)*

Most recent disruption to the approach towards Data Smart Cities was witnessed in March 2020 through the swift re-purposing of prevailing Integrated Command and Control Centres to COVID-19 War Rooms by 45 Smart Cities to drive operations for containing the spread of COVID-19 proactively. Pune Smart City Development Corporation Limited and the Pune Municipal Corporation employed geo-spatial technologies and predictive analytics to define containment zones and enable them to develop containment zone policies.[12]

[11] India Urban Observatory: Using data for cleaner, efficient cities. Hindustan Times. 2019.09.08. https://www.hindustantimes.com/delhi-news/india-urban-observatory-using-data-for-cleaner-efficient-cities/story-cAAppKhvWZ4SGsz1kkDKxK.html (accessed on 03.01.2021)

[12] Municipalities using Smart Cities' command centres turn into war rooms. The Hindu. 2020.04.06. https://www.thehindu.com/news/national/coronavirus-municipalities-using-smart-cities-command-centres-turn-into-war-rooms/article31274714.ece (accessed on 03.01.2021)





3

Technology as a prime enabler of urban transformation

3.1. Technology perspective of contemporary urban transformation

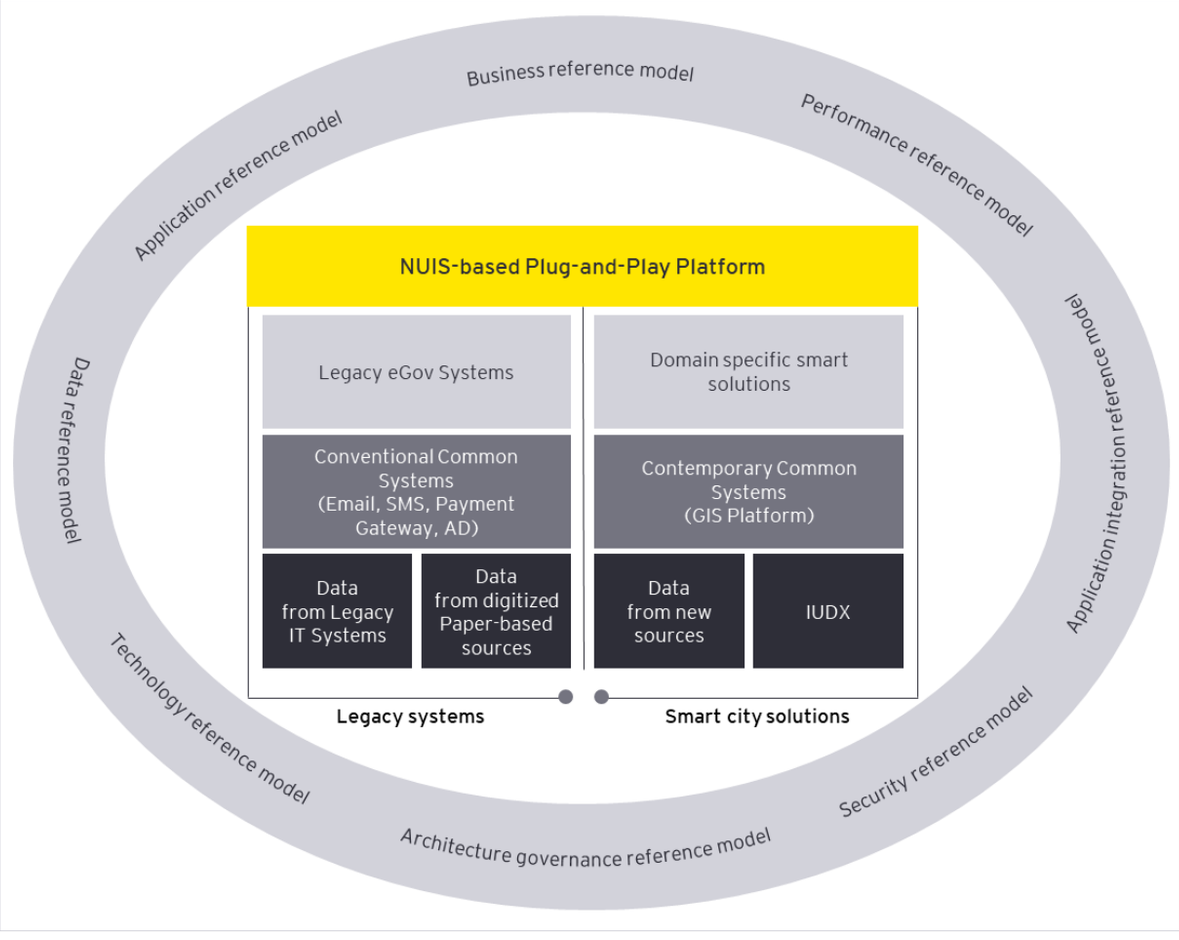
Technology enablement was traditionally viewed as an enabler of governance process and data. 'Process Automation' and 'creating Data Repositories' were the most powerful technology tools. However, as automation became mainstream and clean data repositories started getting populated, the 'Geographical Information Systems (GIS)' mammoth approached and captured everybody's attention. Along with these developments, systems kept getting more complex. Smart Solutions added to the complexity. The pressure of optimizing reasonably-performing functions had always been persisting. Yet, combined with the increasing complexity of governance systems, the stress on city administrations to out-perform expectations of all stakeholders was now multi-fold.

The Contemporary Urban Transformation Approach utilizes technology and now looks forward to enabling the planning phase of development cycle and offers an opportunity to monitor governance processes in real-time. The Contemporary Urban Transformation Approach promises assistance in making far better-informed decisions and intelligent automation, which were not possible with the previous generations of city administrators and urban policy-makers.

The Contemporary Urban Transformation Approach aligns its functions with development thematic areas like water, industries, transport, and waste management, defines all its responsibilities of each stakeholder. In addition, it acts as a service which strives to create building blocks of solutions and integrates them through a common platform (like National Urban Innovation Stack)[13]. It also works towards adopting universal governance mechanisms (India Enterprise Architecture – IndEA) for managing functional and technology

[13] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). The National Urban Innovation Stack for India. National Urban Innovation Stack – Strategy & Approach. https://smartnet.niua.org/nuis (accessed on 03.01.2021)

focus.[14] The approach is a shift of ideology from static, function-orientation to real-time, Human Development Index improvement-orientation.



3.2. Technology enablement of functional domain

One of highlights of the Smart City Mission has been promotion of utilization of technology for enablement of operations of functional domains of city administrations and integration of various functions through employment of technology for enhanced efficiency and cost optimization. 'Smart Solution' in waste management, water management, energy management, urban mobility, medicine, education and skills, urban economy, and governance and citizen services were identified as the key intervention areas under the Smart Cities Mission[15]. As a result, the urban development sector witnessed a tremendous influx of technology in the non-conventional areas.

Consider the case of solid waste management. In addition to ICT-enablement, cases of pilots of technologies for enabling waste-to-energy conversion, utilization of waste plastic for road construction, and synthesis of refuse-derived fuel are being witnessed across the nation. One such example would be that of the 12 MW Waste-to-Energy plant set up by the East Delhi Waste Processing Company Limited (EDWPCL) in Public-Private-Partnership (PPP) with the Delhi Government and East Delhi Municipal Corporation (EDMC) for disposal of

[14] Ministry of Electronics and Information Technology, Government of India. IndEA Framework (India Enterprise Architecture Framework). October,2018. http://egovstandards.gov.in/sites/default/files/IndEA%20Framework%201.0.pdf (accessed on 03.01.2021)

[15] Smart Cities Mission, Ministry of Housing and Urban Affairs, Government of India. June 2015. Smart Cities: Mission Statement & Guidelines. Last updated on: 26-09-2017. http://smartcities.gov.in/upload/uploadfiles/files/SmartCityGuidelines(1).pdf (accessed on 03.01.2021)

1,500 tonnes of garbage per day and mitigating 8 million tons of greenhouse gases (GHG) over the life of the project.[16]

Another instance would be that of application of technology for grey water treatment at community and individual levels for recycling of waste water, along with utilization of treated grey water for reducing consumption. That, in turn, fulfils requirements for sourcing fresh water.

One more peculiar case would be that of implementation of green technologies as part of building management systems for efficient energy management, ensuring protection of environment and promotion of ecological aspects. St. Stephen's Hospital, Delhi has been able to cut-down its energy consumption by 25% by employing green building technologies to reduce cooling load in the hospital by 20% and the improving chiller plant's efficiency to 0.80 kW per ton.[17]

Lastly, the most distinctive account of implementation of technology for a municipal function is that of public health conservancy. Rapid urbanization propelled by commerce and industrialization along with the remodel of associated activities such as transportation have been established as the primary reason for the severe air pollution problem in our cities. Many cities have been noted to have considered employment of environmental sensors for dealing with this challenge. The approach adopted is usually observed to be two-pronged; including real-time display of pollutant levels for creating awareness and driving social action, and analysis of data for identification of patterns of variables for devising solutions.

However, the most distinctive example would be that of the COVID-19 War Rooms that allowed city administrations to not only contain the spread of infection, but also ensure impeccable performance of their duties while addressing augmented social responsibilities during the grim phase of a first-of-its-kind 'health emergency'[18]. The COVID – 19 War Rooms now tracked COVID-19 positive cases, monitored quarantine facilities and shelters for homeless, tracked health-workers, provided virtual training to doctors, tracked ambulances and disinfection services, ensured availability of sufficient stocks of medical and essential items, and ascertained uninterrupted supply of utilities and telecommunication services utilizing their existing technology set-ups. The Bruhat Bengaluru Mahanagara Palike of Bengaluru City set up their COVID-19 War Room rapidly allowing them to monitor all individuals within a radius of 8 km around a confirmed COVID-19 case in order to contain the second degree of spread of infection from a very early stage. City Administration of Kanpur, Aligarh and Varanasi tracked health services through their War Rooms and provided Tele-medicine through video conferencing facilities[19]. Municipal Corporation of Tirupati facilitated home delivery of groceries and other essentials to citizens amidst the lockdown through their War Room[20]. Bhubaneswar Smart City Limited employed high-end drones to accomplish sanitization of areas identified as infected to contain the spread of COVID-19 and maintain hygiene[21]. Amritsar Smart City Limited (ASCL) utilized their Smart City Portal for integration of local doctors in mainstream COVID-19 response by allowing them to register suspected and identified cases of COVID-19 with the City Administration[22].

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[16] Delhi Metro becomes India's first project to receive power from waste-to-energy. Live Mint. 2019.06.05. https://www.livemint.com/news/india/delhi-metro-becomes-india-s-first-project-to-receive-power-from-waste-to-energy-1559728219567.html (accessed on 03.01.2021)

[17] Alliance for an Energy Efficient Economy (AEEE). Smart Cities Solutions Enabled by Private Sector. Energy Efficiency: A Compelling Value Proposition and enabling resources for Smart Cities. https://www.aeee.in/wp-content/uploads/2019/03/AEEE-Smart-Cities-Thought-Leadership-March-2019-v1.pdf (accessed on 03.01.2021)

[18] Tewari, Manish. India's fight against health emergencies: In search of a legal architecture. Observer Research Foundation. ORF Issue Brief No. 349. March 2020. https://www.orfonline.org/research/indias-fight-against-health-emergencies-in-search-of-a-legal-architecture-63884/ (accessed on 03.01.2021)

[19] How Centre's smart cities command centres are monitoring Covid-19 hotspots. Hindustan Times. 2020.04.07. https://www.hindustantimes.com/india-news/how-centre-s-smart-cities-command-centres-are-monitoring-covid-19-hotspots/story-gHWui8G3q5mmuMHldKuvFK.html (accessed on 03.01.2021)

[20] 45 smart city command and control centres turn into Covid-19 war rooms. The Economic Times. 2020.03.31. https://economictimes.indiatimes.com/news/politics-and-nation/45-smart-city-command-and-control-centres-turn-into-covid-19-war-rooms/articleshow/74904329.cms?from=mdr (accessed on 03.01.2021)

[21] Tech-based infra of Bhubaneswar Smart City comes handy for Bhubaneswar Municipal Corporation to deliver civic services effectively: Prem Chandra Chaudhary. ETGovernment.com. 2020.07.29. https://government.economictimes.indiatimes.com/news/smart-infra/tech-based-infra-of-bhubaneswar-smart-city-comes-handy-for-bhubaneswar-municipal-corporation-to-deliver-civic-services-effectively-prem-chandra-chaudhary/77236838 (accessed on 03.01.2021)

[22] Smart City Portal provides means to city doctors for registration of suspected COVID cases (translation from Punjabi). Jagbani, Amritsar Edition. 2020.04.14.

PIMPRI Chichwad empowers citizens to conduct prelimiary assessment of COVID infection utilizing technology

Pimpri Chinchwad Municipal Corporation (PCMC) launched an online self-assessment test from their PCMC Smart Sarathi mobile app for enabling citizens residing in the municipal limits of PCMC. The test led citizens through a series of questions that allowed them to assess their health status and plan for necessary action. The mobile app also identified the location of infected individuals and tracked movement of quarantined individuals. The data collated through the tests was processed and analyzed utilizing the technology infrastructure of the COVID-19 War Room to identify and display containment zones and prepare plans for emergency response and relief. The system provided real-time notifications of an identified infection in their areas so that assistance and relief can be provided. The system enabled even citizens to register with PCMC for providing additional required help required by the civic administration through volunteering. The system also integrated and monitored operations of over forty free food distribution centres, nine home shelters, more than thirty-five emergency dispensaries, and home delivery operations of over fifty grocery stores to ensure uninterrupted supply of necessities to its citizens.[23]

Technology has always existed. Yet the recently noted shift in ideology witnessed towards employment of technology for enablement of functions for not just merely accomplishing targets, but also to revolutionize the concept of urban governance and management has been unprecedented in the history of urban development of the nation.

3.3. Reforms in ICT-based technology

With the launch of the Smart Cities Mission, even the conventional perspective on technology for urban transformation has also witnessed a revolutionary shift in ideology. The fundamental motivation driving this reform in ICT-based technology for Smart Cities is to create a flexible yet robust, optimal yet scalable infrastructure that will address all aspects of each function of a city administration. This can be discerned through the mission's active encouragement of extensive usage of IoT and other ICT-enabled technologies for enablement of civic functions and municipal governance process. As a consequence, data centre technology has undergone a fundamental transformation. Cloud-based technology and hyper converged infrastructure (HCI) have now mainstreamed themselves in the 'ICT for City Administration' arena. Bhopal Smart City Development Corporation Limited has established the Common Cloud Based Data Centre for Smart Cities (CCDCSC) for enabling cloud-based, shared data centre operations across seven Smart Cities in Madhya Pradesh.[24]

Further, considering the requirements of IoT-based systems and service-level expectations from the deployed IoT networks, rapid adoption of edge-computing has been witnessed throughout the nation. So, decision-making does not take place at data centres anymore. Data is processed in the field itself, and situational decisions are made and effected in accordance with standard operating procedures defined in the field itself. Only that part of data which needs to be processed at the data centre travels to the data centre.

Even though Smart Cities in India have been observed to deploy both; connected and non-connected, components, huge investments have been observed to be made in the networks that connect all field-level components such as IoT sensors, Wi-fi hotspots, and security surveillance cameras to the data centres. Nagpur Smart City has deployed its own fibre-optic cable network for reducing the existing connectivity gap and ensuring dedicated high-quality connectivity for its Smart City implementation. Also, wireless sensor networks utilizing Wi-fi and near field communication (NFC) have been observed to be deployed in cases of Smart Solutions requiring intermittent connectivity; as in the case of a typical solid waste management solution.

[23] Pimpri Chinchwad corporation sets up COVID-19 war room. The Hindu. 2020.04.15. https://www.thehindu.com/news/cities/mumbai/pimpri-chinchwad-corporation-sets-up-covid-19-war-room/article31342904.ece (accessed on 03.01.2021)

[24] Bhopal Smart City. Integrated Control and Command Centre ICCC. Bhopal Smart City Development Corporation Limited. https://www.smartbhopal.city/projectdetails/Mw== (accessed on 03.01.2021)

Architecture of IT applications deployed for processing of incoming data for providing information in usable format have also witnessed an elemental transformation. Plug-and-play, modular architecture has established itself as the present-day norm. National Urban Innovation Stack (NIUS) provides the requisite framework for developing 'Building Blocks' of smart solutions and plugging them into a common service platform for seamless integration of process, solutions, shared services and data. Operational technologies; such as Supervisory Control And Data Acquisition (SCADA) systems and Building Automation Systems (BAS) have emerged as 'Building Blocks' of the Smart City eco-system. India Enterprise Architecture (IndEA) offers requisite guidance for holistically designing, implementing, streamlining, standardizing, and optimizing the smart city ICT eco-system. These reforms in the method of architecting and deployment of IT applications is envisioned to not just enable seamless integration of cross-functional systems, but also is expected to enable seamless collaboration between stakeholders of the development process and encourage innovation.

The perfect information – Operations handshake

Pimpri Chinchwad Smart City Limited (PCSCL) has successfully deployed a state-of-art integrated SCADA (Supervisory Control And Data Acquisition)-based water and sewerage solution. This SCADA (Supervisory Control And Data Acquisition)-based solution allows PCSCL to monitor key health parameters of installations in the city's water supply and sewerage management network in real-time, analyse historical data periodically, provide recommendations to a city administration on preventive actions, and implement the identified interventions to the solution for a 'learned' operation. Monitoring of key health parameters is undertaken by the field-based component of the solution, while analysis, decision-making and implementation of decision is processed by the data centre-based component.[25]

Apart from revolutionizing the role of information technology departments of municipalities and acting as a convergence point for all technology components, integrated command and control centres now act as 'Urban ICT Labs' for city administrations. Since the integrated command and control centre houses all data, it has now intended to drive innovation in; both, urban governance and technology domains. Pilots of data-driven initiatives such as the India Urban Data Exchange and Emerging Technologies such as block-chains and artificial intelligence are now emanating as a part of the integrated command and control centre eco-system.[26]

[25] Pimpri Chinchwad Smart City Limited. Component 4: Smart Water Management System and Component 5: Smart Sewerage Management. Volume II. Request for Proposal (RFP) for Selection of System Integrator for Supply, Installation, Testing, Commissioning and O&M for ICT led PCSCL Smart City Solutions. 2019.01.09

[26] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Chapter I: Contours of DataSmart Cities. DataSmart Cities: Empowering Cities through Data.

3.4. Shift in perspective of technology-related security

Even though city administrations have learnt about the benefits of employing ICT for enablement of civic functions and delivery of public services, a formalized and holistic approach towards technology-related security in form of a mature practice is yet to be established. Security measures employed even in the projects of a Smart City follow the traditional ICT-systems security approach. Implementation of a full-fledged expert 'Cyber Security Cell' under integrated command and control is yet to be perceived as a requirement in the Smart City sector. Further, considering the launch of 'Data Smart Cities', it has now become imperative that city administrations work on acquiring a comprehensive understanding of threats and risks impending them, and work on 'Cyber Securing' themselves across the Smart 'City Administration' through development of essential standards and building universal security within the design of 'integrated operating eco-system'. Office Memorandum of Ministry of Urban Development (erstwhile Ministry of Housing and Urban Affairs), Government of India on 'Cyber Security Model Framework for Smart Cities' marked the beginning of action on this front.[27]

India's first step towards independent municipal cyber security policy formulation

Pune Smart City pioneered in attempting to formalize their cyber security vision. Pune Smart City Development Corporation (PSCDCL) in collaboration with Data Security Council of India (DSCI) organized a cyber security hackathon in March 2019 for preparation of their cyber security policy and framework. This policy was expected to guide all departments of Pune city administration on the methods of holistically ensuring cyber security and data privacy across all elements of people, process and technology.[28]

[27] Ministry of Housing and Urban Affairs, Government of India. Office Memorandum: Cyber Security Model Framework for Smart Cities. New Delhi. 2016.05.20. https://smartnet.niua.org/sites/default/files/resources/Cyber_Securitypdf.pdf (accessed on 03.01.2021)

[28] Pune Smart City join hands with DSCI to work on cyber security policy. Tech Observer. 2019.03.09. https://techobserver.in/2019/03/09/pune-smart-city-join-hands-with-dsci-to-work-on-cyber-security-policy/ (accessed on 03.01.2021)



4

Innovative models

4.1. Finance perspective of the contemporary urban transformation approach

Barring a handful of municipalities, all other municipalities across the country are financially stressed. Keeping in view the spirit of financing of municipal operations, municipalities were envisaged to operate as self-sustaining third-tier of government with own revenue streams and part of financing was to be made available to them from grants. Despite of implementing reforms such as asset accounting and roll-out of ICT-enabled accrual-based double-entry accounting systems prescribed under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), municipalities still face a financial crunch.

The contemporary urban transformation approach offers opportunities to:

- Optimize costs and liabilities
- Monitor and control expenses
- Identify non-conventional assets
- Re-invent public services.

4.2. Optimization of costs and liabilities

With respect to cost management, 'Cost Center' is an unheard word; hitherto, in the Government and Public Sector. However, the contemporary urban transformation approach identifies each function as a cost centre and requires operations to be aligned in accordance with principles of cost centre management. It further proposes that each liability be identified and provisioning be undertaken for addressing requirements for fulfilling each identified liability. More relatable examples would be salaries and expenditure on operations of functions. Examples with relatively lesser recall would include pensions and health benefits.

4.3. Monitoring and controlling of expenses

Further to cost center management, the Contemporary Urban Transformation Approach also proposes that fundamentals of project management be adopted for ensuring optimal control of expenditure. Additional benefits of adopting this approach would include seamless orchestration of deliveries by multiple participants, superior quality of delivery and immediate decision making – esp. with respect to course corrections – to ensure achievement of identified outcome.

4.4. Identification of non-conventional assets

The Contemporary Urban Transformation Approach allows for identification existing operational components and additional leverages associated with already identified assets as 'non-conventional assets' for being evaluated for their potential of revenue augmentation.

A very popular example of this would be the 'Transfer of Development Rights' under Public-Private-Partnership (PPP) Projects. One of the earliest record of successful implementation of this technique would be the Sister Nivedita Bridge (or Nivedita Setu) of Kolkata. Another example would be that of paid-parking operations. It not ensures optimizing parking space by maintaining orderliness and improves citizen experience, but also contributes to promotion of commerce and private sector participation.

A more recent and novel instance would be utilization of the Property Tax Database for issuing Digital Door Numbers. Digital Doors Numbers have been commercially piloted and launched in few cities in the country independently by private operators as of today. Large-scale, full-fledged implementation of Property Tax Database-enabled Digital Door Numbers is yet to be witnessed in the nation. Yet the opportunity definitely exists.[29]

Few more non-conventional assets that have very recently caught attention of city administrations for consideration are Land Value Capture and Municipal Bonds based on a city's existing development projects, air rights, and street-vending spots.

4.5. Re-invention of public services

City administrations today operate in a very dynamic environment. There is a tremendous pressure of expectations from multiple stakeholders with varied objectives. Citizens seek more responsive public services and accountability in the conduct of city administrations. Higher levels of government expect higher efficiency in operations and cost optimization. Global agencies such as the United Nations expect cities to adopt the sustainability agenda. This requires an approach that is beyond the typical enablement. It calls for a fundamental shift in way public services are perceived.

Trading for cleaner industry

A novel case of re-invention of public services would be the Government of Gujrat's first ever cap-and-trade programme launched on pilot basis in Surat. The prevalent regulation and compliance-based practices employed within the textile industry had failed to achieve environment sustainability goals. However, this initiative set an overall cap on the permitted particulate matter (PM) emissions in Surat's textile industry. Now, each company is allowed to discharge only that amount particulate matter which is equivalent to the value of permit possessed by them. Total value of these permits is to be equivalent to the overall cap on permitted particulate matter emissions and each company is expected to buy their permits through an exchange.[30]

Providing Factory Permits is an identified public service of municipalities for regulating manufacturing-based economic activities in the area under their jurisdiction. And monitoring compliances is also an identified responsibility of a municipality for sustenance of quality of life and maintenance of environmental integrity of the city's ecology.

Now, since the process of securing Factory Permits involves trading market dynamics, it is imperative that textile factories in Surat will invest in cleaner technologies and optimize their manufacturing process for cutting down emissions. So, the Government of Gujarat now achieves the required level of compliance inherently as non-compliance translates to penalty and buying additional traded-Factory Permits that would be substantially more expensive. And the Government of Gujarat also accomplishes its overall urban sustainability goals.

Hence, it is evident that by re-thinking the design of the process of delivery of a public service such as issuance of Factory Permit, a city administration can not only bring in better adherence to compliances owing to the inherent design of public service delivery, but also reduce the overall costs incurred on public health, water and waste management.

[29] Kumar, Ashok. Into the future! Houses with geo-tagged digital door plates. Times of India. 2019.12.13. https://timesofindia.indiatimes.com/city/indore/into-the-future-houses-with-geo-tagged-digital-door-plates/articleshow/72497727.cms (accessed on 03.01.2021)

[30] Goel, Siddharth. Gujarat's Emission Trading Scheme is India's First Real Battle in War Against Air Pollution. The Wire. 2019.06.14. https://thewire.in/environment/gujarat-air-pollution-emission-trading-cap-trade (accessed on 03.01.2021)



5

Policy-level interventions

5.1. Shift in public policy formulation ideology

Traditionally, public policy formulation was perceived to be an outcome of the development planning process. The city modernization programme of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) launched in 2005 was the first formal experiment in devolution of the process of policy formulation. Jawaharlal Nehru National Urban Renewal Mission mandated administration of few reforms through repealing and enactment of policies. Smart Cities Mission launched in 2015 enhanced this experiment further by advised the participant cities to administer all requisite reforms and enact all essential policies to enable their city's vision of urban transformation.

However, the turning point in the history of public policy formulation was marked by the launch of 'Data Smart Cities' initiative under the Smart Cities Mission. Even though 'Data Smart Cities' possessed a technology-driven temperament, the fundamental character of the initiative was that of public policy formulation. India Urban Observatory instituted as part of the initiative was envisioned to utilize the volumes of real-time data generated by cities to acquire insights into development challenges for facilitation of evidence-based public policy formulation.

5.2. The missing link in steering universal urban transformation

The outlook under the conventional urban development paradigm typically involved planning programmes and enactment of policies specific to the constituent subjects. However, such an approach has only contributed to increase in complexity in urban governance and management process and conflicts in priorities instead of simplifying operations and overall state-of-affairs.

The National Urban Policy Framework 2018 was introduced as an effort to unify the disintegrated continuum of urban transformation. The policy framework is envisaged to address the subjects of urban legislation, urban economy and urban planning an integrated manner while uniting them with the sustainability agenda agreed by the nation as part of United Nations' Urban Agenda prescribed under Habitat – III and Sustainable Development Goals. The policy framework is expected to focus on ten core areas including cooperative federalism, agglomeration economies, harnessing rural-urban regional integration, inclusive growth, sustainability, empowering local institutions, adequate and affordable housing, urban infrastructure finance system, social

justice and gender equity, and robust urban information system.[31] Even though the National Urban Policy Framework 2018 is yet to be enacted, efforts towards instituting an enabling eco-system have already ensued. Amalgamation of the Ministry of Housing Urban Poverty Alleviation, and Ministry of Urban Development into Ministry of Housing and Urban Affairs in 2017 substantiates efforts in this direction.[32]

However, the outset of the COVID-19 pandemic in the nation in early 2020 has brought yet another crucial link to the spotlight. Health as an urban development agenda from the perspective of provisioning of health-care services and improving quality of urban environments, lifestyle and dietary habits of the resident population ought to be brought to mainstreamed as an established role of the City Administrations in India. Moreover, the need for enactment of structural reforms to the 74th Amendment of the Constitution has become strikingly evident to enable decentralization of power for empowering municipal administration in dispensing a robust bottom-up governance for responding to a variety of indiscernible circumstances in future.[33]

5.3. Science and technology policy perspective

Until the launch of Smart Cities Mission, Science and Technology Policies related to the urban sector were dominated by eGovernance perspective. However, on account of the data-driven approach and introduction of emerging technologies such as IoT in field, there has been a drastic transformation in the outlook with respect to science and technology policies dealing specifically with urban governance and management.

Standards such as the National Urban Innovation Stack (NIUS) have been promoted for enabling accelerated deployment of functionality, facilitating seamless integration of various modules, and allowing leveraging of common services and data for driving cross-functional integration.

Further, considering the exponential increase in volumes of data especially from sources that are geographically distribued in an open environment, an Office Memorandum of Ministry of Urban Development (now Ministry of Housing and Urban Affairs), Government of India on 'Cyber Security Model Framework for Smart Cities' was issued for addressing the data security concerns arising from the data-driven approach of Smart City implementation.

[31] Nair, Shalini. National Urban Policy: Single policy for multiple states. The Indian Express. New Delhi. 2018.01.20. https://indianexpress.com/article/india/national-urban-policy-single-policy-for-multiple-states-5031992/ (accessed on 03.01.2021)

[32] Directorate of printing, Government of India. Amendment of Government of India (Allocation of Business), Rules, 1961 – merger of the Ministries of Urban Development and Housing & Urban Poverty Alleviation- reg. Ministry of Housing and Urban Affairs, Government of India. Nirman Bhawan, New Delhi. 2017.07.17. http://dop.nic.in/sites/default/files/Amendment%20of%20goi%20%28allocation%20of%20business%29.pdf (accessed on 03.01.2021)

[33] Praharaj, Sarbeswar, and Vaidya, Hitesh. The Urban Dimension of COVID-19: COVID Outbreak and Lessons for Future Cities. National Institute of Urban Affairs. 2020. https://smartnet.niua.org/sites/default/files/resources/the_urban_dimension_of_covid-19-3.pdf (accessed on 03.01.2021)



6

Cross-functional integration

In accordance with the spirit of 74th Constitutional Amendment, function-wise decentralization reigned the governance process. And traditionally, thematic interventions recommended by higher orders of government and developmental multi-lateral agencies had been driven in the form of programmes by the function that addressed maximum requirements with support from other functions. However, considering the unified nature of 'Service Delivery' proposed by the Contemporary Urban Transformation Approach, cross-functional integration gains centre stage and assigns identified responsibilities to each function participating in an intervention / programme. Cross functional integration not only improves the speed of execution on account of its inherent characteristic of seamlessly coordinated operations, but also brings in accountability, provides room for exploring innovative solutions, creates a sense of ownership within the operational ecosystem and facilitates optimum utilization of organizational learning by identifying contribution of an individual participating function in the collaborative effort. This further culminates to the effectiveness of programmes and individual function's performance while helping the city administration in achieving its determined urban transformation outcomes.

Also, under the Conventional Urban Development Paradigm, cross-functional integration was restricted to functions within the city administration and interactions of city administration with the State, Central governments or developmental multi-lateral agencies. But under the Contemporary Urban Transformation Approach, cross-functional integration transcends beyond conventional boundaries to explore institution of new specialized establishments like Special Purpose Vehicles and Public-Private Partnerships, and forging partnerships with various participants of developmental process as envisioned in the sustainable development goals. This allows city administrations to keep themselves up-to-date while relieving them of continual performance stress and leverage knowledge of various other sectors to address their concerns.

Further, integrated command and control centres have been instrumental in driving the radical shift in cross-functional integration in urban governance and management ideology. Under the Conventional Urban Development Paradigm, civic functions were performed by a nodal department and an independent information technology department within in the city administration served each nodal department for ICT-enablement. They interacted with each other only on need-basis. However, integrated command and control centres provided the opportunity of allowing all functions of a city administration to function as part of a real-life 'City Operations Centre' where each responsible functional department within the city administration participates collaboratively along with the IT department in delivering all public services.

Bhubaneswar one - uniting all functions across departments through geo-spatial technology

Bhubaneswar, the capital of Odisha, is one of the fastest-growing trading and commercial hub and a significant tourist destination in the East region. However, whenever citizens had to access data regarding various public services, business permits, construction permits or tourism, they found it difficult to access the data since it was available through different sources and usually under control of separate authorities. Moreover, the data available was not always up-to-date.

Bhubaneswar One was set-up to address this challenge with respect to citizen information services and public service delivery. Bhubaneswar One comprises of a geo-spatially-enabled portal that integrates data from various departments and organizations for facilitating hassle-free access to location-based information and delivery of public services.[34]

SURAT'S SMAC (Smart City) centre – 360º view of Municipal operations

As per Census 2011, Surat is the eighth most populous city in the nation. Surat is a historical textile trade hub and diamond cutting and polishing industry hub in the West region. Surat is also considered as the economic capital of Gujarat.

Governance and management of such a vibrant city involves multitudinous complexities and required a centralized approach. Surat's SMAC (Smart City) Centre was conceptualized as a solution for addressing this requirement. Smart City (SMAC) Centre is an Administrative Control Centre comprising of an Integrated Command and Control Centre built over a floor area of 2,100 square feet, with a seating capacity of 22 operators and a meeting, and a Video Wall spanning across 240 square feet area.

Smart City (SMAC) Centre integrates data and processes of all functional departments within Surat Municipal Corporation and other government agencies for improving coordination within different departmental activities, simplifying urban governance and management, optimizing utilization of municipal assets, enhancing quality of service delivery, ensuring quick turnaround in emergencies and monitoring performance of various functions for further refinement.[35]

[34] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Chapter 3: Bhubaneswar One – Bhubaneswar. India Smart Cities: Success Stories from Mission Cities. 2017. https://smartnet.niua.org/sites/default/files/resources/Success%20Stories%20from%20Mission%20Cities%20Lowres.pdf (accessed on 03.01.2021)

[35] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). Chapter 19: SMAC (Smart City) Centre – Surat. India Smart Cities: Success Stories from Mission Cities. 2017. https://smartnet.niua.org/sites/default/files/resources/Success%20Stories%20from%20Mission%20Cities%20Lowres.pdf (accessed on 03.01.2021)



7

Changing roles of citizens, industry, NGOs and academia

7.1. Revision in definition of citizen

Almost all documentation available on urban development encompassing every perspective of the agenda specifies that 31% of India's population dwelled in its cities and that cities accounted for 63% of Gross Domestic Product (GPD) in 2011.[36] Which means that the economic activities in urban areas are responsible for contributing at least four-fold to the economy as compared to their rural counterparts. And yet, the prime focus of all urban development programmes remained the people in entirety with intermittent focus on gender.

However, this scenario has witnessed a drastic revitalization with the launch of Smart Cities Mission. Today, cities have begun acknowledging the diverse segments that comprise the people – differently abled, economically marginalized, labour-force participant, vulnerable segment including elderly, children, widows and destitute. Recognition of these segments is now allowing cities to investigate the age-old issues of poverty alleviation, education, health care, equitable access to civic amenities and public services, and so on in a new light. These new-found insights are facilitating innovation in solutions involving multiple aspects of the urban governance and management process such as introduction of development programs, undertaking development works and policy formulation for propel an unprecedented urban transformation based on the principles of inclusion and sustainability.

[36] Make in India, Government of India. Improving Lives: Urban Infrastructure. http://www.makeinindia.com/article/-/v/improving-lives-urban-infrastructure (accessed on 03.01.2021)

Inclusive parks for achieving overall child development

Illustrations of 'revision in definition' can be discerned from the intentions of Greater Chennai Corporation (GCC) in undertaking development of a model 'Sensory Park'. This 'Sensory Park' is developed in an area of 1529 sq. meters on a Greater Chennai Corporation land at Santhome, Chennai under the Smart Cities Mission. The 'Sensory Park' is envisioned to enable access to individuals with visual impairment, hearing impairment, physical disability, and mental and cognitive disability through re-thinking park design in areas like approachability, accessibility and sensory stimulation of the space utilizing various park elements.

At the entrance, the park features two tactile art walls that helps individuals feel paintings through bright primary colours and embossed elements such as tyres, bangles, shells and other material. The purpose of these tactical walls is to take art beyond eyesight for the visually impaired; either partial or total, and to improve sensory perceptions for others. Sand banks, swings and ground-level merry-go-rounds featured in the park have been designed to accommodate wheelchairs and allow access to individuals with various types and degrees of disability. Specially designed slides and climbers that require focus and control to manoeuvre have been installed for individuals with Attention Deficit Hyperactivity Syndrome (ADHD). Playgrounds are installed with fibre to reduce the risk of children hurting themselves while playing. Basketball courts with hoops fixed at two levels have been built for accommodating players in wheelchairs. Various musical toys have been installed for stimulating auditory capabilities of individuals with hearing impairment. A herbal garden with plants such as lemongrass, tulsi, basil and other indigenous herbs has been curated for those specifically with olfactory impairment.

Moreover, this park encourages access to everyone; whether with disability or otherwise. Hence, it is not just expected to provide inclusive recreation, but also anticipated to bring about overall child development of higher quality and sensitization of society regarding needs of the differently abled.[37]

7.2. Main-streaming of NGOs

Throughout the history of development studies and social work, the role of non-government organizations (NGOs) have been understood to be that of independent grass-root level change agents undertaking social work in isolation. However, the Contemporary Urban Transformation Approach, perceives non-government organizations as a stakeholder to the urban transformation process. Smart Cities Mission has recommended on-boarding non-government organizations as part of the Smart City advisory forum for monitoring implementation of the Mission at the city-level.[38]

Additionally, main-streaming of non-government organizations is expected to allow city administrations to not only capitalize the relationship they share with the people for driving a change, but also leverage the additional capacity offered by the non-government organizations in form of augmented dedicated work-force for undertaking development programmes. Moreover, since Non-government organizations usually operate locally and in a specific development sector, they present vital insights and expertise that prove critical to accomplishing tangible outcomes.

An instance of such an effort would be the 'Majhi City Swachh City' program of Aurangabad Municipal Corporation (AMC) undertaken in association with the Center For Applied Research & People's Engagement (CARPE India). CARPE India assisted Aurangabad Municipal Corporation in transforming their Solid Waste Management process through a systematic change that encompassed multiple elements of the value chain. CARPE India was instrumental in operationalizing and managing two dry waste processing centres, but also focussed on welfare of waste pickers through integrating them in the mainstream solid waste management process, while maximizing material recovery.[39]

Another enterprise would be the engagement of the non-government organization, Humara Bachpan Trust, by Bhubaneswar Municipal Corporation (BMC), Bhubaneswar Development Authority (BDA) and Bhubaneswar Smart City Ltd (BSCL) for undertaking a variety of community mobilisation initiatives under the Smart City Plan in slums. Humara Bachpan Trust started a pilot of its 'Socially Smart' project in 24 slums under the Bhubaneswar Town Centre District (BTCD) area in 2016 and expanded the coverage of its activities to over 100 slums during the subsequent months of implementation. Activities such as skills training, community

[37] Jayarajan, Sreedevi. Let's all play: Chennai's first inclusive park for kids with disabilities opens. The News Minutes. 2018.12.18. https://www.thenewsminute.com/article/lets-all-play-chennais-first-inclusive-park-kids-disabilities-opens-93585 (accessed on 03.01.2021)

[38] Smart Cities Mission, Ministry of Housing and Urban Affairs (MoHUA), Government of India (GoI). City Level Monitoring. Last updated on 17.08.2017. http://smartcities.gov.in/content/innerpage/city-level.php (accessed on 03.01.2021)

[39] Center For Applied Research & People's Engagement (CARPE India). Our Projects: Aurangabad. http://www.carpeindia.org/solid-waste-management-botram-process/#thumb3 (accessed on 03.01.2021)

mapping for identification of local challenges, community sensitization through observation of various International Days, and innovation incubation have been undertaken as part of this project. However, amongst its many achievements, the most remarkable ones are training of over 60 'Peer Leaders' or 'Pragati Sathis' for leadership at community level, and capacitation of around 120 ground level functionaries for effective implementation of government schemes and provisions. Significance of these initiatives was that they envisaged to assure sustenance of efforts towards continued community engagement initiated under the project in the long term for achieving improved urban governance and management, and poverty alleviation outcomes.[40]

7.3. Corporate 'social responsibility' 2.0

Industry had always been acknowledged as a driver of economic development of our nation since its advent. However, the perspective of industry throughout the course of our development history remained as that of a beneficiary of the development process that was required to comply to rules and regulations laid down by the government. However, given the pressures under which the government eco-system is operating to keep up the pace of development in a dynamic global scenario and within the myriad of fulfilling various development agenda adopted; such as the Sustainable Development Goals, it is imperative that industry, too, escalates its participation in the urban development sector beyond its current contributions through employment and wealth creation, and corporate social responsibility.

Social development through carbon emission reduction

A noteworthy stride of the Industry in this direction are the measures adopted by various industries and commercial organizations in reducing their carbon emission footprint. Industry is now seen proactively taking up carbon emission audits and planning interventions for establishing zero carbon emission facilities with an objective of not just doing their bit for 'giving back to the society which they are a part of', but also fostering a sustainability-driven culture for driving ideological change in the society through the workforce employed.[41]

Industry intervention for encouraging gender development

In recognition of the wide disparities prevailing in the gender aspect of the development process, the Government of India has outlined plans for increasing women's participation in work-force in the Union Budget 2020. Apart from the conventional interventions, collaboration with Industry for developing relevant skills within the woman workforce, bridging the gender-based wage gap and deploying social infrastructure for enabling women to participate in main-stream workforce has been a notable feature. Since industry was conventionally looked up to only for driving economic development, their engagement for addressing a very separate subject of gender development is a remarkable instance of disruptive participation.[42]

[40] Bhubaneswar Smart City Limited. Planning and Implementing People Centric Programmes for making Bhubaneswar a socially smart City. Socially Smart Bhubaneswar. https://www.smartcitybhubaneswar.gov.in/social-smart (accessed on 03.01.2021)

[41] We mean Business. 2019.09.19. 6 companies helping to create the zero-carbon economy of the future. https://www.wemeanbusinesscoalition.org/blog/6-companies-helping-to-create-the-zero-carbon-economy-of-the-future-2/ (accessed on 03.01.2021)

[42] Subramaniam, Nikhil. Union Budget 2020: The 10 Major Takeaways For Startups From The Longest Budget. Inc 42. 2020.02.01. https://inc42.com/features/union-budget-2020-the-8-major-highlights-from-nirmala-sitharamans-budget-speech/ (accessed on 03.01.2021)

7.4. ‘Start-up’ urban transformation

Utilizing the indigenous essence of start-ups, smart cities have been looking up to start-ups as partners in facilitating the city administrations in innovating for accomplishing urban transformation outcomes. Numerous instances of non-conventional smart solutions have been noted across the nation since the launch of Smart Cities Mission.

Strength of start-ups lies in utilizing cutting-edge urban-tech to devise localized smart solutions that are tailored to address each city’s challenges while considering the context and milieu with equal importance as the challenge itself. This factor is critical for accomplishing the vision set out by the mission at its outset. Hence, to encourage participation from start-ups, there have been tremendous investments in creating an enabling environment for start-ups to initiate innovation and scale-up. Initiatives such as T-Hub have been instituted through collaboration of government, industry and academia for instrumentalization of requisite incubation ecosystem to start-ups.[43] Government-led initiatives such as the India Urban Data Exchange have been observed to be supplementing the effort by supplying essential data-based inputs.

7.5. Academic insights for policy formulation

Evidence-based policy formulation as an essential practice gained attention only after the launch of Smart Cities Mission. Traditionally, policies were formulated based on data collected previously, at a different point in time. Academia too operated independently with very little collaboration with government and other development participants. And so, the research conducted was passive, and usually myopic and not thoroughly aligned to current development issues.

However, with the influx of real-time data from Smart Cities’ implementation, there exists an opportunity of conducting inquiry into present-day challenges without losing context and utilizing knowledge, skills and capacity of otherwise untapped workforce from academia. Policy analysis for impact and social research have always been recognized as the forte of the academia. Leveraging this speciality is critical for achieving the monumental vision of urban transformation set out by the mission.

Further, the mission formally advises on enactment of all essential policies and rules for enablement of not just an intervention under the Smart City plan, but also for deriving defined outcomes. Hence, collaborative endeavours with academia are imperative as they are expected to assure vital insights accrued from focussed evidence-based social research and accelerate comprehensive context-oriented policy formulation for driving deeper-rooted impacts.

[43] T-Hub. Enabling and empowering an ecosystem, hungry for innovation. https://t-hub.co/ (accessed on 03.01.2021)

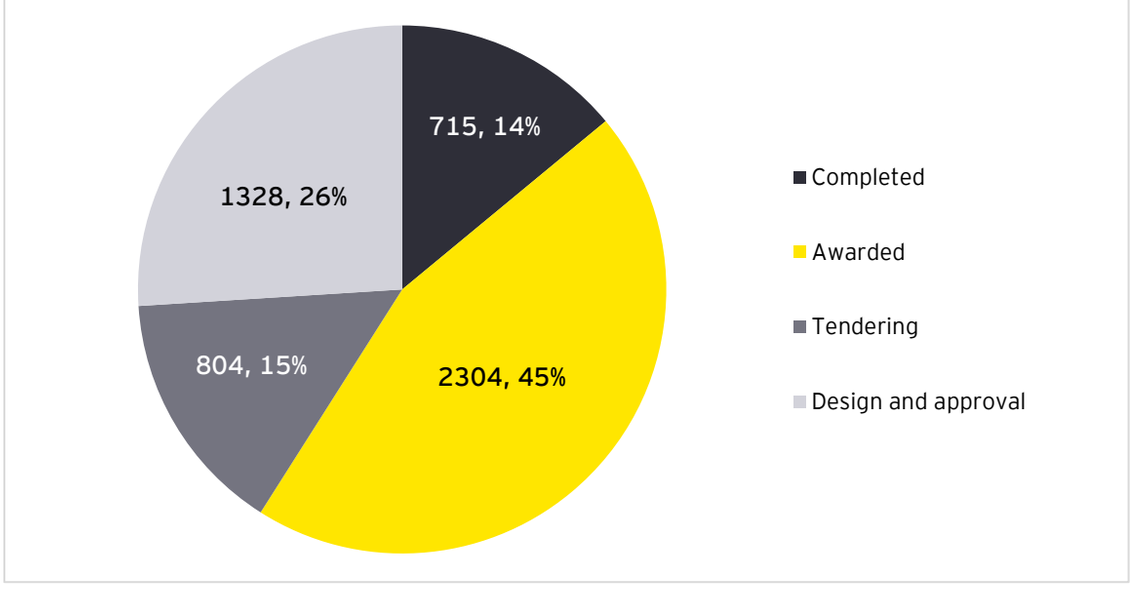


8

Impact

The Smart Cities Mission is an urban transformation program covering 100 cities with a total of 5,151 identified projects and a total outlay of 2,05,018 Cr.[44]

Figure: Number of projects at various stages of implementation



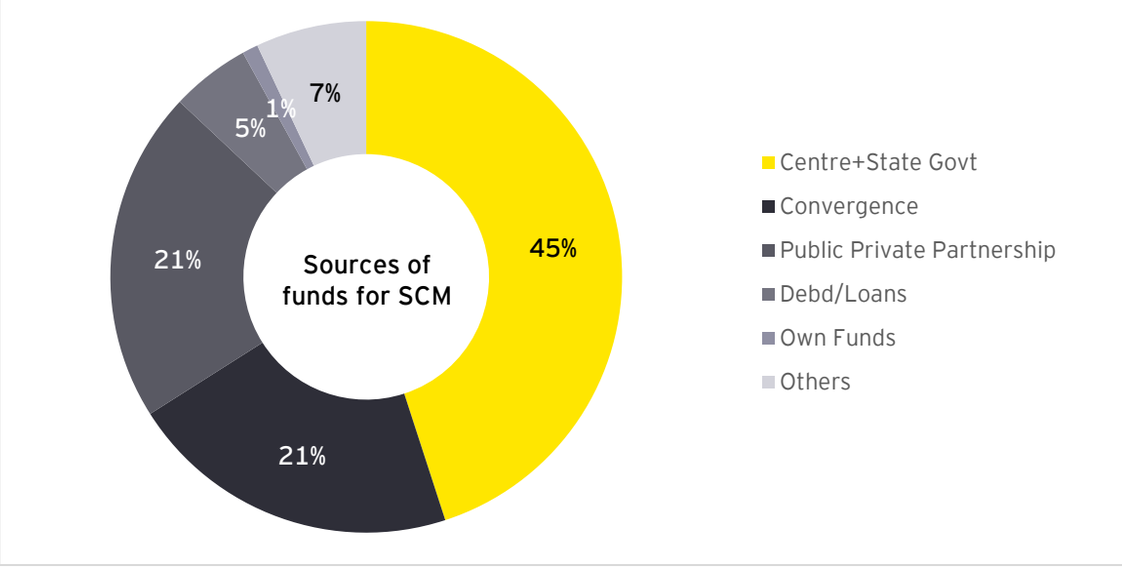
Source: *Ministry of Housing and Urban Affairs, Government of India. Smart City Mission. Transforming Urban Landscape 2014 – 2019. New Delhi. 2019.03.01. http://mohua.gov.in/upload/5c7faf00eac57UT%20Book1.pdf*

[44] Ministry of Housing and Urban Affairs, Government of India. Smart City Mission. Transforming Urban Landscape 2014 – 2019. New Delhi. 2019.03.01. http://mohua.gov.in/upload/5c7faf00eac57UT%20Book1.pdf (accessed on 03.01.2021)

As of March 01, 2019, of the total 5,151 projects identified across participant cities under the mission, only 14% projects have been completed, while work orders have been issued for 45% projects and tenders have been issued for 15% projects. However, a fourth of the identified projects; i.e. 26% of the projects, are still under design phase.

At the outset of the mission, of the total investment of INR 2,05,015 Cr. to be made across projects, 45% of the funds were expected to contribute by the Central Government and respective State Governments, while 21% of funds were expected to be secured through convergence of schemes. However, it is interesting to note that another 21% of funds were planned to be raised through private participants and 7% of the funds were planned to be raised through other funding mechanisms such as Land Value Capture, Incremental Tax Funding mechanisms, calibration of impact fees on high rise structures and right-of-way, sale of air rights and sale of additional FSI (Floor Space Index).[45]

Pune Smart City's proposal projected a total cost of INR 3,110 Cr. at the onset, of which they expected to raise fund to the tune of INR 1,000 Cr. (32%) through sale of development rights and INR 200 Cr. (6%) through collection of user fees.[46]



Source: *Ministry of Housing and Urban Affairs, Government of India. Chapter 8: Smart City Mission. Handbook of Urban Statistics – 2019. New Delhi. Government of India Press. 2019.03.01*

Overall Fund utilization under the Smart Cities Mission in March 2018 was 9.87%, which increased to 34.77% in March 2019. However, in spite of the impact of the COVID-19 pandemic, this figure had almost doubled in September 2020 to 73.66% and is expected to grow steeply in near future as 2,383 projects worth INR 1,04,000 Cr. are under implementation.[47]

[45] Ministry of Housing and Urban Affairs, Government of India. Chapter 8: Smart City Mission. Handbook of Urban Statistics – 2019. New Delhi. Government of India Press. 2019.03.01 http://www.indiaenvironmentportal.org.in/files/file/Handbook%20of%20Urban%20Statistics%202019.pdf (accessed on 03.01.2021)

[46] Ramachandran, M. Smart cities mission: Four years of implementation. ORF Online. 2019.10.15. https://www.orfonline.org/expert-speak/smart-cities-mission-four-years-of-implementation-56676/ (accessed on 03.01.2021)

[47] Smart city mission fund utilisation doubles post lockdown. The Economic Times. 2020.10.29. https://economictimes.indiatimes.com/news/politics-and-nation/smart-city-mission-fund-utilisation-doubles-post-lockdown/articleshow/78923441.cms?from=mdr (accessed on 03.01.2021)



9

Way ahead

Even though the journey of urban transformation in India has witnessed a significant shift in overall ideology during the recent past, it is essential to note that there still exists a tremendous gap in the envisaged outcome-state and the current operating-reality. City administrations are still operating in the passive 'Best Practices' paradigm, whereas they have been expected to internalize evidence-based and performance-oriented urban governance and management process as part of their operating ethos. City administrations ought to understand that simply adopting a practice that worked for another city administration without critical data-driven evaluation will not work. Undertaking development initiatives without evidence-based insights will not only deprive a city administration of opportunities of full-scale success, and also make them vulnerable to unforeseen risks. In response to this disparity, the nation has witnessed roll-out of new initiatives such as India Urban Observatory to facilitate city administrations overcome this gap. However, it will thoroughly depend on the city administrations how they leverage this initiative to launch themselves on the path to truly rational Contemporary Urban Transformation Approach.

Further, in accordance with the data-driven approach adopted recently within the urban development sector, initiatives such as India Urban Data Exchange have been noted to be rolled-out. Subsequent to their launch, it has become apparent that emerging technologies such as Blockchain and Artificial Intelligence will henceforth be considered for being employed for effectuating the envisioned urban transformation agenda. However, there are two key concerns relating to this aspect. First, there exists a void with respect to standardizing practices of technology architecture and management and mainstreaming cyber security as a specialized subject under the digital urban transformation reign. And second, institutionalization of data being generated. Addressing these concerns would now become more critical than ever for not just ensuring sustenance of the evidence-based and performance-oriented urban governance and management aspect, but also assuring the integrity of technology continuum too.

Lastly, despite the elevated enthusiasm with respect to 'Smart' urban transformation, many impediments have been encountered in the implementation process, culminating into a sluggish rate of progress as compared to that which was projected initially. Consequently, measures such as the publication of a comprehensive Smart Cities Report Card has been announced during the Union Budget 2020 to infuse the requisite focus to the process. Implementation of five new Smart Cities has also been announced during the Union Budget 2020 to expand the existing purview of knowledge creation and dissemination, and invigorate the implementation process.[48] Proactive launch of initiatives around improving the Ease of Living Index and those involving elements of sustainable development goals have been noted across the nation. Advent of the COVID-19 pandemic in the nation witnessed re-purposing of the 'Smart' installations to facilitate emergency response. However, it is fundamental that all aspects concerning each segment of the urban people be investigated rigorously and public service delivery be planned further comprehensively, while keeping up with the anticipated pace of transformation. Afterall, urban development and transformation is an endeavour undertaken for its subject, the urban people!

[48] Rawat, Aman. Union Budget 2020: 5 New Cities Added To India's Smart City Programme. Inc 42. 2020.02.01. https://inc42.com/buzz/union-budget-2020-5-new-cities-added-to-indias-smart-city-mission/ (accessed on 03.01.2021)

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