Draft Concept Note on Smart City Scheme

Context

1. Urbanization accompanies economic development. As countries move from being primarily agrarian economies to industrial and service sectors, they also urbanize. This is because urban areas provide the agglomerations that the industrial and service sectors need. This trend of urbanization continues to take place as seen in the Fig 1.

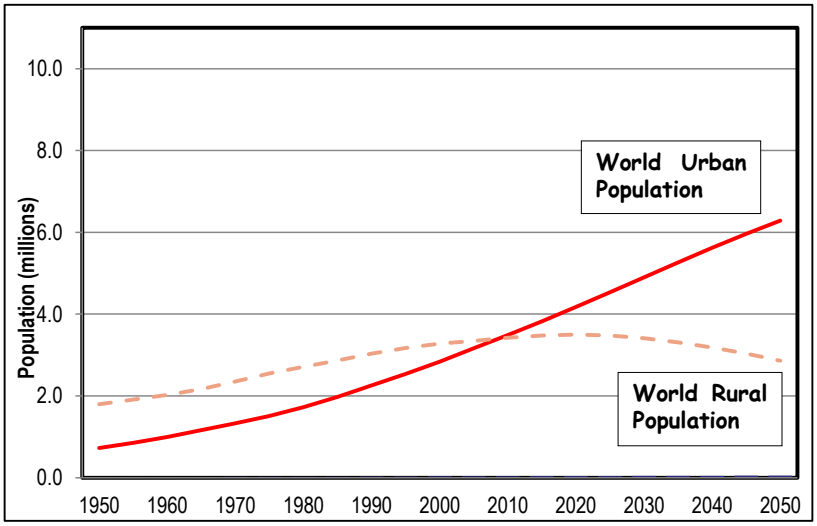


Figure 1: Urbanization Trends

2. In fact, 90% of the world's urban population growth will take place in developing countries, with India taking a significant share of that. Urban areas also contribute a higher share of the GDP. The share of the GDP from urban areas in India has been growing, as seen from the Fig 2.

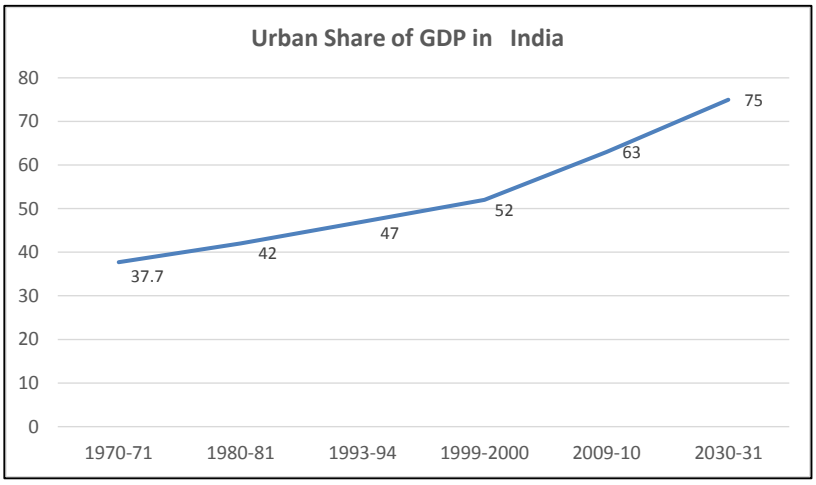


Figure 2: Urban Share of GDP in India

3. While the urban population is currently around 31% of the total population, it contributes over 60% of India's GDP. It is projected that urban India will contribute nearly 75% of the national GDP in the next 15 years. It is for this reason that cities are referred to as the "**engines of economic growth**" and ensuring that they function as

efficient engines is critical to our economic development. This trend of urbanization that is seen in India over the last few decades will continue for some more time. The global experience is that a country's urbanization up-to a 30% level is relatively slow but the pace of urbanization speeds up thereafter, till it reaches about 60-65%. With an urban population of 31%, India is at a point of transition where the pace of urbanization will speed up. It is for this reason that we need to plan our urban areas well and cannot wait any longer to do so. The relatively low base allows us to plan our urbanization strategy in the right direction by taking advantage of the latest developments in technology especially in ICT (Information and Communication Technology). Moreover, it also offers us an opportunity to create conducive environment for creation of many times more employment opportunities and economic activities while improving the quality of life substantially. It also allows an opportunity to learn from good practices and mistakes made elsewhere within the country as well as outside the country..

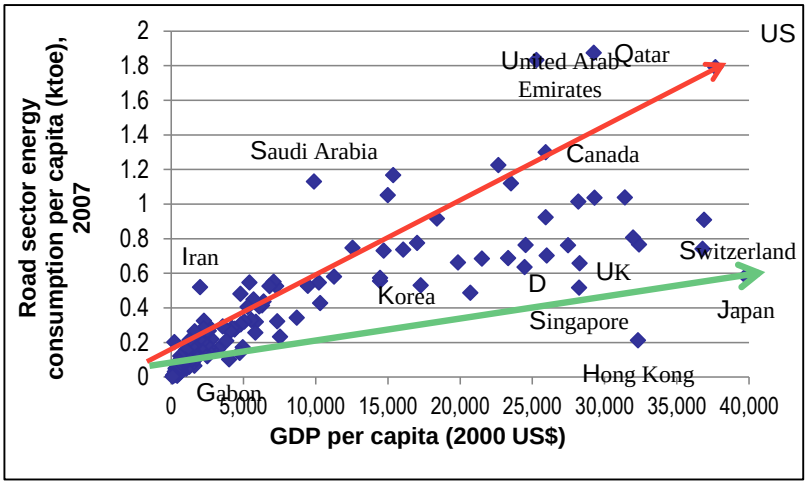


Figure 3: GDP V

s Energy Consumption

4. It is in this context that the Government has decided on developing 100 "Smart Cities" in the country. Accordingly, in his budget speech of July 2014, the Finance Minister has stated as follows:

"*As the fruits of development reach an increasingly large number of people, the pace of migration from the rural areas to the cities is increasing. A neo middle class is emerging which has the aspiration of better living standards. Unless, new cities are developed to accommodate the burgeoning number of people, the existing cities would soon become unliveable.* ***The Prime Minister has a vision of developing 'one hundred Smart Cities', as satellite towns of larger cities and by modernising the existing mid-sized cities.***"

5. Countries have taken different paths to development as seen from the income Vs energy consumption graph given in Fig 3. While some, such as the oil rich countries, have adopted an energy intensive approach, others have adopted a more energy efficient growth path. In India, since we are still a developing economy and mostly unbuilt, we have the opportunity to choose the path we want to take. Clearly, we should take the low energy path, especially in view of environmental sustainability as well as in view of the fact that for becoming globally competitive we need to be efficient in terms of energy utilization as we have to import a major part of our energy requirement, at prices that have been very vulnerable to the international political situation.

What is a smart city?

6. Smartness in a city means different things to different people. It could be smart design, smart utilities, smart housing, smart mobility, smart technology etc. Thus it is rather difficult to give a definition of a smart city. However, people migrate to cities primarily in search of employment and economic activities beside better quality of life. Therefore, a Smart City for its sustainability needs to offer economic activities and employment opportunities to a wide section of its residents, regardless of their level of education, skills or income levels. In doing so, a Smart City needs to identify its comparative or unique advantage and core competence in specific areas of economic activities and promote such activities aggressively, by developing the required institutional, physical, social and economic infrastructures for it and

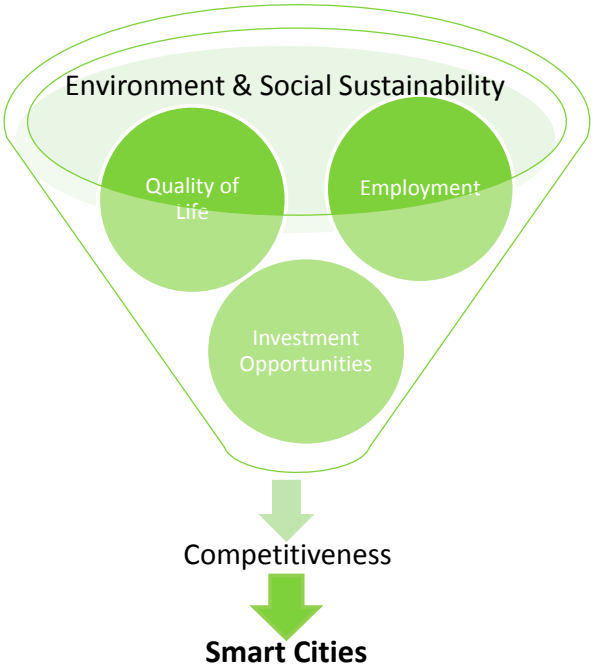


Figure 4: What is a Smart City

attracting investors and professionals to take up such activities. It also needs to support the required skill development for such activities in a big way. This would help a Smart City in developing the required environment for creation of economic activities and employment opportunities.

7. Apart from employment, it is also important for a Smart City to offer decent living options to every resident. This would mean that it will have to provide a very high quality of life (comparable with any developed European City) i.e. good quality but affordable housing, cost efficient physical, social and institutional infrastructure such as adequate and quality water supply, sanitation, 24 x 7 electric supply, clean air, quality education, cost efficient health care, dependable security, entertainment, sports, robust and high speed interconnectivity, fast & efficient urban mobility etc.

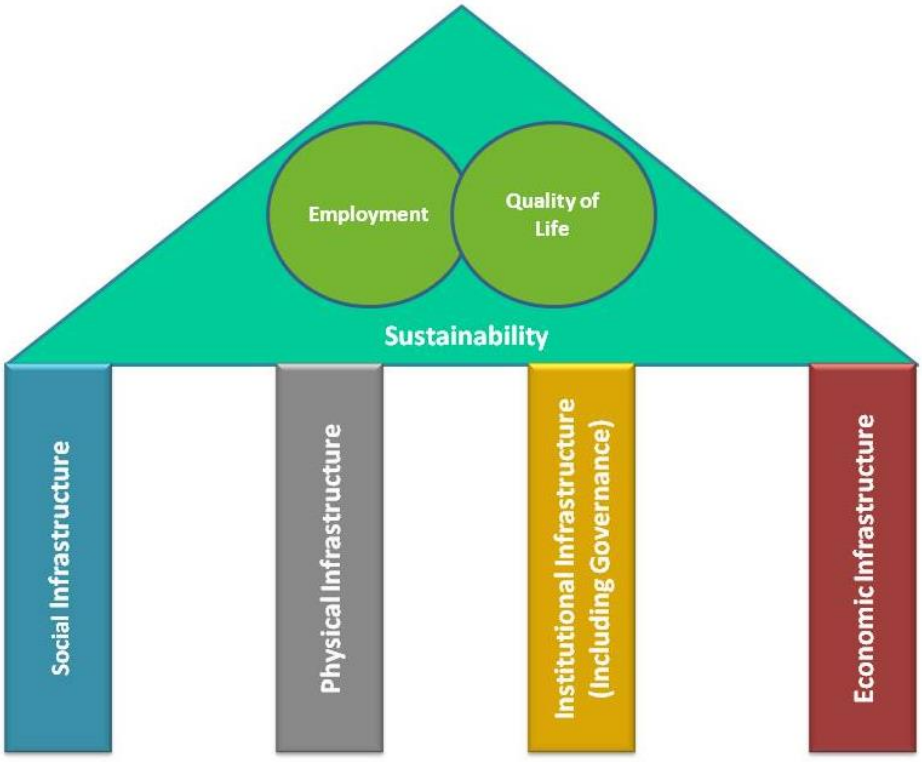
8. In this context, Smart Cities are those that are able to attract investments and experts & professionals. Good quality infrastructure, simple and transparent online business and public services processes that make it easy to practice one's profession or to establish an enterprise and run it efficiently without any bureaucratic hassles are essential features of a citizen centric and investor-friendly smart city. Adequate availability of the required skills in the labour force is a necessary requirement for sustainability of a Smart City. Entrepreneurs, themselves, look for a decent living and so they also look for smart housing, high level of healthcare, entertainment and quality education. Safety and security is a basic need for them as to any other resident. A city that is considered unsafe is not attractive. Besides an entrepreneur or a professional needs to be there as someone who helps a city to prosper and adds value to it rather than someone who only benefits from it.

9. Different organizations have used different definitions for Smart Cities, as given at Annex -1. While there are many definitions, the key features of a Smart City, as it emerges from the variety of definitions and from the discussion above, seem to be as shown in Fig.4. Smart Cities are those cities which have smart (intelligent) physical, social, institutional and economic infrastructure while ensuring centrality of citizens in a sustainable environment. It is expected that such a Smart City will generate options for all residents to pursue their livelihoods and interests meaningfully and with joy. In this context:

- **Competitiveness** refers to a city's ability to create employment opportunities, attract investments, experts, professionals and people. The ease of being able to do business and the quality of life it offers determines its competitiveness.
- **Sustainability** includes social sustainability, environmental sustainability and financial sustainability.
- **Quality of Life** includes safety and security, inclusiveness, entertainment, ease of seeking and obtaining public services, cost efficient healthcare, quality education, transparency, accountability and opportunities for participation in governance.

Pillars of a Smart City

10. **Institutional Infrastructure** (including Governance), **Physical Infrastructure, Social Infrastructure and Economic Infrastructure** constitute the four pillars on which a city rests. The centre of attention for each of these pillars is the citizen. In other words a Smart City works towards ensuring the best for its entire people, regardless of social status, age, income levels, gender, etc.



- **Institutional Infrastructure** refers to the activities that relate to governance, planning and management of a city. The new technology (ICT) has provided a new dimension to this system making it citizen-centric, efficient, accountable and

transparent. It includes the participatory systems of governance, e-governance, inclusive governance, the sense of safety and security and the opportunities for creativity.

- **Physical Infrastructure** refers to its stock of cost-efficient and intelligent physical infrastructure such as the urban mobility system, the housing stock, the energy system, the water supply system, sewerage system, sanitation facilities, solid waste management system, drainage system, etc. which are all integrated through the use of technology.
- **Social Infrastructure** relate to those components that work towards developing the human and social capital, such as the education, healthcare, entertainment, etc. It also includes performance and creative arts, sports, the open spaces, children's parks and gardens.

  These together determine the quality of life of citizens in a city. It is also necessary that city promotes inclusiveness and city has structures which proactively bring disadvantageous sections i.e. SCs, STs, socially and financially backwards, minorities, disabled and women into the mainstream of development.

- **Economic Infrastructure**

  For a city to attract investments and to create the appropriate **economic infrastructure**for employment opportunities, it has to first identify its core competence, comparative advantages and analyse its potential for generating economic activities. Once that is done, the gaps in required economic infrastructure can be determined. This would generally comprise the following:

  - ✓ Incubation centres
  - ✓ Skill Development Centres
  - ✓ Industrial Parks and Export Processing Zones
  - ✓ IT / BT Parks
  - ✓ Trade centers
  - ✓ Service Centres
  - ✓ Financial Centers and Services
  - ✓ Logistics hubs, warehousing and freight terminals

- ✓ Mentoring and Counselling services

12. A schematic of some of the major components of these pillars is shown at Annex – 2.

Institutional Infrastructure (including Governance)

13. The current governance structures do not focus on citizen participation. People do not get the feel of ownership of city. Therefore, there is a need for involving citizens in decision-making processes. Procedures are cumbersome and citizens often find it difficult to secure public services they seek. Further, responsibilities for different services are fragmented across multiple institutions, making the situation even more complex for any citizen. Besides, many of these institutions report to different departments of the State government and local bodies have little influence on them. For example, even within the transport system, metro rail, buses, roads, parking, traffic lights, street lights, etc. are dealt with by different institutions/ departments.

14. Reforms in how our cities are governed are necessary as high quality governance, with a strong citizen say in decision making, is critical for Smart Cities. Typically, the principle to be followed is "**Governance by Incentives rather than Governance by Enforcement**". This would imply that people do the right things because they are good for society or there are incentives to do so and not due to the fear of penal action. However, a greater sense of respect for civic discipline needs to be brought in through **deterrents to civic indiscipline**. Also, decisions will need to be taken at the local level and with well-established processes through which citizens can actively participate in such decision making. However, it is to be ensured that all such decisions are taken without any arbitrariness, discrimination and subjectivity. This can be brought in by ensuring that all information is imparted on real time basis through infusion of technology and very strong Service Level Agreements (SLAs) so that human intervention is bare minimum.

15. In this context, it also needs to be recognized that management of cities comprise of multiple systems, all of which are closely connected in meeting human needs. A Smart City is one where each of these systems works in harmony and reinforces the usefulness of the other. Therefore, a comprehensive approach to the development of a city is essential. This requires that the current practice of **working in silos needs to be broken down with greater institutional integration**, at least in planning and oversight. People are

attracted to cities that provide all services well. Thus, while developing smart cities, it is important to adopt a holistic approach rather than a sectoral approach.

16. More specifically, Smart Cities would have municipal offices fully automated so that citizens have the ability to seek and the municipal offices the ability to deliver services in real time, through IT based facilities. Public participation in governance should be made possible through the social media and by making all information available in the public domain.

Physical Infrastructure

Urban Mobility

17. Our cities are faced with rapid motorization. This has led to severe congestion, deteriorating air quality, increasing incidence of road accidents and a rapidly increasing energy bill. Walking and cycling have been rendered unsafe due to poor infrastructure and public transport has been inadequate. So far, urban transport planning has emphasized providing for the personal motor vehicle. Public transport systems have been planned in isolation with the result that a well-integrated multi-modal system has not come up. This has resulted in high cost facilities not giving the outcomes that were sought.

18. Ease of being able to move from one place to another is at the core of a "Smart City". Seoul, Singapore, Yokohama and Barcelona (all considered Smart Cities) have a sound transport system as the core of their "Smartness". The smart transport system emphasizes walking, cycling and public transport as the primary means for mobility with personal motor vehicles being actively discouraged. In fact, smart cities lay considerable emphasis on the walkability and cycling in the city. The pedestrian is given a place of prominence as every trip has a leg that involves walking. However, smart city need to look into the bottlenecks of road/rail networks also and wherever required underpasses, elevated roads, additional rail networks need to be put in place urgently.

19. Cycling is one of the, most cost efficient and environmentally sustainable mode for commuting in cities. Many cities across the world have given emphasis to it and developed the required infrastructure for promoting cycling. Also programs like bicycle sharing such as Velib in Paris can be promoted to decongest the CBDs.

20. If cities are to be efficient engines of economic growth, it is important that goods are able to move from production centres to consumption centres at low cost and high speed. Therefore, a good freight movement system acquires importance.

Hence, improved mobility will involve a three pronged approach whereby there are:

1. Improvements in public transport – Metro Rail, BRT, LRT, Monorail, Trams etc.
2. Improvements in infrastructure of other motor vehicles – ring roads, bypasses, underpasses, elevated roads, improvements in the existing road ways
3. Improvements in infrastructure for walking, cycling and waterways

Reliable Utility Services

21. Reliable, adequate and high quality Utility services are critical in a Smart City. Whether it is electricity or telephony or ICT services, they need to be very reliable and adequate. 24x7 services are necessary. For example, a minimum of 100 Mbps of internet bandwidth and wide availability of Wi-Fi will be very important features. It should be the right of every citizen to get these facilities on demand. Similarly, municipal services such water supply, drainage, solid waste management need to be of very high quality and available 24x7. Telephone services based on Direct-to-Home Fibre should be available for every household. A Smart City cannot have only a few hours of water supply a day or electricity that goes off for several hours or the streets littered with garbage. The general appearance of the city has to be pleasing and clean. The main utilities that need to ensured are the following:

Water Supply

22. Safe and adequate water supply is a public good as it has very large positive externalities. Access to water supply is important for all the urban residents and lack of safe water supply can keep the mortality rates high in general and among the poor in particular. It has been estimated that access to water increases the productive working hours of urban poor in general and the poor women in particular by 1.5 to 2 hours. Smart cities should therefore have adequate availability of piped water supply that also meets benchmarks of water quality, pressure, etc. across the city. Dual water supply systems that serve the needs of drinking water and other needs would help in recycling water and

conserving it. Adoption of new methods especially smart metering for reducing loss and energy consumption in water networks needs to be ensured. This is possible by installing sensors in the supply system that measure water consumption, water levels, and water flow rates on a real time basis. These models will help in not only identifying and localize leaks, it would also assist to optimize energy consumption in the network. In addition, smart water meters may be installed for measuring water consumption more efficiently and providing water customers with data to help them monitor their water usage and reduce costs.

Sanitation

23. Sanitation is important for all the urban residents. Lack of sanitation causes outbreaks of epidemics, health disorders and keeps the mortality rates high in general and among the poor in particular. It is well known that higher incidences of morbidity pushes low income households below the poverty line. It is therefore essential that cities should have a City Wide Sanitation Plan for all parts of the city. The Plan is expected to be based on the concept of Decentralized Sewerage and Solid Waste Management System. Also, each and every household should have a toilet so that no citizen needs to defecate in the open. Further, all commercial and other public buildings should have clean and hygienic toilets. There is a need for 100% recycling in the sanitation system. Idea is that not even a drop of waste water should go out of the local area (one such example of New Moti Bagh Township in New Delhi). Moreover, only treated water should get into water body i.e. lake, pond, river etc.

Solid Waste Management

24. Waste management is the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes". Indian cities are facing many issues with regard to waste management, which include:

- Absence of segregation of waste at source
- Lack of technical expertise and appropriate institutional arrangement
- Lack of proper collection, segregation, transportation, treatment and disposal system.

25. Cities which are not clean do not exhibit a smart character. Cities which are clean are perceived to be smart, providing a healthier environment and a better quality of life. Therefore, they attract people – both people who want to live and work in the city and those who want to invest in the city. The following strategies therefore need to be adopted:

- Segregation of recyclable and non-recyclable waste as well as wet and dry waste at the source so that there can be 100% recycling of solid waste
- Appropriate technology should be adopted for treatment of waste at decentralized locations
- Put in place an effective collection and disposal system
- Encourage use of products based on recycling of solid waste especially – power, compost, building material (based on cycling of debris & construction materials)

Storm Water Drainage

26. Lack of storm water drainage often exacerbates the sanitation problem in many Indian cities, especially during the monsoon months. Lack of storm water drains lead to water logging every monsoon and outbreak of vector diseases such as malaria, dengue and so on. Cities, therefore, need to adopt a storm water management approach. This would include preserving and maintaining the natural hydrological cycle, groundwater recharge, natural drainage system, etc. Provisions for storm water to feed lakes and water bodies would enable recycling of the storm water. For this purpose appropriate technological interventions should be adopted to improve the quality of water from storm water flows. It will help in conserving potable water and at the same time prevent water pollution. Many times storm water drains are connected to sewerage network which makes sewerage system ineffective. This needs to be checked meticulously.

Electricity

27. As per the Government of India statistics, nearly 94% of the households in urban areas have access to electricity; however, the availability and quality of the supply remains a concern. Smart cities needs to have universal access to electricity 24x7. This may not be possible with the existing supply and distribution system. The cities should,

therefore, shift towards smart metering at the household level and the establishment of a smart grid and its integration with the renewable sources to meet the demand such as solar and wind energy. For this purpose the existing distribution system must be strengthened and power banking systems need to be established. Further, the focus should be on green buildings and green transport to reduce the need for electricity. Also, cities should strive towards achieving an integrated billing system for a variety of services such as electricity, water, gas, internet, house tax, etc. with a common customer care centre and user friendly payment platform for online payments. There would thus be a need to review the existing state policy and bring in the necessary changes wherever needed.

Internet and Telephone

28. A 100 Mbps internet backbone coupled with 100% coverage of the area by cell phone towers and a high level of telephone penetration will be essential in a Smart City as most services will have to be offered online. Local service providers should also have multiple service kiosks that can be accessed by people for evaluating public services and accessing public information. Fibre Optic connectivity to each home, Wi-Fi in all public places and educational institutions would be important features of a Smart City. This would need a transparent and efficient system of providing Right of Way by Municipal Authorities.

Urban Development

29. The rapid urbanization of cities has resulted in unplanned development and urban sprawl. Most of the cities in our country are marred by congested CBDs and deteriorating city core. It is therefore essential that while planning for the smart cities, emphasis is given to planned development and decongestion of the CBDs.

30. Further, many policies governing urban areas are old and need to be reviewed in view of the changing needs of the city. The building bylaws are archaic and the provisions like parking space requirements and building heights etc. provided, do not meet the demand for the present day.

31. Land in cities is at a premium and the existing FARs does not permit development of high rises, which results in high cost of housing. To ensure availability of affordable housing for every citizen, the existing FARs and bye-laws needs immediate revision. This would also ensure that Transit Oriented Development (TOD) is implemented along public transport corridors. This would have multiple benefits like financial viability of the transit system, reduction in use of personalized vehicles and cleaner environment etc. GoI would assist all identified smart cities to develop City Development Plans based on ICT, GIS and Spatial Mapping.

Social Infrastructure

32. Social Infrastructure would include the following:

- Education - The city should have quality educational facilities, both for schools and higher education in every neighbourhood. This can be achieved with e-education and digital content.
- Healthcare - High quality healthcare facilities are important factors in making a city liveable and attractive for people and businesses. This would necessitate creation of Electronic Health Record for every resident and adoption of telemedicine in every neighbourhood.
- Entertainment - Good entertainment facilities make the people in a city happy. Theatres, concert calls, auditoriums, cultural centres, open spaces and plazas allow opportunities for recreation, so important for healthy and happy living.
- Good sports facilities – Children park, stadium, swimming pools, neighbourhood sports complex, golf courses.

Health Infrastructure

33. India is at the crossroads of an exciting and challenging period in its history. Making healthcare affordable and accessible for all its citizens is one of the key focus areas of the country today. While on one hand, India urban area lacks strong healthcare infrastructure, on the other hand, the country has several inherent weaknesses in its healthcare system. The health care delivery segment is dominated by the private sector in India, with 70% of the total delivery market in India catered to by the private sector.

However most of the organized private infrastructure is confined to the state capitals or Tier I cities. Very few have made inroads in Tier II and Tier III cities. This presents the country with both a challenge and opportunity to not only increase the penetration of quality health services but also be the growth driver in these regions.

34. In smart city approach in order to complement the skills, expertise and resources of each other as well as alleviate the financing burden for the growth and development of the healthcare sector, the private and public sectors are now working together at a varied pace and working model across the states in India. Some of the successful Public Private Partnerships (PPP) involve laboratory services (pathology, radiology, CT scan, MRI etc.), mobile medical units, PHC management, telemedicine services and hospital maintenance. In addition, service delivery through telemedicine, high end tertiary care, community insurance schemes are other opportunities where private sector will need to participate. Therefore, the need of the hour is to develop **Medi-city** in every Smart city with minimum land of 50-100 Acres.

Economic Infrastructure

Financial sustainability

35. The services need to be financially sustainable so that there are no financial constraints to delivering quality services. However, in doing so, tariff structures adopted should be such that they are affordable for the poor and yet recovers costs at higher levels as use. The revenue gaps can be bridged by innovative means to raise and allocate resources to the service providers such as Purchasable FAR, Development Charges, New roads, underpasses, Metros, Elevated roads etc. Use of the private sector would be a good way of tapping efficiencies in delivery to reduce costs. Independent Regulators for electric supply, water supply, property taxes etc., need to be appropriately placed. To begin with the same Regulator can look after Power and Water tariffs.

Establishing Incubators and Creations of Jobs

36. Creation of a start-up eco-system requires an incubator being set up and spreading the culture of innovative thinking and finding solutions to everyday problems through technological intervention. It requires specific expertise and needs to be done with a

long-term view towards making the process sustainable. Each city will house an incubator each and 1000 start-ups per incubator shall create at least 1000 jobs per year. *This will result in 1 million jobs created per year and 10 million jobs in 10 years across these 100 cities through the incubators*

37. The host institutes of incubators approved by DST, Government of India, maybe invited to setup incubators in the smart cities. These cities may house self-sustainable 'live-work-play' campuses for the start-ups through these incubators to provide them with a vibrant atmosphere for innovation. The concept of live and work has already been engrained in the philosophy of smart cities. Incubation and start-up ecosystems are still at a very nascent stage in India and the sustainability model is still being figured out. They require support from the government for a 5 year period in the in the form of:

a) financial support for the host institute of the incubator for each start-up incubated at the rate of Rs 12,500 per month
b) Infrastructure development fund to establish the live-work-play campus
c) Tax break and incentives for the incubators and incubated start-ups within smart cities
d) Supports and incentives for large organisations working with the incubators for setting up innovation zones that will provide start-ups technology support and market-access opportunities

Support for the incubators to roll out programs that will in spreading the message of entrepreneurship and develop the pipeline that will continuously attract start-ups and encourage youngsters to take up innovation and entrepreneurship seriously.

38. <u>Financial Hubs</u>

In smart city the financial hub will be of major importance as major financing mechanism has to be developed keeping the social and the physical infrastructure in mind. A city or region that is considered to be a focal point for the financial services industry which should have vibrant and functional financial hub. Financial hubs will be home to major banks and/or stock exchanges as well as other financial services. They have to be developed in areas due to externalities, as well as supportive government regulation.

There are several existing financial instruments that cities may apply in order to attract private finance for urban green infrastructure:

- Private sector involvement in urban green infrastructure which can take the form of public-private partnerships (PPPs), in which the long-term risk is transferred to the private sector.
- Through an alternative instrument, tax increment financing, future tax revenues are used to attract private finance.
- Real estate developers which may also pay for the infrastructure that is needed to connect their new development to existing infrastructure in the form of development charges (impact fees) and value capture (taxes that capture the value increases of real estate due to new infrastructure development nearby).
- Finally, loans, bonds, credit rating of ULBs and carbon finance are instruments used to attract private finance in well-functioning capital markets.

Instruments that make smart cities possible

Energy efficiency

39. Energy concerns are also a key feature of "Smart Cities". Energy efficient practices are adopted in transportation systems, lighting and all other services that require energy. Tariff structures are such that conservation has incentives. Awareness programs lead to a culture of conservation. Good areas to focus energy efficiency measures would be the building material used, the transport system, sewerage and water supply systems, street lighting, air-conditioning systems and energy consumption in buildings.

Smart Grid:
A smart grid is an electricity network that uses digital and other advanced technologies to monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end-users. Smart grids co-ordinate the needs and capabilities of all generators, grid operators, end-users and electricity market

stakeholders to operate all parts of the system as efficiently as possible, minimizing costs and environmental impacts while maximizing system reliability, resilience and stability.

Smart grids include electricity networks (transmission and distribution systems) and interfaces with generation, storage and end-user.

Key Characteristics of the Smart Grid

- Self-healing: The grid rapidly detects, analyzes, responds, and restores.
- Empowers and incorporates the consumer: Ability to incorporate consumer
- Equipment and behavior in grid design and operation.
- Tolerant of attack: The grid mitigates and is resilient to physical/cyber-attacks
- Provides power quality to users: The grid provides quality power consistent with
- Consumer and industry needs.
- Accommodates a wide variety of supply and demand: The grid accommodates a variety of resources, including demand response, combined heat and power, wind, photovoltaic, and end-use efficiency.
- Fully enables and is supported by competitive electricity markets.
- Transform the Indian power sector into a secure, adaptive, sustainable and digitally
- enabled ecosystem that provides reliable and quality energy for all with active
- participation of stakeholders

Need for Smart Grid in India

Every global driver for smart grids applies to India, but India also has additional drivers in the short term. The power system in India has roughly doubled in the last decade and similarly in the previous decade. With 230 GW of installed capacity with utilities (as of July 2013), the Indian power system is now the fourth largest in the world, but per capita consumption of electricity in India is only about one-fourth of the world average. This underscores the need to grow the power system at a rapid pace for the next several decades. This low consumption is amplified by the lack of access to electricity to a significant proportion of the population. The potential demand by 2032 is estimated to be

as high as 900 GW. India is also pursuing an aggressive renewable generation program. The 12th Five Year Plan target for renewable energy (RE) generation is 36 GW which will increase the current 12% share of RE(excluding hydro) to around 20% by end of this decade.

It is discussed and decided that for smart cities approximately 10% of the energy has to come from renewable energy sources.

Demand Management

40. While enhancing supply to meet the demand is important, Smart Cities would also lay special emphasis on demand management, by creating incentives for savings and disincentives for excessive consumption. This could be by way of rate structures that are affordable and low levels of consumption, but increase steeply as more is consumed. For transport systems the demand management efforts will be such that they promote the use of non-motorized modes of travel or public transport and discourage personal motor vehicles. They also promote shorter trip lengths by improved integration of land use and transport plans and mixed use planning, where residential and commercial areas are well interspersed.

Improved access to information

41. A very important feature of all smart cities is good citizen access to information. Whether it is regarding city specific data or the measures being taken by municipal bodies or information relating to various service providers such as transport and similar information relevant for potential investors has to be conveniently available. This could be through multiple channels – internet, mobile apps, radio, TV, print media, etc.

Environmental Sustainability

42. Pollution in our cities is growing at an unprecedented pace. As per the WHO report published in 2014, our cities are amongst the most polluted ones in the world. This has resulted in a high rate of air borne diseases in all age groups. To create a more liveable and healthy environment, it is therefore important that smart cities that are planned, are environmentally sustainable. This would mean not only improving the air quality but also

reducing wastage of water, electricity, fuel etc. Steps have already been taken in this regards, however much more needs to be done. Star rating is being done for electrical appliances and in the building industry. All vehicles should also be star rated to indicate their energy efficiency. Also industries should be given incentives to reduce their carbon emissions.

43. In addition, all documents that are prepared by cities for funding as part of this scheme, i.e. plans, policy documents, DPRs etc. should be vetted by a professional agency for environment sustainability like TERI, etc. before any financial sanctions are given.

44. There are several instruments that facilitate the development of a Smart City. These are:

Use of Clean Technologies

45. As per the WHO report, Indian cities are amongst the most polluted in the world, creating severe health hazards. The trend needs to be reversed by promoting the use of clean technologies that harness renewable materials and energy sources and have a lower smaller environmental footprint. In smart cities buildings, transport and infrastructure should be energy efficient and environmentally benign.

Use of ICT

46. The extensive use of ICT is a must and only this can ensure information exchange and quick communication. Most services will need to be ICT enabled, and this often helps reduce the need for travel. The ability to shop on-line or book tickets on-line or converse online is very powerful ways of reducing the need for travel, thereby reducing congestion, pollutants and energy use. An extensive use of ICT enabled services will need a sound communications backbone. In this context, it is important to note that ICT is not the "end" but only the "means" to an "end" – the end being improved service quality and information availability.

Participation of the Private Sector

47. PPP allows Government to tap on to the private sector's capacity to innovate, invent and bring in efficiency. Greater involvement of the private sector in the delivery of services is another instrument as it enables higher levels of efficiency. However, there

are a few concerns that need to be addressed. These are defining the scope properly, dispute resolution mechanism at local level, designing of PPP Projects so that enough flexibility is available while ensuring 100% transparency and accountability, shortening the procurement cycle and due recognition to quality rather than going in for L-1 only.

48. Over the last few months, several professional agencies made presentations in the Ministry highlighting different aspects of what constitutes a smart city. Globally renowned consulting companies like McKinsey, KPMG, PWC, ILFS, Accenture etc., have presented a wide range of features that are the hallmark of a smart city. Leading experts like Dr Keshav Verma have also presented some of the important features of a smart city. Leading IT companies like Microsoft, IBM, CISCO, WIPRO, TCS, INFOSYS, Mahindra Tech have made presentations on the role that IT can play in developing smart cities.

49. Given the knowledge base that exists in such agencies, as well as others in the country, it would be important to involve them actively in the process of designing smart cities hand holding the city/ state government in coming up with visionary plans. It is therefore proposed to take advantage of this capability in a structured manner. Detailed guidelines for doing so will be developed.

Citizen participation

50. Citizen consultation and a transparent system by which citizens can rate different services is yet another instrument for improving performance. Making these ratings openly available for public scrutiny creates a powerful incentive for improved performance and a disincentive for poor performance.

51. A Smart city also communicates well with its people and enlists their support in everything it is doing. The culture of working in a closed environment needs to end as people are often the biggest support base for any initiative a city takes up, if they have been informed of the efforts and the reasons for the same. Social pressure on other citizens can often remove resistance and facilitate a greater degree of civic discipline.

52. For citizen friendly smart city and IT based platform will be created and involvement of social media will be maximum. A 24x7 call centre will be established at each ULB/Parastatal.

Smart Governance

53. The existing government setup in the ULBs/parastatal is rather fragmented with each department working in silos. The result of this is lack of coordination which is reflected in form of poor services to the citizens. Therefore, for cities to become smart, it is essential that the governance structure is also smart. Therefore, ULBs/parastatal would need to make effective use of ICTs in public administration to connect and coordinate between various departments. This combined with organizational change and new skills would improve public services and strengthen support to public. This will mean the ability to seek and obtain services in real time through online systems and with rigorous service level agreements with the service providers.

Identifying the Smart Cities

54. In order to modernize our cities and make them internationally competitive, the Government has decided to support the development of 100 Smart Cities in the country. In this context, one has to recognize the federal structure of the country as well. Moreover, it has been the experience world over that developing greenfield cities have seldom been successful. A city can grow on a sustainable basis only if there are opportunities for economic activity, entertainment, education, healthcare and a wide range of such services for residents. However, some new cities need to be developed in the Hills and Coastal areas. In view of these boundary conditions, satellite towns of cities with a 1 – 4 million population would seem to be appropriate. Besides, mid-sized cities would also make very good candidates. Given their economic activities potential some of smaller cities also need to be taken up.

55. Accordingly, it is proposed that 100 cities to be developed as Smart Cities may be chosen from amongst the following:

- One satellite city of each of the cities with a population of 4 million people or more (9 cities)
- Most of the cities in the population range of 1 – 4 million people(about 35 out of 44 cities)
- All State/UT Capitals, even if they have a population of less than one million (17 cities)
- Cities of tourist, religious and economic importance not included in above (10 cities)
- Cities in the 0.2 to 1.0 million population range (25 cities)

56. It will be ensured that a comprehensive lens is taken in identifying potential Smart Cities, taking into consideration economic growth, political framework, execution capability as well as positive externalities of clusters and urban agglomerations.

57. In the process of deciding upon the list ofSmart Cities, the state governments shall also be invited to share their views and suggestions. It would be ensured that adequate representation is given to all States and Union Territories in the final selection of cities.

Conditions Precedent

58. The selected cities will have to strive towards attaining specified benchmarks in a range of services as given in Annex - 3. In addition, they will need to undertake the following through a tripartite MoU between the Central Govt., State Govt., and the Urban Local Body:

- Have an existing master plan or one that is likely to be approved shortly and have such a validity of at least 10 years.
- Have digitized spatial and GIS maps
- Issue all clearances for projects in a collegiate manner using online processes and in a time bound manner
- Electronic/Online seeking and delivery of all Public Services.

- Transparent and time-bound procedure of granting free right of way for laying optic fibre networks, water supply lines, sewerage systems, draining systems and other utilities (Not more than 7 working days).
- Create an IT-based platform for effective communication with the citizens and keep them abreast of various activities and plans of the city.
- Adopt tariff structures that are affordable for the poor and yet enough to recover cost including Capital Expenditure. In doing so the State/Cities could use their own resources to bridge the gap between the revenue and expenses.
- Create Open Data Platforms that are regularly updated.
- Make all information and decisions taken available in the public domain
- Setup a regulatory body for all utility services such as water supply etc. so that a level playing field is made available to the private sector and tariffs are set in a manner that balances financial sustainability with quality.
- All project first will be offered to Private Sector (PPP etc) for implementation and O&M.

A more detailed list of conditions precedent is given at Annexure 4.

Financing Smart Cities

59. The High Power Expert Committee (HPEC) on Investment Estimates in urban infrastructure has assessed a Per Capita Investment Cost (PCIC) of Rs 43,386 for a 20 year period. Their estimates cover water supply, sewerage, sanitation and transportation related infrastructure. Using an average figure of 1.0 million people in each of the 100 smart cities, the total estimate of investment requirements for the services covered by HPEC comes to Rs7.0 lakh crores over 20 years (with an annual escalation of 10% from 2009-20 to 2014-15). This translates into an annual requirement of Rs 35,000 crores. However, it is expected that most of the infrastructure will be taken up either as complete private investment or through PPPs. The contributions from the Govt. of India and States/ULBs/parastatal will be largely by way of Viability Gap Support (VGF). The possible sources that they may like to explore for raising the required funds are given as Annex – 5.

60. To fully realize the potential of a Smart City, investments will also be required in smart but affordable housing, 24x7 electricity, integrated ICT services, education, cost-efficient health services, recreation and sports facilities in every neighbourhood, cultural facilities, public parks, botanical gardens etc. Cost-efficient efforts of the Ministry of Urban Development will thus be supplemented by other Ministries, such as Housing and Urban Poverty Alleviation, Health, Education, Power, Environment & Forests, ICT, Culture, Sports, Surface Transport etc.

61. Of the funds allocated to each Smart Cities by the Central Government, roughly 60% will be earmarked for investment in infrastructure and 10% for e-governance initiatives. The remaining funds will be in the form of equity contribution of the government in two integrated township projects (in partnership with a private developer), as well as one greenfield project and one redevelopment project.

62. In addition, it is expected that investments of Rs 5,000 crore may be required as an initial investment to be provided for proposed 100 smart cities to prepare Reference Frameworks based on Citizen Engagement, the City Development Plans based on GIS/Spatial Mapping, integrated ICT ecosystems, Master Plan to ensure successful implementation of the scheme. This would also include setting up of a PMU at the State and ULB level. Fragmented and project-based approach will not work as has been the experience in JnNURM. Proper planning and a holistic approach based on citizen engagement will be necessary.

63. In addition to the budgetary resources available with various levels of government, additional resources would need to be leveraged for the sector from both domestic and overseas investors. As an option to leverage such resources for the municipal sector, the Central government will explore the possibilities of establishing a Fund, which would blend grant funds from Central Government, borrowings from multi-lateral and bi-lateral agencies and bonds subscribed by national and state level land development agencies. Similarly, States and Cities may like to establish such Funds at their level also.

64. Other financing sources could include the Pooled Municipal Debt Obligation (PMDO) announced in the budget, Real Estate Infrastructure Trusts (REITS), Infrastructure debt funds (IDFs), tax-free municipal bonds, PPPs etc. Details of such possibilities are given at Annex – 6.

Operational Procedures

65. Detailed guidelines would be issued with regard to the preparation of proposals as well as the criteria to be used for the selection of the cities. However, the following steps are mandatorily required to be taken by the ULBs/parastatal:-

Citizen Reference Framework (CRF) – It is proposed that a Citizen Reference Framework be evolved through professional agencies. It is necessary that before a City Development Plan is prepared, a Citizen Reference Framework (CRF) is developed. CRF is basically a structured document which captures aspirations and expectation of residents/citizens of the town/city. It is very important that the development of city is in conformity with aspirations and expectations of residents/citizens. This, therefore, needs to be undertaken through a professional agency. The agency is expected to capture needs and feelings (including expectations and aspirations) of local people after intensive interaction with them through personal contacts, social media and other methods. Such agencies need to talk to housewives, students, artisans, traders, employees, entrepreneurs, senior citizens, NGOs, Government agencies, scientists, artists and opinion-makers etc. However, while capturing such aspirations and expectations, the main objectives of smart cities in employment generation and creation of economic activities need to remain in focus. The framework need be developed through wide consultation of citizens. The citizen engagement would involve focussed group discussions, seminars, workshops, *nukkad-nataks*, media interaction etc. MoUD would try to identify such agencies to take up work related to citizen engagement.

Smart City Development Plan (SCDP) – Cities would be expected to develop their Smart City Development Plans (SCDP) based on Citizen Reference Frameworks. The preparation of the SCDP would be based on the following:- (i) GIS mapping, (ii) Spatial mapping, (iii) ICT mapping, and (iv) Master Plan. It should also spell out the financial requirements of

the city and the sources of funding. Requirement of the City should be based on a Gap Analysis exercise which has to be done to meet the desired objectives. In addition, to Gap Analysis, SCDP is expected to take care of parameters like attracting young entrepreneurs, scientists, professionals, cost-efficient and fast urban mobility, city identity, encouragement to innovating thinking etc. An indicative list is given at Annexure -6.

Environmental Sustainability Plan (ESP) – Smart Cities are required to be environmentally sustainable. In this respect, it is expected that each of Smart City would prepare an environmental sustainability plan (ESP) which will outline the plan and actions for ensuring inter-alia adoption of energy efficient and green technologies and processes. It would also encourage change in behaviour to maintain and rejuvenate cleanliness, greenery, water-bodies etc. It is also proposed to get such ESPs audited by some credible agencies such as TERI.

It is envisaged that for all these three plans i.e. Citizen Reference Framework, Smart City Development Plan and Environmental Sustainability Plan, the GoI would not only provide financial resources but would also help State Governments/Urban Local Bodies by empanelling professional agencies centrally so that State Governments/ULBs/parastatal need not go through bidding processes at their individual levels. This will not only cut down the procurement cycle but also improve the quality of professional agencies. State Governments/ULBs/parastatal will be able to select one of the empanelled agencies of their choice for each of the aforementioned plans.

It may also be mentioned that each of these plans prepared by professional agencies will be appraised by regional hubs/agencies in consultation with the respective State Governments/ULBs/parastatal.

Once the Plans have been appraised, the ULBs/parastatal would be expected to get DPRs ready through their PMUs and consulting agencies. GoI would prepare a list of empanelled consulting agencies for the assistance of ULBs/parastatal. Each of the DPR has to be appraised by the PMU at the ULB level and thereafter DPRs would be required to be appraised/approved by the Regional Hubs/GoI through Empowered Committees.

Once DPRs have been duly approved, the ULBs/parastatal would be required to invite EOI bids and take a final decision. The bid management will be carred out through ULB level PMUs. Indicative roles of Central PMUs, ULB PMUs and that of Regional Hubs will be detailed out later. Similarly model concessionaire agreements for each of the sector i.e. Drinking Water, Power supply, Sewerage, Sold Waste Management, Metro, Elevated Road/Underpasses, Cyber Connectivity, Communication & Information Technology, Security shall be detailed out later.

66. The proposals received will be scrutinized by a Committee specially constituted for this purpose and supported by a multi-disciplinary PMU at the Central/Regional level. While regional level Hubs would undertake handholding of the cities and appraisal of the projects, the final sanctioning of the projects will be by an Empowered Committee of Experts including senior level officers at the Central Government/ State/ ULB, duly supported by a PMU at the national level. In addition the SCDPs and DPRs to be prepared thereafter would need to be vetted by professional agency like TERI, etc. on environment sustainability.

Nature and Extent of Central Government Support

67. Central Government's support will be in three forms:

Financial support

68. Huge investments will be needed. Current financial resources of the States and Cities do not permit this level of investment. Therefore, innovative methods of raising revenues will have to be developed by the States and Cities, taking into account some of the possibilities outlined earlier. These efforts will be supplemented by the Central Government through the Ministry of Urban Development and other Ministries responsible for different sectors, such as Health, Education, Power, Transport, IT, Communications, etc., by way of allocations specifically for the development of smart cities. The involvement of other ministries such as health, education, power, transport, IT, communications, housing, etc. is critical because all these services need to be available in a comprehensive and integrated manner. Fragmented enhancement of only some services will not prove adequately beneficial.

Policy support and legal backing

69. It is recognized that urban development is a state subject under the constitution of India. Yet the Central government plays an important supporting role in facilitating appropriate policies that provide a framework for urbanization. While we have a national urban transport policy framework, we don't have a national urban policy framework. It would be appropriate for the urban transport policy to also fall within the framework on a national "urbanization policy". Such a policy, which channels the growth of cities along a "Smart "trajectory, would be crucial for guiding the national government financial support to cities.

70. Existing legal frameworks and policies that regulate the urban sector need to be reviewed by the State and urban local bodies to see what changes, if any, are required. Few possible examples:

- The "Development Acts" need to insist on a public transport master plan to be part of a land use master plan and must have the same legal backing as the Master Plan itself.
- FAR norms need to be rationalized and made more granular rather than city wide, to allow very high densities to be interspersed with adequate green areas
- The existing Urban & Regional Development Plans Formulation and Implementation Guidelines (URDPFI) guidelines need to be updated to reflect the higher standards expected in a smart city
- The current standards for water supply, sewerage and drainage, etc. need to be reviewed to aim at higher standards
- Framework related to investment by the private sector need to be reviewed so that a higher level of private investment in urban infrastructure becomes possible.
- Framework for making changes in land use need to be reviewed and procedures simplified
- Building bye-laws need to be citizen friendly
- Laws for making land available for public purposes need to become more liberal

71. In this context the Government of India would be able to play a supporting role by developing model policy guidelines as well as model concession agreements.

Capacity Building

72. It is well recognized that the current capacity to take up such a large program is weak. It is also recognized that with the previous emphasis on rural development, a strong cadre of urban planners has not developed in the civil services. Developing 100 Smart Cities across the country will need a large number of professionally trained manpower and several decision support systems to be in place. Thus, there is a need for a large capacity building program that encompasses training, education, contextual research, knowledge exchange and a rich database. Investments in such a program will have a considerable multiplier effect and several times this amount can be easily saved if the capacity building program is meaningful and well implemented. A program of this nature benefits from economies of scale, as there will be a need to invest in designing programs, developing faculty, building databases as well as designing toolkits and decision support systems. Therefore, it would be advantageous if this is managed and coordinated by the Central Government instead of all States duplicating the effort. However, the role of the State Governments will remain important. Accordingly, the Ministry of Urban Development will take up a national program towards Capacity Building through (i) a Mother Institution which will be responsible for developing curriculum, standards, contacts and ensuring quality, (ii) Regional Institutions (5 to 8) which will ensure conduct of courses, adherence to standards, protocols etc. (iii) Training Institutions (about 50) which will be responsible for actual training and Capacity Building. It is envisaged that for Capacity Building no new institution would be created, rather existing institutions would be suitably strengthened. It is expected that each of the Training Institute would be able to impart skills & trainings to at least 100 personnel every year. The areas of training/capacity building would primarily be Town Planning, Urban Mobility, Sanitation (Technology Processes & Management), Water Supply, Power Supply, Finance and Accounting (including PPPs), Municipal Taxation and Revenues, Environmental Sustainability, ICT, Public Participation etc. This will cover both "leadership" level manpower and "technical" level manpower. It will also cover opportunities for knowledge

exchange and research that would support decision making in the Indian context. Relevant databases and toolkits will also be developed under this program. Efforts will also be towards developing a professional cadre of urban managers in the civil services.

73. About 5% of the total central allocation need to be allocated for capacity building. States will be expected to identify their manpower that needs to be trained and also set up a capacity building cell that would coordinate with the national program in ensuring that their personnel benefit from the national program. Support of leading institutions abroad and in India, such as the IITs, IIMs, the Indian School of Business, SPAs etc. will be sought. It is recognized that professions and technical organizations in the country will have to play an extremely important role in supporting the capacity building effort. They will have to be brought together in implementing a large capacity building programs in a coordinated manner.

Approval process

74. States would be required to submit proposals for approval of the respective satellite cities, cities of tourist and religious importance as well as cities in the 0.2 – 1.0 million population range, these proposals would be reviewed by a Committee that will be serviced by a regional multidisciplinary PMU and then approved by the Central Government, supported by the national PMU. A two stage approval process will be followed, as given below:

1. Stage 1 would invite cities and States to submit an Integrated Smart City Development Plan, based on the Smart City Reference Framework. Thereafter, cities would be sanctioned an initial amount for preparation of professional and comprehensive project reports.
2. Stage 2 will require the development of Project Reports which will be appraised by designated Project Management Units and finally approved by an empowered Committee.

75. To facilitate faster procurement of PMUs, a process to empanel capable agencies would be taken up. The list of empanelled consultants agencies will be communicated to

the State Governments who could take advantage of this list, if they want, in procuring their PMUs.

76. For effective and coordinated implementation, there would be an advisory committee at the Central and State levels with mission directors at both levels. Advisory committees and Project Management Units would provide the necessary support. An implementation framework is presented at Annex-7.

77. Evaluation & Monitoring : This work is expected to be taken up by a third party independent agency in consultation with Central PMU. It will design an MIS and submit its quarterly report to GoI and State Governments.

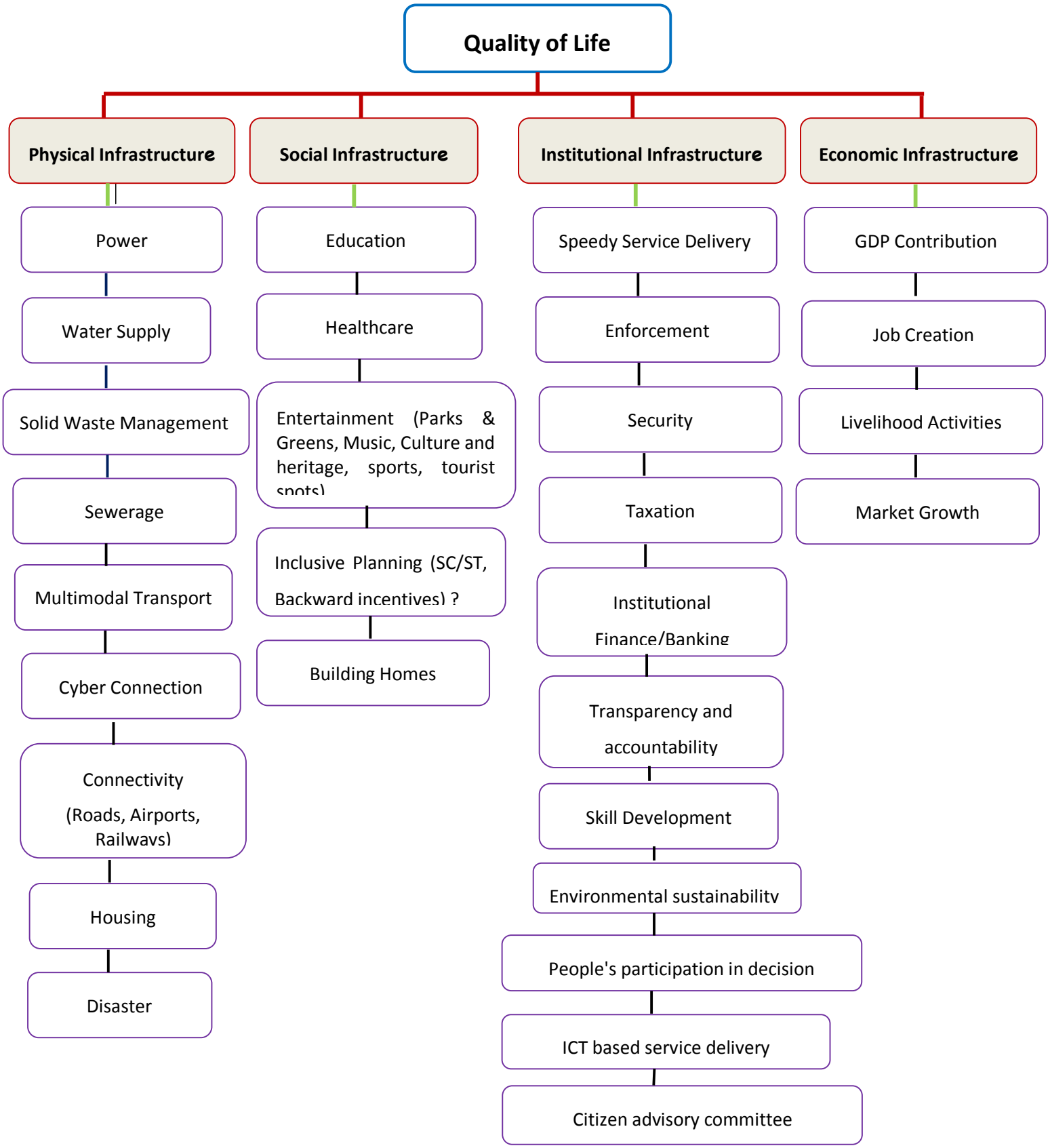
Annex - 1

Definitions for Smart Cities

- The UK Department of Business, Innovation and Skills considers smart cities a process rather than as a static outcome, in which increased citizen engagement, hard infrastructure, social capital and digital technologies make cities more liveable, resilient and better able to respond to challenges.
- The British Standards Institute defines it as "the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future of its citizens".
- IBM defines a smart city as "one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimize the use of limited resources".
- CISCO defines smart cities as those who adopt scalable solutions that take advantage of information and communications technology (ICT) it increase efficiencies, reduce costs and enhance the quality of life".
- Wikipedia defines a city as Smart when investments in human and social capital and traditional (Transport) and modern (ICT) communications infrastructure fuel sustainable economic development and a high quality of life, with a wise management of natural resources, through participatory action and engagement (Caragliu et al, 2009)
- Accenture defines it as "A Smart City delivers public and civic services to citizen and businesses in an integrated and resource efficient way while enabling innovative collaborations to improve quality of life and grow the local and national economy"

Annex- 2

Pillars of a Smart City



Annex – 3

Benchmarks for Smart Cities

Sl.No.	Parameter	Benchmark
A	**Transport**	• Maximum travel time of 30 minutes in small & medium size cities and 45 minutes in metropolitan areas • Continuous unobstructed footpath of minimum 2m wide on either side of all street with RoW 12m or more • Dedicated and physically segregated bicycle tracks with a width of 2mor more, one in each direction, should be provided on all streets with carriageway larger than 10m (not ROW) • High quality and high frequency mass transport within 800m(10-15 minute walking distance) of all residences in areas over 175persons / ha of built area • Access to para-transit within 300m walking distance.
B.	**Spatial Planning**	• 175 persons per Ha along transit corridors. • 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance. • 95% residences should have access to employment and public and institutional services by public transport or bicycle or walk • At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development Zone 800m from Transit Stations • At least 30% residential and 30% commercial/institutional in every TOD Zone within 800m of Transit Stations
C.	**Water Supply**	• 24 x 7 supply of water • 100% household with direct water supply connections • 135 litres of per capita supply of water • 100% metering of water connections • 100% efficiency in collection of water related charges

D.	**Sewerage & Sanitation**	• 100% households should have access to toilets • 100% schools should have separate toilets for girls • 100% households should be connected to the waste water network • 100% efficiency in the collection and treatment of waste water • 100% efficiency in the collection of sewerage network
E.	**Solid Waste Management**	• 100% households are covered by daily door-step collection system. • 100% collection of municipal solid waste • 100% segregation of waste at source, i.e. bio-degradable and non-degradable waste • 100% recycling of solid waste
F.	**Storm Water Drainage**	• 100% coverage of road network with storm water drainage network • Aggregate number of incidents of water logging reported in a Year = 0 • 100% rainwater harvesting
G.	**Electricity**	• 100% households have electricity connection • 24 x 7 supply of electricity • 100% metering of electricity supply • 100% recovery of cost • Tariff slabs that work towards minimizing waste
H.	**Telephone connections**	• 100% households have a telephone connection including mobile
I.	**Wi-Fi Connectivity**	• 100% of the city has Wi-Fi connectivity • 100 Mbps internet speed
J.	**Health Care Facilities**	• Availability of telemedicine facilities to 100% residents • 30 minutes emergency response time • 1 dispensary for every 15,000 residents • Nursing home, child, welfare and maternity, centre - 25 to 30 beds per lakh population • Intermediate Hospital (Category B) - 80 beds per lakh population • Intermediate Hospital (Category A) - 200 beds per lakh population • Multi-Speciality Hospital - 200 beds per lakh population • Speciality Hospital - 200 beds per lakh population • General Hospital - 500 beds per lakh population • 10020Family Welfare Centre for every 50,000 residents • 1 Diagnostic centre for every 50,000 residents

		• 1 Veterinary Hospital for every 5 lakh residents • 1 Dispensary for pet for every 1 lakh residents
K.	**Education**	
1.	Pre Primary to Secondary Education	• Area equivalent to 15% of residential area for building hospitals • 1 Pre Primary/ Nursery School for every 2,500 residents • 1 Primary School (class I to V) for every 5,000 residents • 1 Senior Secondary School (Cass VI to XII) for every 7,500 residents • 1 integrated school (Class I to XII) per lakh of population • 1 school for physically challenged for every 45,000 residents • 1 school for mentally challenged for 10 lakh population
2.	Higher Education	• 1 college per 1.25 lakh population • 1 university • 1 technical education centre per 10 lakh population • 1 engineering college per 10 lakh population • 1 medical college per 10 lakh population • 1 other professional college per 10 lakh population • 1 paramedical institute per 10 lakh population • 1 veterinary institute
L.	**Fire Fighting**	• 1 fire station per 2 lakh population / 5-7km radium • 1 sub – fire station with 3-4 km radius
M.	**Others**	• Use of renewable energy in all sectors • Rooftop solar panels on all public, institutional and commercial buildings as well as multi-storeyed residential housings • Adherence to green building norms • Common ducting for all services • Double entry accounting on real time basis • 3D maps on GIS of property and all services – power, water supply, sewerage etc. • Cities to formulate building and parking standards

Annex – 4

CONDITIONS PRECEDENT FOR SMART CITY DEVELOPMENT

1. **Commitment to Tripartite Agreement**

   ULBs/parastatal and State Governments enter into Tripartite Agreements with the MoUD to confirm commitment to comply with Terms & Conditions listed herein.

2. **Commitment to Enabling Mechanisms**
   a. Establishment of PMU
   b. Convergence between Departments and collegiate decision-making
   c. Fulfilment of Reforms
   d. Adoption of Flexible/Mixed Land Use
   e. Promotion of Public Transport and NMT as citizen's first choice using suitable incentives and disincentives for private vehicle ownership

3. **Commitment to e-Governance**
   a. Citizen's Charter
   b. All public services available online

4. **Financing Mechanisms**
   a. Own Sources
   b. Grants and VGF
   c. Private Sector (PPP)

5. **Notified Master Plan:**
   a. If the ULB has notified a Master Plan, it should conduct a Review within 12 months
   b. If the ULB does not have a Master Plan, it should prepare and notify the Plan within 18 months.

6. **Commitment to Financial Sustainability**
   a. Non-diversion of funds for Smart City Development to any other use
   b. Credit rating by an agency approved/empanelled by Government of India
   c. Willingness to avail of the Pooled Finance Mechanism
   d. Differential Tariffs for electricity and water supply based on levels of consumption

e. ULB to have minimum 10% financial stake in each project, which may be used exclusively to cover O&M of assets

a. Adoption of Land Pooling Policy notified by the State

b. Flexible FAR norms

7. Commitment to Environmental Sustainability

8. Commitment to Robust Disaster Management Strategies

Faced with threats of natural or human-made disasters, resilient smart cities have the capacity to resist, adapt and effectively recover from these effects. Urban resilience is closely linked to "dynamic notions of urban development and growth". An interdisciplinary approach to risk and disaster management, which involves different levels of State and civil society organisations, particularly those committed to this issue and those working on sustainable development and climate change, is required for a city to become resilient.

In recent years, unplanned, fast-paced urbanization and the destruction of local ecosystems have contributed to increasing risks of disasters in urban areas. The effects of climate change and the lack of political will on the part of many States to combat it have compounded this situation and have contributed to the increase in vulnerability of many regions across the globe.

In 2005, United Nations member States passed the Hyogo Framework for Action 2005-2015: The HFA seeks to significantly reduce the losses to lives, social, economic and environmental assets caused by disasters. The HFA highlights five priorities: a) Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation; b) Identify, assess and monitor disaster risks and enhance early warning; c) Use knowledge, innovation and education to build a culture of safety and resilience at all levels; d) Reduce the underlying risk factors through land-use planning, environmental, social and economic measures; and, e) Strengthen disaster preparedness for effective response at all levels".

9. Commitment to Capacity Building

Annex - 5

Financial Architecture for Smart Cities

(These are only suggestions for discussions and no final decision has been taken)

It is suggested that cities which desire to participate in the smart city programme develop a financing plan along with their smart city development plan and detailed project reports. The financing plan developed for a city/urban agglomeration could factor resources from multiple government agencies and departments not restricted to the ambit of urban development schemes alone such as the textile ministry's subventions for textile clusters, textile units in SEZs etc. Credit ratings could also be used by city managements as a dynamic managerial tool for assessing current level of borrowing capacity, along with other performance parameters including economic base, service levels and recovery of user charges and sustainability of proposed investments.

As part of the City Development Plan, the city may develop an investment and financing strategy and identify projects which are amenable to innovative financing such as accessing the bond market or structuring projects as PPP interventions for leveraging additional resources from the private sector. Other strategies for enhancing the resource pool available to cities include the following:

- User charges for utilities to reflect O&M and capital investment costs
- Land value based taxation:
    1. Sale or leveraging the land available with the ULBs/parastatal
    2. Betterment levy/ Higher FSI or FAR to take advantage of the increase in property prices on land serviced by new infrastructure such as roads, water etc. by imposing a surcharge on stamp duty on sales transaction, FSI, FAR, property taxes etc.
- More accounting transparency (double entry, accrual based accounting, balance sheets) to capture unencumbered cash resources.

In addition to the budgetary resources available with various levels of government, resources would need to be leveraged for the sector from both domestic and overseas investors.

As a first step for leveraging such resources for the municipal sector, the Central government may establish a Fund consultation with other ministries, multilateral, bilateral developing agencies and banks. This fund may blend grant funds from:

- CSS (Central Government allocation),
- borrowings from multi-lateral and bi-lateral agencies and
- Bonds subscribed by national and state level land development agencies (e.g. HUDA, PUDA, DDA etc.).

The pooling of monies from commercial and non-commercial sources would allow for reduction in borrowing cost and lengthening of tenor. The fund may provide VGF as well as provide credit guarantees to municipal bonds and term-loans in order to leverage debt resources from the financial markets.

Other financing sources could include:

- Pooled Municipal Debt Obligation (PMDO) facility: As per budget speech of the Finance Minister " *This facility was set up in 2006 with the participation of several Banks to promote and finance infrastructure projects in Urban Area on shared risk basis. Present corpus of the facility is Rs 5,000 Crore. The Government has a major focus of providing good infrastructure, including public transport, solid waste disposal, sewerage treatment and drinking water in the urban areas, in keeping with the Hon'ble Prime Minister's vision for urban areas it is proposed to enlarge it to Rs 50,000 crore with extension of the facility by five years to March 31, 2019*".
- Real Estate Investment Trusts (REITS): As per budget speech of the Finance Minister" *REITS has been successfully used as instruments for pooling of investment in several countries. I intend to provide incentives for REITS which will have pass through for the purpose of taxation……. These structures would reduce the pressure on the banking system while also making available fresh equity. I am confident these two instruments would attract long term finance from foreign and domestic sources including the NRIs*"

- Infrastructure debt funds (IDFs) which could be directed to invest in highly rated municipal bonds/green bonds by defining these as eligible investments. As IDFs are required to invest in post construction assets they could be used as a means to re-finance debt taken during the construction phase as well as additional monies for financing operations
- Encourage issuance of tax-free municipal bonds by creditworthy local governments to bring down the cost of borrowing
- Use PPPs where feasible in smart city projects to leverage private sector financing. To encourage PPPs in the urban sector provision for incentives could be explored however, these need to be discussed with the relevant ministries of the Government of India and concerned departments in the Central/ State Governments.

Annex - 6

Smart City Reference Framework

S.No.	Principles	Key Feature
1.	Attract Young Wealth Creators and others	Cities should setup incubators and certain new-investment areas to lure next generation. Facilities like affordable housing, cityscapes, social networks, rapid transport linkages, entertainment zones, etc. should be provided to attract the younger generation For example Gurgaon gave space to IT enabled services, BPO sector to flourish which led to the creation of new opportunities for younger generation with high salaries and incentives. This, coupled with urban development, including luxury and budget housing, commercial facilities, recreational facilities (sports complexes, gyms, swimming pools, etc.), world-class medical facilities, etc. created a magnetic force which attracted the younger generation from across the country. Similar initiatives were taken by cities like Pune, Bangalore.
2.	Constant Physical Renewal	People prefer to live in core areas or neighbourhoods, which are linked to the city centre by quick and easy public transport. These core areas give an identity to a city. It is therefore important that these areas should be made vibrant, with public spaces that encourage people to use it throughout the day. For example, they can be pedestrianized with authentic and environment friendly streetscapes which will also help in increasing the liveability index of the area. In India, the core city areas are the central business districts of the city. They are generally characterised by heritage buildings. But these areas often constitute of old, dilapidated housing, compact development with mixed land use, very poor linkages (both local & city-wide), and inadequate social & physical infrastructural facilities. Further, small and medium towns in India are generally mono-centric with the core city centre as the only nodal point of

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		the city which results into a heavy inflow of people towards the city centre. The inadequate infrastructural facilities are not able to bear the pressure imposed by the heavy movement of people and hence the condition of these areas deteriorates making the city centres unsuitable for living. It is therefore essential that to make a city attractive to the young generation and tourist, these core areas need to be redeveloped. For example, after the redevelopment of Connaught Place in Delhi, the area has regained its lost charm. People now like to visit the place, sit, walk, shop there. Similar initiative has been taken by Lucknow to redevelop its CBD, the Hazratganj.
3.	Unique and Strong City Identity	Each city should have strong and clear city identity that reflects the values, interests, skills of its residents such that they resonate with those they aim to attract. For example. Business cities, industrial townships, heritage cities, religious centres, IT city, etc. Providing a city with a certain identity, just for the sake of it, doesn't work. Taking the example of a business city – it should be such that the local laws help entrepreneurs in setting up of new businesses, and at the same time support existing businesses to flourish. In India, cities generally have a very strong identity attached to it. But due to a number of factors, these cities lose their vibrant nature or significance, or potential to attract people with similar interests. Haridwar, Rishikesh are two very important religious towns of India, but their condition is deteriorating rapidly. Local linkages within the city is very poor, the city lacks basic infrastructural facilities like proper sewerage, solid waste management systems, etc. Tourist cities like Agra lack linkages to and amongst various tourist sites. On the other hand, we have Udaipur, the City of Lakes. All the five lakes of the city are being preserved and cleaned regularly. The city has also redeveloped the lake palaces and developed them as centre of tourist attraction.
4.	Connected to other Cities	Cities should have good regional connectivity. This not only saves time, but helps businesses grow. This encourages

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		exports and imports of both goods and labour. This can be done via building high speed trains, airport for enhancing the regional connectivity of cities. For example. The Rapid rail transit system has been proposed to connect various NCR towns with Delhi. Similarly, big cities like Mumbai, Kolkata already have sub-urban rail transit system in place.
5.	Inculcate innovative/ out of box thinking	City culture should be such that it encourages formation and fermentation of new ideas. This can be done by building institutions which supports world class infrastructure to help in promoting research in a certain field. In India, infrastructure to promote the local skill should be emphasized upon. For example. Local arts, craft, etc. should be promoted and similar institutions and industries should be setup in order to generate employment for the locals like developing the art of silk weavers in Varanasi, Chikan workers in Lucknow, Katha work of the Gujaratis, Madhubani painting in Bihar via building up of some institution for its training or industry for its promotion and export to the world.
6.	Investors	City must be able to attract investments and funds from private players. Municipal or urban local bodies should be able to generate funds for various infrastructural projects. This can be done in a number of ways like land value capture mechanism, generating funds through advertisement on public property, and through various taxation policies, etc. In India, cities are trying to implement various types of projects on PPP like city bus service in Bhopal & Indore, construction of roads in Delhi, Bangalore, etc. Cities are also innovating new financing mechanisms like advertisement on buses, at bus stops; Transfer of Development Rights, etc.
7.	Have Strong Political and Administrative Leaders	Strong political will is the key to creating substantial changes in any city. The leader should be such who works in collaboration with the residents of the city, investors, developers, etc. He should be inflexible about changes to the future vision of the city but extremely flexible about the steps to be adopted to reach there. Often such leaders may not have the required professional

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		experience. Therefore, eminent professional personalities could be thought of as advisors and mentors who would guide the leadership in developing their cities.

Annex – 7

Implementation Framework