



# ICCCs – nerve centres of city governance

**Synapses for proactive crisis monitoring and city management**

<https://home.kpmg/in/covid-19>

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Synapses from the nerve centre	Distributed ICCCs at state and city levels	In conclusion	How can KPMG in India help?
Step 1	City-level initiatives	Step 2	Step 3

## Synapses from the nerve centre

1/3

**Integrated command and control centres (ICCCs) are key to monitoring and managing cities and not just in times of crises**

### Urban India disproportionately affected by the crisis

City monitoring and management takes up a new paradigm when municipal governments have to respond to uncertain unpredictable times. COVID-19 is one such example, the effect of which is still rippling out and impacting life as usual, making city governing bodies take up agile measures to not

only control but also manage the outbreak. This directly affects urban economies on a multilateral level, including social and economic conditions.

The scale of the problem facing urban municipal bodies in India is considerable. City officials face the daunting task of tracking and

containing the virus, managing the pressures on the public health system as well as meeting the increased demand for essential goods and services. The often competing objectives of saving lives and livelihoods have to be balanced.



### What is the role of smart cities?

The rise of smart cities in India has offered greater flexibility and resilience in the response to crisis situation. Integrated command and control centres, created for mainly surveillance and monitoring of citywide operations, overnight became the nerve centres for COVID-19 monitoring and control operations. Similarly, in some of the cities the existing smart solutions were enhanced to contain and monitor COVID-19 situation. It is important to note here though that reactive steps

to retrofit an existing capability in the face of a crisis may only result in short-term gains without the possibility of scale. A reexamination of priorities and requirements along with a complete redesign of the smart solutions is a more effective way to ensure desired objectives are met. This would not only require some additional functionalities but also changes in the technical and functional architecture of smart solutions implementation in cities.

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## Synapses from the nerve centre

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### How can ICCCs help?

The role of ICCCs in monitoring and managing urban activity and associated challenges needs to be assessed.

- What is the extent to which the ICCCs have been helpful?
- What are the areas that could have been addressed with smarter technological integrations in these centres?
- Are a handful of ICCCs within smart cities adequate? Can their reach be extended to neighbouring areas in times of exigencies to aid and support government initiatives?

How can technology be better leveraged to frame an effective response to a crisis situation like COVID-19? Can ICCCs be a platform for economic growth?

#### GIS-based COVID-19 platform

- Track and geofence suspected cases
- GIS-based dashboarding and analytics.



#### Drone-based monitoring

- Crowd detection
- Crowd management
- Surveillance.



#### COVID-19 dashboards

- Showcasing the key indicators of COVID-19 cases, hospital beds available, demand, supply gaps etc.



#### Call centre for citizen grievances

- Grievance handling
- Issuance of passes for essential vehicles.



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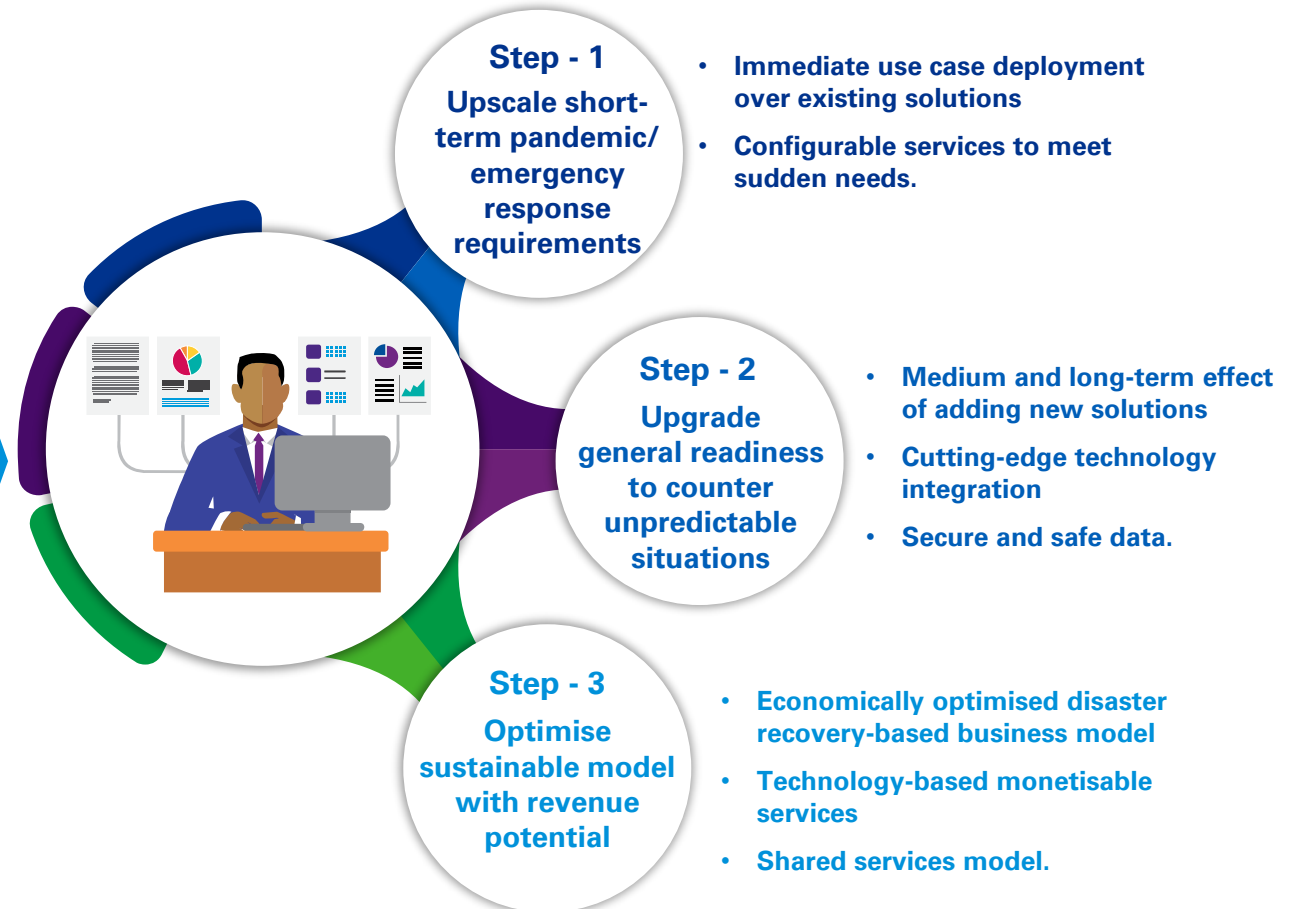
## Synapses from the nerve centre

3/3

**Integrated command and control centres (ICCCs) are key to monitoring and managing cities and not just in times of crises**

ICCCs play an important role in building 'connected cities' by helping to pool data and services for citizen needs alongside improving efficiencies in governance. They must operate with an optimised model to support city functioning. The following three steps will allow them to perform efficiently.







The learnings from the COVID-19 crisis are bound to bring about a shift in the role of technology solutions implemented in cities. Smart cities are likely to focus on enhancing the role of ICCCs for better analysis and greater data sharing in the event of similar outbreaks in the future. ICCCs hone the capabilities of government to provide a centralised, informed response to adverse stimuli in city environments.



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## Step 1: upscale for immediate response requirements

Cities can leverage existing infrastructure to configure special services. By upscaling current solutions, the timing of initial and immediate response can be shortened.

Solutions	Enterprise GIS solution 	Video surveillance 	ICCC platform and analytics 	Citizen web portal and mobile app 	Smart mobility solutions 	Intelligent traffic management 
<b>Present coverage</b>	<ul style="list-style-type: none"> <li>City-level GIS base map</li> <li>GIS analytics engine</li> <li>Data of properties, underground utilities, commercial establishments</li> <li>Route optimisation</li> <li>Geofencing</li> <li>Zoning of cities</li> <li>Heat maps.</li> </ul>	<ul style="list-style-type: none"> <li>Video surveillance along with analytics such as facial recognition, suspect search, crowd management, chain snatching etc.</li> </ul>	<ul style="list-style-type: none"> <li>Integrated platform with all the subsystems covered under smart cities/Urban Local Bodies</li> <li>Onpremise data centre with video wall and collaboration platform.</li> </ul>	<ul style="list-style-type: none"> <li>Provides digital solution for basic citizen services and citizen grievances</li> <li>Citizen services covered bill payments, death/birth certificates, establishment certificates</li> <li>City-related information.</li> </ul>	<ul style="list-style-type: none"> <li>Real-time public transport and waste-management vehicle data</li> <li>Covers solid-waste-management police vehicles, hospital vans</li> <li>Biometric (fingerprint)-based authentication</li> <li>Route optimisation</li> <li>Citizen mobile app</li> <li>Bin sensors.</li> </ul>	<ul style="list-style-type: none"> <li>Uses real-time data from traffic sensors and cameras to prevent congestion</li> <li>Identifies traffic violations like red violation, speed violation, no helmet/seat belt, wrong-side parking etc.</li> <li>Integrated with e-challan system</li> </ul>
<b>Crisis/pandemic-related additional requirements</b>	<ul style="list-style-type: none"> <li>Geospatial analytics such as social-distancing scorecards</li> <li>Under most smart cities, the GIS survey does not cover all the elements of the supply chain of essential elements like warehouses, essential goods inventory, disaster management assets etc.</li> </ul>	<ul style="list-style-type: none"> <li>Analytics such as no mask detection, crowd detection</li> <li>Temperature-sensing and body-worn cameras</li> <li>Coverage of cameras</li> <li>Intercity integration at least within state boundaries i.e. person of interest can easily travel from one territory to another without getting noticed</li> <li>Integration with cameras installed at residential societies, ATMs and commercial establishmentcrow</li> </ul>	<ul style="list-style-type: none"> <li>Inbuilt AI-based correlation and analytics for decision-making</li> <li>Integration with health systems/hospitals/educational institutions</li> <li>Data of commercial establishments</li> </ul>	<ul style="list-style-type: none"> <li>Chat bots for citizen grievances</li> <li>Supply chain-related applications</li> <li>Permit/e-pass during lockdowns</li> <li>Modules related to identifications of volunteers</li> <li>Hawker management system</li> <li>Modules for temporary housing allocation for evacuated citizens, supply and ration distribution.</li> </ul>	<ul style="list-style-type: none"> <li>Route optimisation for supply chain related vehicles</li> <li>Facial recognition feature</li> <li>Protocols/systems related to management of biomedical waste</li> <li>Tracking of vehicles used for supply chain of essential goods.</li> </ul>	<ul style="list-style-type: none"> <li>Address of vehicle registered under city/district to be mapped</li> <li>Addresses of citizens entering from different cities/district for commercial purposes to be mapped so that violators can be identified</li> <li>Analytics for overloaded vehicles/no entry etc., needs to be enhanced</li> <li>Road closures/alerts for emergency situations.</li> </ul>

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## City-level initiatives adopted to upscale during COVID-19

### Hit the road running – making use of existing ICCC infrastructure

#### Chandigarh

- Installation of 'fight COVID-19 station' with facilities for thermal screening by taking temperature, pedestal-operated hand-wash and soap dispenser, mist spray of sodium hypochlorite solution and hand-drying facility.

#### Gujarat

- **Gandhinagar** – video conference set up for health team (expert doctors) to suggest initial steps/precautions to home quarantine or COVID-19 suspected patients.  
Distribution of the contact details of grocery stores for all sectors of Gandhinagar through Gandhinagar Municipal Corporation's website
- **Vadodara** – helium balloon attached camera for surveillance of lockdown violators with public address functionality.

#### Maharashtra

- **Nagpur** – COVID-19 application launched for citizens and monitoring by NMC doctors in case of suspected symptoms
- **Kalyan-Dombivli** – creating awareness and keeping citizens informed about COVID-19 using social media for awareness videos.

#### Karnataka

- **Mangaluru** – dedicated call centre set up at ICCC with professionals from Mangaluru City Corporation, police and doctors available for monitoring as well as offering advice to citizens under self quarantine.
- **Bengaluru** – COVID-19 war room set up with state data dashboard to report real-time data such as people under quarantine with their contacts, availability of medical personnel, hospitals all across city and taluka.

#### Andhra Pradesh

- **Kakinada** – COVID-19 data dashboard developed in Kakinada ICCC for monitoring of city, district and state-level information
- **Tirupati** – groceries and other essentials are being home delivered through the command centre.

#### Uttar Pradesh

- **Kanpur** – telemedicine is being offered through a video-conferencing facility launched by the city administration for citizens by calling 8429525801
- **Varanasi** – medical services through video conferencing by doctors
- **Agra** – tele-video consultation facility through mobile app (E-Doctor) and home delivery of medicines.
- **Aligarh** – doctors deployed at ICCCs to offer telemedicine through video conferencing.

#### Tamil Nadu

- **Chennai** – doctors engaged in ICCC to guide 250 quarantine people each and refer to the necessary medicines
- **Vellore** – Using telehealth118 suspected cases mapped with individual health experts for closer monitoring and support.

#### Madhya Pradesh

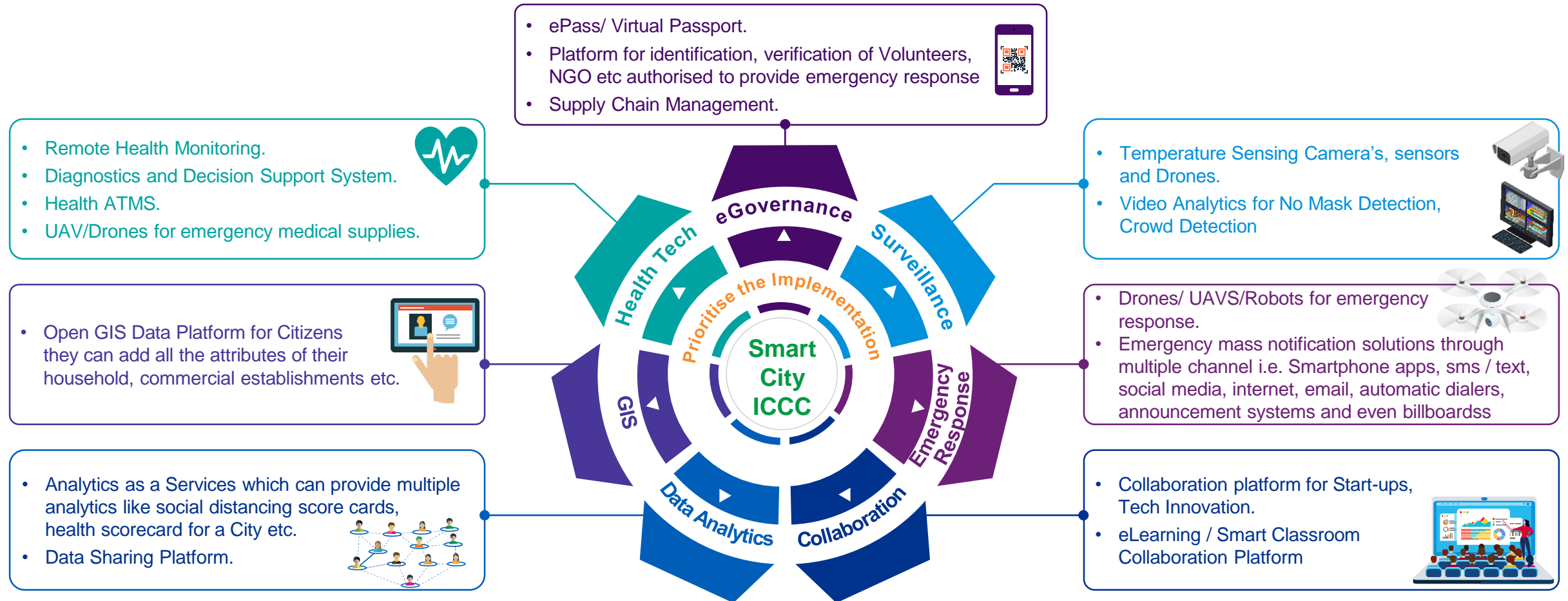
- **Bhopal** – dedicated helpline and tele counselling centre for citizens at ICCC integrated with toll free numbers. Medical officers stationed at ICCC round-the-clock to advise on incoming calls
- **Indore** – medical officers stationed at ICCC round-the-clock to advise on incoming calls, media cell, health officials and food supplies management and coordination station at ICCC to monitor and deliver citizen services
- **Ujjain** – mobile medical units (MMU) operationalised to distribute medicines to people based on prescriptions by doctors. Doctors stationed round-the-clock to advise on video conferencing/telephone
- **Jabalpur** – dedicated rapid response team (RRT) and mobile action unit (MAU) present to support team at ICCC. ICCC used to monitor quarantined citizens, passengers from abroad and tackle general queries
- **Gwalior** – setup of counselling helpdesk trained professionals and designated doctors to resolve the queries raised by citizens
- **Satna and Sagar** – remote consultations by doctors stationed at ICCC through video conferencing/telephone calls.

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## Step 2: upgrade to new solution requirements

1/2

Cities need to realise and utilise the potential of upcoming technology to create a robust functioning environment to counter unpredictable situations



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## Step 2: upgrade to new solution requirements

2/2

**Cities need to realise and utilise the potential of upcoming technology to create a robust functioning environment to counter unpredictable situations**

Emergency response systems need to be an essential part of city monitoring and management as they help create resilience within a city, both in its regular functioning and in response to exigencies. Technology plays an important part in helping deliver city infrastructure and related services.

Location-based services provide real-time discovery. Supported by faster and higher computing prowess, multiple types of data can be crunched to arrive at decision-taking KPIs. Unmanned surveillance through drones in pandemic/disaster-sensitive areas provide real-time situation analysis.

Collaboration tools support further data sharing and platforms to engage multiple services and support groups such as volunteers, NGOs, aid agencies, medical staff and police.

Virtual simulation or 'digital twinning' through a GIS-enabled solution can help

forecast and mitigate risks allowing authorities to assess the impact of their decisions. The age of technology will also necessitate the importance and deployment of cybersecurity measures to ensure safety and privacy of the data collected.



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## Step 3: optimise

### Reimagining solutions to create a sustainable model

**e-pass/virtual passport, Platform for identification, verification of volunteers, NGOs etc. authorised to provide emergency response, supply chain management.**

Cities have to invest in disruptive methods for solutions to manage services in every scenario: peak loads, silent hours and crisis situations. ICCCs and smart deployment is an obvious answer to this problem.

The first step would be to **share cost and resources** by creating a common or shared ICCC in active-passive mode. Some steps have been taken in this regard by Madhya Pradesh, Tamil Nadu and Karnataka. States need to create a new integrated model across cities by putting together a cluster of cities with shared resources on the cloud.

Second, these models can be tweaked to exist from a capex **heavy model to an opex or hybrid** model This will ensure efficiency in fund allocation and support in future-proofing investments

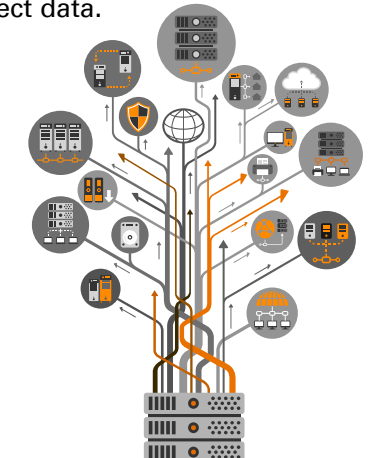
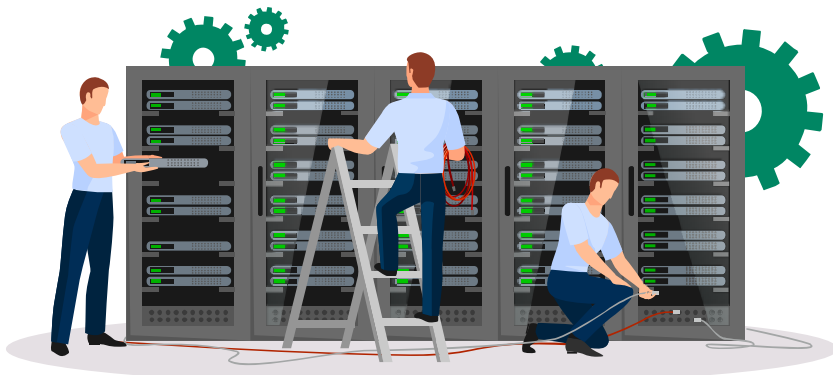
Third, because smart cities generate enormous amounts of data from sensors and devices, like surveillance and traffic cameras, storing and analysing this data typically requires real-time significant computing capacity. The use of **cloud technologies and platforms as a service (PaaS)** or software could not only lower the

entry barrier but also ensure speedy deployment. The biggest advantage would be the ability to pay on a variable usage basis. The need to deploy new and more sensors shall rise and cities must build capacity for millions of such devices and sensors.

Fourth, there must be an impetus for **open source frameworks and scalable architecture**, wherein the city/state can own the source code allowing reuse and replication in local clusters with similar needs.

It may be pertinent to mention that the data volume of smart cities and the number of use cases for AI-based analytics is expected to increase substantially, which necessitates the requirement of inexpensive and cloud-based solutions. **Analytics as a service (AaaS)** can build visualisations, perform ad hoc analysis and quickly aid in uncovering insights.

Moreover, security needs should be heightened with stronger measures to protect data.



## Distributed ICCCs at state and city levels

1/2

### Use case to optimise cost and sharing of resources

#### ICT infrastructure

#### State level

#### City level

**ICCC, collaboration and analytics**



The ICCC platform shall be installed at the state level on private cloud/on-premises. This ICCC shall collect data from sensors installed all around the state and display the reports and provide a summary dashboard. It shall be used for connecting the entire state ICCC personnel and run analytics for faster and easier decision-making. Same tool can be used for citizens' help and support (chat, phone etc.)

City-level ICCC will display data related to the particular city only and will not have access to data of other cities. It shall use centralised collaboration solutions to connect with other city ICCCs and to provide helpdesk support. A dedicated ICCC or dashboard can be considered at the city level. Only city-level ICCCs shall view the report.

**ICCC hardware/ viewing centres**



The required hardware for computing, storage, cybersecurity devices etc. will be installed at state-level private cloud/on-premises DC. Minimal hardware will be available at the viewing centre for its operations. Viewing centres will have a videowall, workstations and IP phones for day-to-day activities.

City-level ICCCs will have compute and storage hardware for video data. Viewing centres will have a videowall, workstations and IP phones for day-to-day activities. And also local helpdesk will be available.

**Enterprise GIS platforms**



GIS applications shall be centrally installed at state-level private cloud/on-premises DC. This application shall have the details (MAP, property details, portal etc.) for the complete state.

At the city level, access shall be provided for details of the city and shall not have access to other city databases. Field activities such as property and utility tagging shall be done at the city level and shared with the state DC.

## Distributed ICCCs at state and city levels

2/2

### Use case to optimise cost and sharing of resources

#### ICT infrastructure

#### State level

#### City level

**E-governance, DMS, e-office, citizen portals and mobile apps**



A common e-governance platform, including DMS, e-office, citizen portals and mobile applications shall be created/developed for the state. Each city shall be provided access only for its data/application/module. All the data collected, applications, databases, portals and apps will be hosted on state-level private cloud/on-premises DC. Reports and dashboards of the state will be available at the state-level ICCC.

Each city will be provided access to its respective portion of applications, portals and mobile applications. If any specific module for the city is required, the same will be created and hosted on state-level private cloud/on-premises DC. Reports and dashboards of a city will be available at the city ICCC.

**Camera sensors VMS and video analytics**



Only field-level sensor data shall be available in the state-level ICCC. Camera feed shall be available only on demand (to reduce the bandwidth and computation required at private cloud/state DC). Video analytics will be done at the city level and only the reports will be available at the state level. The state-level ICCC shall access video feeds of any camera in any city when required.

Cameras and field sensors will be installed and managed at the city level. Only the sensor data will be sent to the state-level ICCC. VMS and video analytics applications will be installed in the city-level server room. And the storage required for the same shall also be deployed in the server room.

**City traffic and mobility solutions**



The application required to manage the traffic of the complete state will be installed on the state-level private cloud/on-premises DC. Each city will be given access to manage the ATCS system deployed in their respective city. For state ICCCs, ATCS of the complete state can be managed.

City-level ICCCs shall be responsible for managing the field infrastructure, including field devices (signals, LPU, switches etc.) and field connectivity. Each city will have access to the ATCS solution of its city only.

**Telehealth EMR, HER and e-medicines**



The application for telehealth and medicines will be centrally installed at the state level. Only access to respective infrastructure will be provided to each city. Reports can be generated for the complete state.

City-level ICCCs will have application access to their respective city. They can generate the report only for that city.

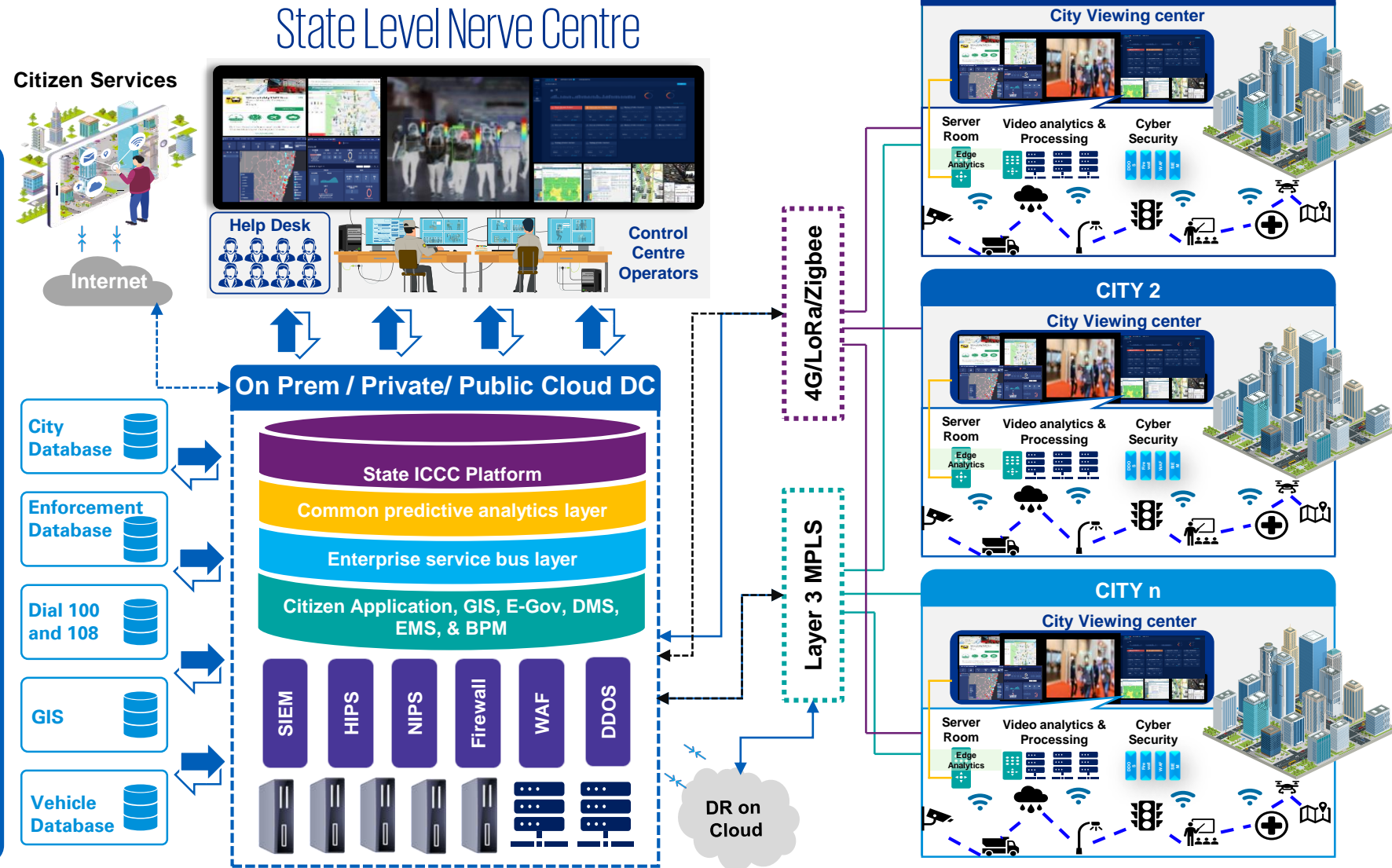
## In conclusion

### The how - for the what

Having determined the 'what' (the needs in emergencies or disasters), the question arises on 'how' do we achieve the objective of a resilient future, ready to react to any eventuality.

An ICCC works as the nerve centre to connect various city management solutions and supports them to work in tandem. In order to build a forward-looking, reliable and fungible smart solution system, the following steps could be considered.

- Assess existing solutions in ICCC for gaps and upgrade existing solutions to support new use cases
- Identify crisis-handling solutions focussing on citizens' well-being like health, supply chain, support for unmanned virtual presence in affected areas
- Utilisation of simulation-based software to assess the threat and mitigation options
- Develop a distributed architecture of ICCC capabilities by clubbing multiple cities and their resources
- Improve economic viability of supporting cutting-edge technology by developing a PaaS-based architecture.



## In conclusion

### The how - for the what

To keep pace with the demands of 'smartness' and be able to make the initiatives an economic success requires a pooling of resources. An optimal model is to develop a mesh of interacting ICCCs across a cluster of cities with the following advantages.

- Standardisation of operating processes and protocols
- Commonality in data collection aiding in comparable statistics
- 'By design' offsite DR supporting decision-making and actionable support from a centralised location
- Resource and skill reutilisation across cities
- Stronger measures for control and reuse of learnings from clubbed cities.

Any preparedness may not always be sufficient for any calamity and hence there is a need to have a flexible, distributed structure that can scale to include new services and use cases. Economic viability to sustain the addons or crisis management can come from shared responsibility and collaboration.



## How can KPMG in India help?

KPMG in India recognises that cities are under considerable strain due to the outbreak of COVID-19. The presence of ICCCs has greatly supported the monitoring and controlling of situations from a central location. We understand the dynamics of smart city operations across all models of cities along with associated competencies built or under progress and are well positioned to provide immediate support for various models.

01

**Immediate operational, and technology challenges:** gap analysis and use case identification in existing implementation.



02

**Business continuity planning:** conduct business continuity and scenario planning across people, process, funds and technology layers.



03

**Financial planning:** leverage lessons learned and design new revenue-generation and monetisation opportunities for existing and new ICT infrastructure, consolidation and planning system support.



04

**Technology and network infrastructure enhancements:** develop a technology and network infrastructure enhancement roadmap. SOP for distributed architecture of ICCC Implementation and change management.



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