WHITEPAPER: DEVELOPING A DATA-DRIVEN APPROACH

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Authored by
Zaheb Ahmad and Karthikeyan Kuppu

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For More Information

Executive Summary

The growing use of digitally driven technologies and applications in cities is transforming urban management and creating new risks and challenges for city authorities. Cities seeking to move towards urban digitalization can seize this potential for evidence-based decision-making if they can deal effectively with multiple challenges presented in the adoption and use of digitally driven technologies.

To ensure a successful and responsible adoption of the data-driven approach in Panaji, the following considerations are critical:

- **Technical capacities:** How can technical capacities be developed within government departments to support urban digital transformation in Panaji?
- **Consolidated institutional efforts:** How can Panaji develop strategies to consolidate efforts by multiple actors, and leverage inter-departmental collaborations to comprehensively tackle its complex urban issues?
- **Regulatory safeguards:** In many cases, legal and regulatory frameworks have not yet caught up to the real-world effects of data and technology. How can we push ourselves to higher standards to safeguard both Panaji and its residents?
- **Social inequities and the limits of technology:** Who are the least powerful actors in any situation, and how are they affected by technology solutions? What perspectives are missing, and how can we include a diversity of thought to ensure that a wide range of approaches are included in understanding the limits of technological solutions and their outcomes for citizens?
- **Meaningful urban data innovation:** For new ideas to be relevant to Panaji, and have the best possible chance of succeeding – and for everyone to benefit from those new ideas and projects – how can city authorities and solution providers work in synergy?

Key barriers and challenges in Panaji include reliance on older approaches and tools for data collection and management; lack of technical capacities in government departments to switch to digitally driven technologies; siloed efforts among departments; the need to map and understand the relevance of urban digital solutions for residents across a range of socio-economic backgrounds; the absence of a city data policy; and a strategy to incentivize digital innovation in the city.

Recommendations for Panaji

- Panaji needs to formulate and adopt a city data policy to clearly establish uniform terms for data collection, ownership and use and put to rest concerns around data security and privacy.

- Development of technical capacities among government departments in Panaji is critical for the adoption of a data-driven approach.

- To foster a culture of data ground-up, government departments in Panaji need to liaison frequently and systematically – leading to the creation of common city-level data assets.

- The implementation of digital solutions in Panaji, especially those directly catering to residents, must be informed by a research process that focuses on understanding barriers and challenges that residents from diverse socio-economic backgrounds, age groups and gender are likely to face.

- The city could establish a data innovation hub or a sandbox to test the efficacy and relevance of digitally-driven technology solutions on a small scale before such solutions are adopted more widely in the city. In the long run, exposure to such arrangements could help government departments strengthen in-house capacities for data-driven governance and planning.

Abbreviations

IoT	Internet of Things
GIS	Geographic Information System
RFID	Radio Frequency Identification
MoHUA	Ministry of Housing and Urban Affairs
SCM	Smart Cities Mission
ODP	Open Data Portal
IUDX	India Urban Data Exchange
GMIS	Geospatial Management Information System
PULL	Project Urban Living Lab
NUIS	National Urban Innovation Stack
NDSAP	National Data Sharing and Accessibility Policy
CKAN	Comprehensive Knowledge Archive System
API	Application Programming Interface
SDFE	Danish Agency for Data Supply and Efficiency
GDPR	General Data Protection Regulation
GTFS	General Transit Feed Specification

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BACKGROUND
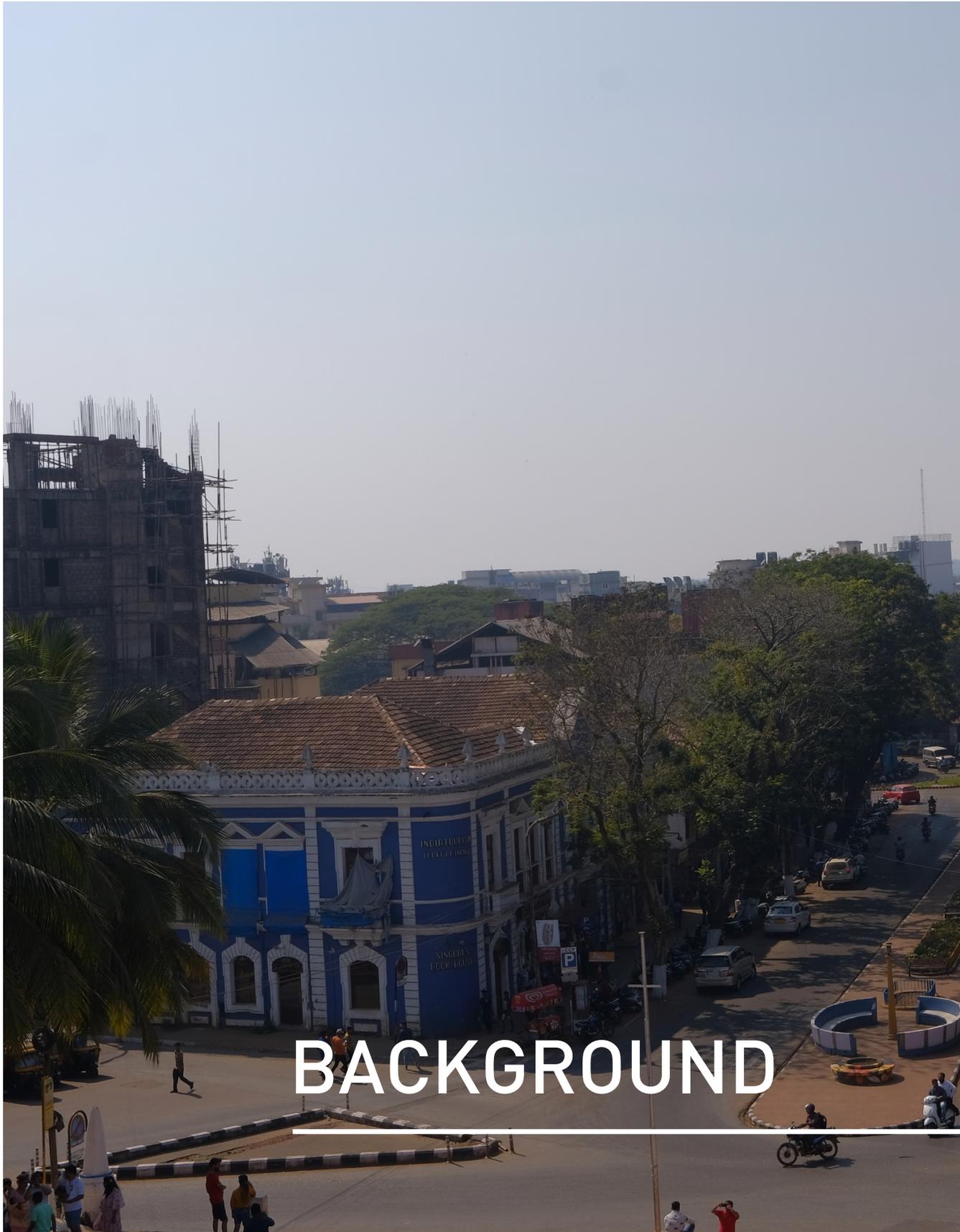
Introduction

Rapid development of new digitally driven technologies and applications - the Internet of Things (IoT), purpose-built sensors, GIS systems, RFID tags, smart meters, 5G internet and AI-based predictive solutions and analytics have opened up new possibilities for managing services and addressing challenges in cities.

The convergence of these new technologies in urban contexts has fuelled the idea of the 'real-time city' – where conditions can be monitored and reacted to instantaneously.[1] Michael Batty describes this phenomenon as city planning in a new guise – that is, thinking of cities as being plannable in some sense over minutes, hours and days, rather than years, decades or generations – based on the increasing availability of data on several aspects of urban life. [2]

While the idea of a 'real-time city' privileges the deployment of urban technology solutions, the approach fundamentally hinges on producing and processing data on various aspects of urban life. Therefore, mechanisms to collect, manage, archive and share urban data are seen as critical for the delivery and monitoring of public services in the city, and for informational insights which could allow for longer-term interventions. In recent years, this understanding has been termed as the data-driven approach.[3]

One of the most common examples of the use of data-driven approach in cities today relates to movement of vehicles around a transportation network, where information from a network of cameras and sensors are fed back to a central control hub to monitor the flow of traffic, adjust traffic light sequences and speed limits, and to automatically administer penalties for traffic violations.[4] Other emerging uses-cases include the collection of data on environmental conditions from a sensor network distributed throughout the city which measure air and water quality, noise levels, temperature, rainfall and tree cover health, and innovative solutions such as the Copenhagen Wheel, which transforms ordinary bicycles into mobile sensing units to map pollution levels, traffic congestion, and road conditions.[5]

One of the obvious features of new urban technologies is the fact that they produce massive streams of digital data. There has never been anything equivalent to this in the urban sphere, and cities using new urban technology solutions are just beginning to grasp the possibilities and challenges presented by the availability of a variety of digital data - the ways in which it

can be coded to generate meaningful attributes in space and time, new inferences that can be drawn by combining multiple datasets, its use in predictive planning; and on the flipside – inadequacy of current data legislations, ambiguous data ownership between public bodies and private enterprises, lack of technical capacities to support urban digital transformations, issues of representational validity in datasets, and cybersecurity and privacy implications of data leaks, among others.

The challenges and opportunities inherent in data-driven planning and governance in urban contexts necessitate the development of robust and responsible data strategies, practices and policies in cities, so that city authorities can derive meaningful value from the use of digital technologies while keeping potential risks and harms at bay.

The Ministry of Housing and Urban Affairs (MoHUA), through a series of policy documents and programmes, has laid out the contours for a data-driven approach for planning and governance of Indian cities. It launched the Smart Cities Mission (SCM) in 2015, selecting 100 cities over 5 rounds, to drive economic growth and improve the quality of life of citizens by enabling local area development and harnessing technology to lead to smart outcomes.

In a bid to address barriers and challenges in adopting a data-driven approach, the MoHUA has created an evolving policy framework, the DataSmart Cities strategy.[6] The framework seeks to support the goals of the SCM at the city-level by driving the adoption of a data-driven approach through the formulation of city-level policies, enhancement of technical capacities, and implementation of processes around data collection, management and use. In 2019, an Open Data Platform (ODP) was launched by the MoHUA to serve as a single-point of access to datasets in open format published by the 100 Indian smart cities, so as to enable innovation with open data sets.

In 2021, the National Urban Digital Mission was launched to create a data ecosystem for cities. It includes the India Urban Data Exchange (IUDX) - to enable management of city data on a national-scale and serve as a marketplace for cities and businesses; the SmartCode Platform - a repository of open-source codes for cities; and the Geospatial Management Information System (GMIS) which enables cities to map and monitor projects.[7] As of late 2021, the IUDX has deployed operational data exchanges in 10 Indian cities and is poised to enter the it next phase where the platform will be the core digital infrastructure of 25 more smart cities.[8] Additionally, an open-source National Urban Governance Platform (NUGP) is being created to host key urban services such as: water and sewerage, birth and death registration, citizens' grievance

redressal, online building permits, NOC, property tax, trade license, municipal accounting, and miscellaneous user fees.[9] The NUGP seeks to leverage digital opportunities for sustained improvement in efficiency and effectiveness of delivery of municipal service to citizens.

In line with the government initiatives for the digitalization of smart cities, the whitepaper seeks to provide guidance for the adoption of a robust and responsible data-driven planning & governance approach in Panaji. The whitepaper draws from the Project Urban Living Lab's (PULL) activities in Panaji to identify and highlight some of the key challenges and barriers for the adoption of a data-driven approach in Panaji. PULL's activities relevant to this whitepaper include a pilot for a bus-tracking system, safety audit of Panaji's street and road network, planning for pedestrianization and cycling, and data collection for the development of a rejuvenation plan for the St. Inez creek, and an urban flood mitigation plan for Panaji. The whitepaper also highlights how data-driven approaches have been successfully adopted in other contexts – with the objective of learning and drawing inspiration from such efforts. Lastly, the whitepaper provides a set a recommendation for Panaji, to help the city responsibly implement a data-driven approach by focusing on multiple elements that will shape its digital transformation trajectory. These include: technical capacities; institutional efforts; city-level regulations; understanding the social determinants technology use; and formal mechanisms to enable urban data innovation.

A FRAMEWORK
FOR URBAN
DIGITAL
TRANFORMATION
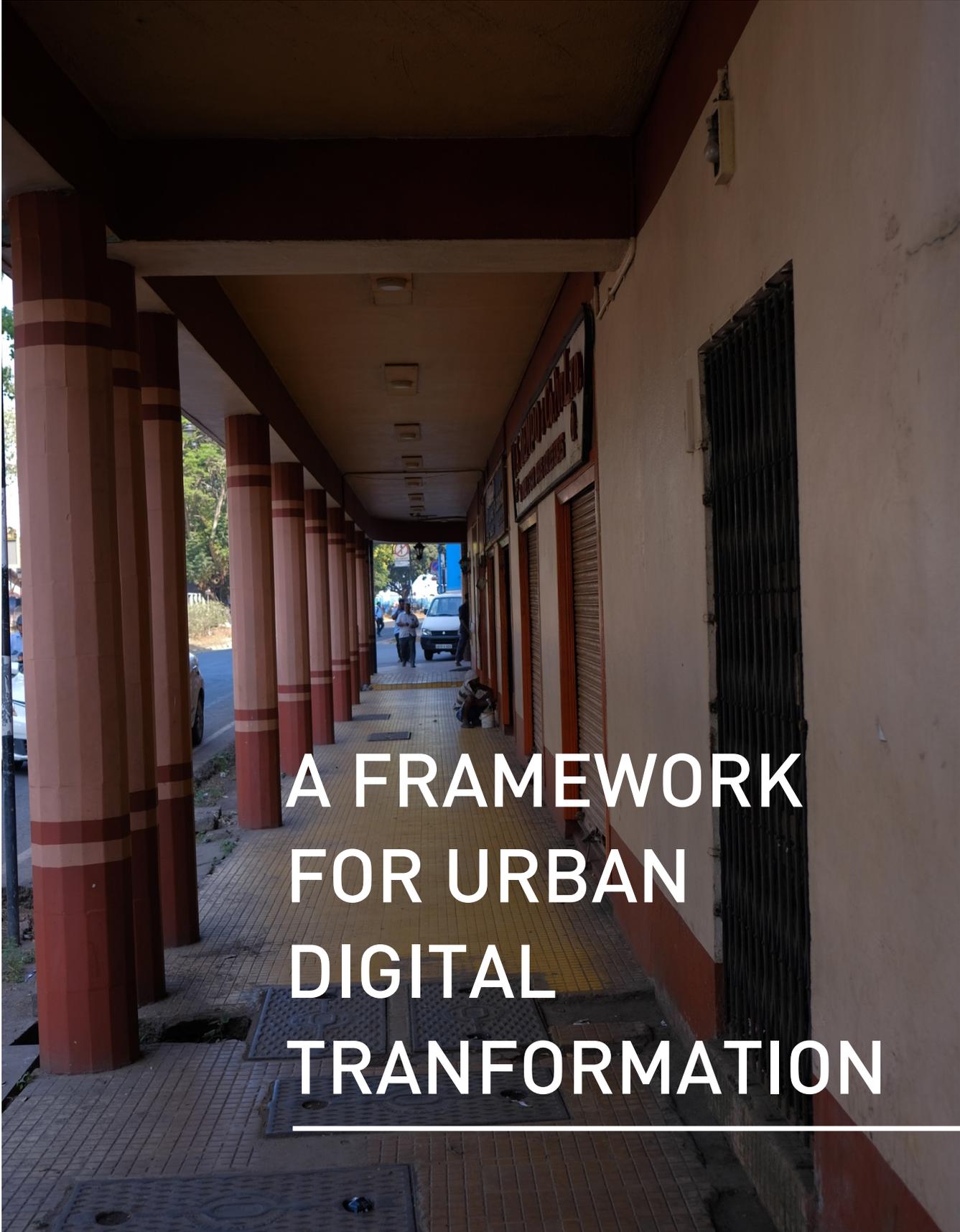
# Five considerations for successful and responsible use of data in Panaji

The data-driven economy is unfolding at a pace that outstrips the development of experience-based policy and experimentation with alternative regulatory models to address risks including data security, commodification, and data leaks. Polar opposite models that are in play are the e-Estonia model with its tight controls on use and storage of data, and the cloud model promoted by the US internet giants in the Trans-Pacific Partnership negotiations, which demands the free flow of data across borders and proscribes data localization.[10]

Further, simply relying on data without qualitatively understanding how people and existing systems interact with new technologies, and how well the needs and interests of socio-economically diverse populations are represented in datasets, can obscure real problems that citizens face. Recent data projects using remote analysis of geocoded mobile data from lower income countries have echoed this issue. For instance, in developing a public transportation optimization model for Abidjan, limited access to representative data about a highly diverse public transport system in the city arguably made the optimization model invalid for up to 90 percent of the city's transport users.[11]

The ultimate goal of evidence-informed city cultures is to improve the lives of city residents. As cities use data to inform decision-making, they can better determine the needs of their residents, be more inclusive of resident feedback, and more comprehensively tackle complex issues. It is, therefore, critical that the adoption of a data-based approach in Panaji is shaped by sound principles of responsible data use, and a tailored approach is developed drawing from best practices across multiple geographies. As the main actor responsible for mediating social objectives and digital transformations in Indian cities, the government has a fundamental role to play in enabling and regulating the data-driven approach in Panaji.

To ensure a successful and responsible adoption of the data-driven approach in Panaji, the following considerations are critical:

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- **Consolidated institutional efforts**: How can Panaji develop strategies to consolidate efforts by multiple actors, and leverage inter-departmental collaborations to comprehensively tackle its complex urban issues?

- **Regulatory safeguards**: In many cases, legal and regulatory frameworks have not yet caught up to the real-world effects of data and technology. How can we push ourselves to higher standards to safeguard both Panaji and its residents?

- **Social inequities and the limits of technology**: Who are the least powerful actors in any situation, and how are they affected by technology solutions? What perspectives are missing, and how can we include a diversity of thought to ensure that a wide range of approaches are included in understanding the limits of technological solutions and their outcomes for citizens?

- **Meaningful urban data innovation**: For new ideas to be relevant to Panaji, and have the best possible chance of succeeding – and for everyone to benefit from those new ideas and projects – how can city authorities and solution providers work in synergy?

BARRIERS
AND
CHALLENGES

Barriers and Challenges

The following challenges and barriers have been identified based on a review of pan-India issues associated with urban digital transformations, and an analysis of PULL's activities in Panaji. Pan-India narratives on the issues associated with urban digital transformations provide a general context of the state of urban digitalization in the country, and are followed by Panaji-specific findings. PULL has focused on both pan-India and Panaji-specific issues since the resolution of some of the challenges requires action at the national-level in addition to city-led efforts. Global learnings, detailed at the end of each challenge, is meant to provide a new perspective on ways that similar challenges have been dealt with elsewhere.

1. Lack of technical capacities and non-adoption of good data practices could impede progress towards urban digital transformations

The government has created urban data sharing platforms such as the Open Data Portal (ODP) and the India Urban Data Exchange (IUDX) on top of the National Urban Innovation Stack (NUIS) – the core digital infrastructure for cities. The National Data Sharing and Accessibility Policy (NDSAP) has prescribed data cataloguing standards as well as open data standards for urban data. While these initiatives are crucial to facilitate digital transformations in Indian cities, additional capacities and efforts are needed to implement and support the government's vision. The lack of a culture of data and awareness around data use have specifically been identified as fundamental challenges to adopting a data-driven approach by the Ministry of Housing and Urban Affairs.[12] Consolidated efforts to develop a culture of open data are needed across multiple government agencies across scales and domains. Additionally, government agencies and departments need to proactively revamp older tools and solutions, and develop technical capacities to support digital transformations in cities.

A significantly large number of datasets obtained from government departments in Panaji were in non-digitized formats. Many digital datasets, particularly GIS maps and satellite-based imagery, could not be relied upon since they had not been verified through ground-truthing exercises. Non-templatization of data i.e. uniform formats in which data points are to be recorded and organized, impact the quality of several datasets available within government departments.

Global Learnings

Due to the Danish government's strategy of enabling actors at the municipal and regional levels to innovate and test non-conventional solutions and approaches (e.g. Free Municipality/ Frikommuner experiments) public sector organizations have been able to establish informal networks between municipalities, citizens, knowledge institutions and solution providers. This has led to better capacities for the uptake of new technologies and approaches by public sector organizations in Denmark.

Aarhus, Denmark's second largest city, was the first to open its data to the public in 2010. Soon after, Copenhagen also followed. In 2016, Aarhus and Copenhagen decided to share their experience with open data with other cities in Denmark, and created a shared open data portal for all municipalities. Today, more than half of all Danish municipalities share data on the same open data platform – Opendata.dk. The platform enables users to navigate data across municipalities by topic or choose data from individual municipalities. One of the major benefits of the platform is that the municipalities use the same standards for data cataloguing which makes it easier to combine data from different sources. Opendata.dk use the open-source data management system CKAN (the Comprehensive Knowledge Archive Network), which is also partly used by the national data portals. CKAN makes data accessible and usable – by providing tools to streamline publishing, sharing, finding and using data (including storage of data and provision of robust data APIs). Besides Denmark, some of the countries using CKAN include the United States, Canada, Switzerland, Australia and Singapore.

For the past 15 years, different ministries in Denmark have also been providing free open data. Some of these include:
- Data Distribution Platform (data on streets, buildings, company information, maps and more)
- Geodata (topography, addresses, area information)
- Environmental data
- Energy data

2. Consolidated institutional efforts are needed to drive urban digital transformations

The fragmented governance of cities reduces scales of economy and produces interjurisdictional incompatibilities that limit spatial intelligence, foster back-to-back planning and stifle the benefits of information sharing.[13] For example, research conducted in Mumbai, Delhi, Kolkata and Bengaluru suggests that land-use and transport planning are often conducted as separate exercises, leading to new development without transport, and transport infrastructure that fails to further cities' long-term visions.[14] A successful data-driven approach rests on collaboration and the creation of multi-layered data from which new insights can be drawn for city management. Going forward, discrete institutional efforts are needed to address the siloization among departments created by past governance approaches.

The city of Panaji does not have a central repository for the archival and management of data. Due to this, collecting data about a single issue, for example the St Inez creek, involved interactions with multiple government departments that are responsible for different aspects of creek. While over the years several departments have carried out projects, studies and data collection in relation to the St Inez creek, synergies between multiple government efforts have still not been tapped into. Inter-departmental exchange of knowledge on what data has been collected and available, and what are the data gaps that need to be addressed is lacking – suggesting lack of coordination between multiple stakeholders involved in the governance of the creek.

> ## Global Learnings
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> In Denmark, efforts for the adoption of the data-driven approach have been led by a dedicated government agency. The Danish Agency for Data Supply and Efficiency (SDFE) is in charge of collecting, managing and making available geographic and administrative public-sector data to Danish decision-makers, businesses and citizens, with three corresponding goals: providing a sound basis for decision-making, improving public-sector efficiency and facilitating economic growth. The SDFE plays a major role in ensuring quality, availability, and coordination of data coming from a range of different sources across public sector organizations.

3. Lack of regulations clarity could hamper urban digital initiatives

The absence of pan-India legislations governing the collection, management and use of data present barriers for the implementation of the government's vision around data-driven planning and governance of Indian cities.[15] Further, the contentious manner in which data has either been collected or proposed to be collected, used and shared in smart cities in other geographies, amplifies the privacy challenges it faces due to the lack of sufficient legal safeguards around data protection. Research conducted in contexts where the deployment and use of urban technologies is at a relatively advanced stage suggests that data capture and commodification practices by private enterprises for economic gains is a recurring issue.[16] The Information Technology Act, the relevant legislation in India to govern the use of data, is not adequately equipped to address the barrage of potential challenges the smart city offers. It is for this reason that the Personal Data Protection Bill introduced in Parliament in late 2019, and a Non-Personal Data legislation which is currently being formulated, are seen as safeguards for data protection. However, in the absence of enacted legislation to regulate data, government-led efforts for urban digital transformations while protecting citizens from personal harms are currently seen as being inadequate.

In Panaji, the lack of a city-level data policy clearly establishing frameworks for data ownership and usage, allows service providers to negotiate the terms of service agreements to their benefit. This includes the ability to assign rights and benefits arising from agreements to third parties, and neutral provisions around data ownership - implying that there is no understanding between the city and the service provider around who owns critical data about the city and its residents. PULL's activities for a technology-based safety audit of Panaji's streets is a case on point. In the absence of a national data protection law, Panaji needs to ensure that concerns around data protection are addressed at the city-level.

Global Learnings

Similar to other countries in Europe, Denmark has passed legislation designed to supplement the requirements of the EU General Data Protection Regulation (GDPR), which came into force on 25 May 2018. In Denmark, the main regulation concerning processing of personal data is the GDPR and the Danish supplementary act, the Data Protection Act, which came into force on 23 May 2018. In addition to the rules of the GDPR, the Data Protection Act and national practice implements certain derogations concerning the processing of personal data. Based on the legislation, the Data Protection Agency is the primary enforcement agency with regards to data protection and privacy in Denmark, while the Danish Business Authority has been tasked with managing security issues and security breaches in the telecommunications and internet sector, which would presumably concern data-generating technologies in urban contexts.

4. The limits of technology, and its implications for socio-economically diverse populations needs to be assessed

Technology is not a panacea for all problems. Rather, the social system within which technology solutions are deployed needs to be understood better to inform its design and policies around its use. Due to vast socio-economic disparities prevailing in India, access to technology has a highly skewed distribution among the Indian population. Estimates for 2021 peg the smartphone adoption rate in India at 50-60 percent,[17] and internet penetration at 45 percent.[18] The large digital divide in India, particularly for women and marginalized groups, could mean that their needs are not adequately incorporated into data-driven planning decisions, consequently leading to skewed focus, both on people, and the areas that they inhabit in cities.

Findings from PULL's technology-driven safety audit of Panaji suggests that the audit provides an assessment of areas based on several parameters including lighting, visibility, openness, gender usage and security, but it does not factor in perspectives across different demographics around the issues of safety, inclusivity and accessibility. Due to this, the audit provides a high-level safety assessment of the areas - enabling city authorities to identify areas where infrastructural interventions are needed to improve women's safety. The audit, however, does not consider conditions of walk-paths, what areas along roads are lit up by street lights or other sources, why certain areas are less crowded on particular days, or whether women pedestrians in Panaji perceive relatively male dominated spaces negatively. This points to a degree of inherent bias in the method through which safety scores have been generated for Panaji - necessitating the need for qualitative analysis through surveys and interviews in tandem with the technology-based safety audit.

Global Learnings

The city of Columbus in Ohio, United States - recipient of a $40 million grant by the U.S. Department of Transportation for developing a smart transportation system, has a modest plan to improve mobility. Instead of deploying new technology solutions, it is focused on deploying solutions that address the city's needs. The city has prioritized making transportation more accessible for all. For this, a unified payment card has been introduced since some residents lacked access to bank accounts and credit cards, a streamlined app was developed that unifies every transportation system in the city, and Wi-Fi access was improved in marginalized neighbourhoods. In its approach, Columbus demonstrates two attributes key to the responsible use of technologies in cities. First, cities need to have a clear policy agenda before deploying technology solutions, and second, a research process that focuses on barriers and challenges people face in availing civic services which then informs decisions on the deployment of technology solutions.

5. Lack of formal mechanisms for urban data innovation could stall the adoption of a data-driven approach

The adoption of data-driven approach in Indian cities requires partnerships and collaborations with knowledge institutions, research groups and the private sector. With inadequate technical capacities and bandwidth for data and technology solutions among public sector organizations in India, there is a need for other actors to step in to fill this gap. These partnerships could add-value to data available on government portals such as the MoHUA's Open Data Portal (ODP), turn the focus from privately collected data to government datasets, and help mainstream the adoption of data-driven approach among cities.

Data innovation in Panaji demands a combination of knowledge on urban systems and data science, requiring collaborations between government stakeholders – familiar with the city's context – and private sector innovators. While Panaji does not have a strategy for data innovation, the PULL has developed a framework for testing and refining solutions through pilots - in collaboration with knowledge institutions and private sector service providers. Additionally, the PULL team has worked to identify datasets available within departments in the context of the PULL's activities across water body management, urban flooding and mobility, and has helped the city develop data pilots in a short span of time. However, such an approach needs to be formalized and continued in the long run. The city also needs to establish rules for non-commercial engagement with the private sector and develop regulations to support pilots in order to encourage private sector innovators to work closely with city authorities.

Global Learnings

When data was made publicly available in Denmark it quickly resulted in new start-ups, who used their GIS and data skills to add value to open datasets and develop products and services to catalyze the uptake of data-driven approaches among municipalities and the private sector.

SCALGO developed digital tools and analysis about the terrain based on open datasets. They have developed an interactive tool SCALGO Live, where they map flooding risk, and these are updated when new data is made available. They used the data topography data and other geodata sets. Their services are used by municipalities, engineering consultants, landscape architects and national environmental authorities.

Septima provides advice and services on effective use of data, with special focus on property and geographical data. They are specialized in the Grunddataprogrammet (basic data program from the SDFE) and have deep knowledge about how the different data registers are connected. The provide a range of services to Danish municipalities and private sector organizations.
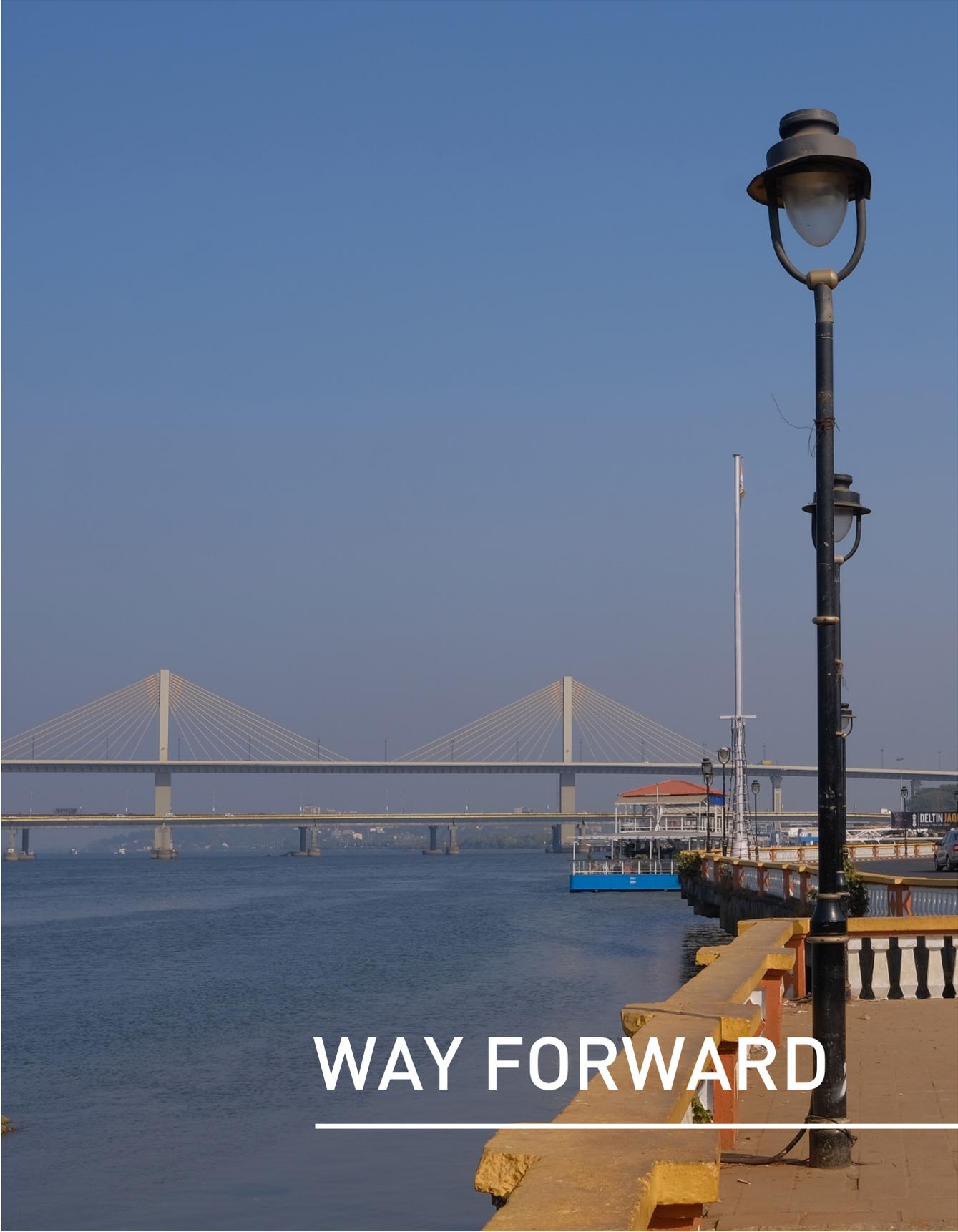
WAY FORWARD

Recommendations for Panaji

1. City-level policies and regulations for data governance

Due to the fact that data is a key resource for decision-making, a city-level framework for the governance of data is critically needed in Panaji. While there's a growing trend among private technology providers to collect and use data for operations and solution development, cities often do not exercise control over this data. Data collected in cities could be a key resource for decision-making by government stakeholders. At times it may also contain sensitive information which could threaten the safety of the city, or personal information which warrants protection under privacy rights. The city could formulate and adopt a city data policy to clearly establish uniform terms for data collection, ownership and use in its dealings with private sector enterprises, and put to rest concerns around data security and privacy. A city data policy would also lend weight to Panaji's efforts in adopting a data-driven approach and provide legislative clarity to government departments to institute efforts towards the approach.

Recommended Actions

1.1 Budget allocation for data initiatives
1.2 Formulation and adoption of a city data policy

2. Development of technical capacities among government departments

While ushering in a data-driven approach in Panaji requires government departments to not only replace legacy approaches with newer tools and solutions for the collection, organization, analysis and visualization of data, efforts to strengthen in-house capacities to be able to work with those tools and solutions are equally needed. Government stakeholders could benefit by developing relevant expertise for the digitization of paper-based data, the adoption of universal data standards such as General Transit Feed

Specification (GTFS) for transportation data, the use of standard templates for data collection across multiple departments, ensuring that the frequency of data collection does not result in obsolete datasets, and verifying digital datasets, such as GIS maps and other technology based audits and surveys, through ground-truthing exercises. These efforts could lead to more meaningful engagement with private sector solution-providers, and enable government stakeholders to comprehensively drive the choice, design and deployment of data-driven solutions in Panaji.

Recommended Actions

2.1 Appointment of key officials/ data managers within departments with defined roles and responsibilities for overseeing department-specific data collection, management and analysis

2.2 Capacity development workshops for appointed officials, data managers and support staff

3. Interdepartmental collaborations and creation of city-level data assets

To foster a culture of data ground-up, government departments in Panaji need to liaison and systematically share available datasets with each other. As a first step, data managers within departments can carry out exercises to identify and collate existing data. Data from different departments could then be housed in a municipal data repository, and updated by the departmental data managers periodically. The municipal database could enable departments to expeditiously identify and use existing datasets; creation of data manager roles within departments could facilitate inter-departmental exchange of information, and enable collaborations for projects that cut across the mandates of multiple departments. Lastly, the inter-departmental collaborations and the municipal data repository could promote an open data approach in Panaji, and draw interest from private sector innovators to draw new insights from multiple datasets and develop solutions that truly address Panaji's challenges.

4. Qualitative assessment of the social determinants of technological solutions

The implementation of technology solutions in Panaji, especially those directly catering to residents, must be informed by a research process that focuses on anticipating the barriers and challenges that residents from diverse socio-economic backgrounds, age groups and gender are likely to face. The city could conduct on-ground surveys and studies to assess needs and understand perspectives around its specific challenges, and identify the limitations of potential solutions and their underlying assumptions in the context of Panaji. These insights could help the city reframe its challenges – ensuring that technology solutions that are both technically and socially relevant to Panaji are adopted.

5. Formal mechanism for urban data innovation

The city could establish a sandbox in partnership with research and knowledge institutions to test the efficacy and relevance of digitally-driven technology solutions on a

small scale before such solutions are adopted more widely in the city. With backing and support from city authorities, private sector solution providers and data analysts could make use of Panaji's municipal data repository to fine-tune existing solutions, identify data gaps, generate new insights by combining multiple datasets, and identify new approaches for the city to inch closer to a data-driven approach. In the long run, exposure to such an arrangement could help government departments in strengthening in-house capacities for data-driven governance and planning.

Recommended Actions

5.1 Establishing a Digital Solutions Sandbox with regulatory support and access to the city data repository

5.2 Development of data use-cases for Panaji

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