

## TC Document

### I. Basic Information for TC

▪ Country/Region:	BRAZIL
▪ TC Name:	Leverage the use of Big Data solutions for Brazilian Smart Cities
▪ TC Number:	BR-T1496
▪ Team Leader/Members:	Bouskela, Mauricio Simon (CSD/HUD) Team Leader; Zambrano-Barragan, Patricio Xavier (CSD/HUD) Alternate Team Leader; Alves, Dalve Alexandre Soria (CSD/HUD); Arcia, Diego Andres (CSD/HUD); Avila, Francy Dianela (CSD/HUD); Chona, Gilberto E. (CSD/HUD); De Freitas Severino, Ligia (CSC/CDR); Espinoza Colmenares, Luis Manuel (KIC/KLD); Goette, Gabriel Hernan (ITE/ITO); Guzman Osorio, Jessica (CSD/HUD); Hennessey, Michael P. (IFD/CTI); Kim, Kidae (CSD/HUD); Muenste Kunigami, Arturo (IFD/ICS); Piedrafita, Carolina Marcela (CSD/HUD); Richter Elias, Alessandra (CSD/HUD); Roberto Madera (CSD/HUD); Silva Casseb, Marcia Maria (CSD/HUD); Pérez, Silvia (CSD/HUD); Tribouillard, Clementine Claire Dominique (CSD/HUD); Valente Lins, Paula (CSC/CDR); Vazquez Brust, Hector Antonio (CSD/HUD); Verissimo Da Silva, Carolina (LEG/SGO); Villota Coral, Maria Alejandra (CSD/HUD); Zapparoli Zetina, Carmen Isabelle (CSD/HUD)
▪ Taxonomy:	Client Support
▪ Operation Supported by the TC:	Non-Applicable
▪ Date of TC Abstract authorization:	02 Sep 2021
▪ Beneficiary:	Municipalities of Recife, São Luis, and Vitória in Brazil <sup>1</sup>
▪ Executing Agency and contact name:	Inter-American Development Bank
▪ Donors providing funding:	Multidonor Trust Fund for the Development of Sustainable Cities in Latin America and the Caribbean(CIT)
▪ IDB Funding Requested:	US\$200,000.00
▪ Local counterpart funding, if any:	US\$0
▪ Disbursement period (which includes Execution period):	24 months
▪ Required start date:	January 2022
▪ Types of consultants:	(i) Individual consultants; and (ii) Consulting firms
▪ Prepared by Unit:	CSD/HUD-Housing & Urban Development
▪ Unit of Disbursement Responsibility:	CSD/HUD-Housing & Urban Development
▪ TC included in Country Strategy (y/n):	No
▪ TC included in CPD (y/n):	No
▪ Alignment to the Second Update to the Institutional Strategy (UIS) 2020-2023:	Social inclusion and equality; Productivity and innovation

<sup>1</sup> The selection of any additional municipality – considering available resources - will be based on similar criteria established in 2.9 and dependent the receipt of respective request letters.

## II. Objectives and Justification of the TC

- 2.1 The Latin America and Caribbean region (LAC) are undergoing an urbanization and digitalization transformation. The LAC cities' challenge is to harness the benefits from the "Fourth Industrial Revolution"<sup>2</sup> which can improve the quality of life for populations and address governance issues related to the usage of digital technologies and data regulatory practices. A 2018 McKinsey report on the effect of smart technologies found that cities can use them to improve critical quality-of-life indicators in areas like healthcare, mobility, security, and utilities by 10 to 30 percent.<sup>3</sup>
- 2.2 The rise of innovative technologies resulting from technological, institutional, social media, and business innovations brings an exponential increase in data flows that present exciting possibilities and new challenges for urban development. Data is the primary resource that powers our era's digital transformation and is crucial in constructing smart cities. Massive data collection has a potential market value and will impact economies and development practices. Data gains real value through new knowledge acquired by data analytics using data mining, machine learning, artificial intelligence, or another statistical method.<sup>4</sup>
- 2.3 In the context of rapid urbanization and digitalization, LAC smart cities generate critical data useful for resource management, knowledge generation, civic participation, urban planning, and policymaking, among others. As in the rest of LAC, Big Data plays an essential role in constructing Brazilian smart cities. The democratic generation, analysis, dissemination, and use of data processes and tools, are crucial to address current and future urban challenges, define public policies based on evidence and ensure the transition of cities to become more accessible, inclusive, and smarter.<sup>5</sup>
- 2.4 **Problem.** Despite the enthusiasm for adopting digital technological solutions with a massive generation of data, there is still a lack of knowledge and experiences for data driven decision making for improving governance, urban planning, and service provision in most cities. The institutional setup that can help Brazilian cities use technology and leverage data still requires proper articulation.
- 2.5 While the adoption of digital and automation technologies has been identified as essential to counter the region's slow growth in recent decades,<sup>6</sup> technology adoption in Brazil lags by more than 2 points (on a 7-point scale) global average.<sup>7</sup>
- 2.6 The main constraints in using Big Data solutions in the cities are: (a) underutilized high-volume, real-time data generated by devices, sensors, GPS signals, social platforms, and administrative transactions, which requires specific IT infrastructure development and information management; (b) unequipped municipal teams with tools and skills to combine traditional urban planning methods with new digital competences. Data capture, preparation, and methodical analytics also require specialized knowledge and professional expertise to decode Big Data for urban policy

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<sup>2</sup> The Fourth Industrial Revolution is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human (WEF).

<sup>3</sup> [Smart cities: Digital solutions for a more livable future.](#)

<sup>4</sup> [Towards cloud based big data analytics for smart future cities.](#)

<sup>5</sup> As an example, the "Project Sidewalk" in San Pedro, Mexico that developed sidewalk data collection methods with machine learning, crowdsourcing, and online satellite and street map imagery that enabled new urban accessibility. [Projects Sidewalk.](#)

<sup>6</sup> Where will Latin America's growth come from? 2017. New York, London: McKinsey Global Institute.

<sup>7</sup> BBVA Research (2017). Urbanization in Latin America. Bilbao: Banco Bilbao Vizcaya Argentaria.

and planning.<sup>8</sup> Therefore, there is a need to assist local authorities in creating the framework to leverage Big Data solutions and strategies to improve the decision-making processes in cities and support the development of policies based on evidence in growing urbanization.

- 2.7 **Objective.** The TC aims to support local governments in the Brazilian smart cities of Recife, São Luis and Vitória<sup>9</sup> in adopting data-driven solutions for urban planning by (i) providing the municipalities with data assessments, strategies, and action plans to leverage Big Data solutions for responding to the cities' challenges, (ii) implementing innovative pilot projects to efficiently incorporate Big Data solutions into urban planning; and (iii) strengthening the digital capacity of city officials through the development of knowledge products and delivery of capacity building activities.
- 2.8 The project's impact in the long term is that municipal teams of participant cities adopt a data-driven government model as a tool to support decision-making, transparency, inclusion, and provision of better services to citizens.
- 2.9 The project selected the participant cities using the following criteria: (i) cities are capitals of Brazilian states with opportunities to improve their urban operations and management through Big Data solutions; (ii) cities are prioritizing digital transformation and seeking opportunities to leverage urban data and improving their capacities for better management and policymaking; (iii) cities are in operational dialogues with the Bank or participating in new Bank operations; (iii) their interest to benefit from Bank's added-value to their urban operations, particularly accelerating the adoption of technology and strengthening digital management of the public sector. Thus, the selection of the city facilitates the alignment with strategies and operational Bank portfolio in the country.<sup>10</sup> For example, the City of Vitória, with 365,000 inhabitants, capital of the state of Espírito Santo, is financing Citizen Cooperation Centers (CCC) through the Vitória Urban Improvement and Citizen Program (BR-L1497; [4617/OC-BR](#)). The CCC aims to expand its capacity to provide immediate responses to traffic, safety, emergencies, and natural disasters. Therefore, as part of this transformation, enormous amounts of new data will be generated. In this sense, there is a need to support better data management and evidence-based data policymaking adoption. The City of São Luis, with 1.1 million inhabitants, is the capital of the state of Maranhão. The municipality is currently entering its last year of execution of the Historic Center Revitalization Program (BR-L1117; [2715/OC-BR](#)). It is considering a second urban operation with the Bank to migrate São Luis toward a Smart City model, by leveraging data solutions to support urban planning, special projects, and city innovation. The City of Recife, with 1.6 million inhabitants, is the capital of the state of Pernambuco, and dialog with the Bank is ongoing for financing urban development and housing operation to include a Big Data center to address urban development challenges of communities, social housing, and mobility.
- 2.10 Since these cities are already participating in the Bank's operational work, sector dialogue is ongoing for identifying potential urban problems and data-driven solutions. This step will strengthen the selection of an urban hypothesis or problem statement to address this TC. The TC will select urban challenges, such as urban planning, housing

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<sup>8</sup> Políticas públicas orientadas por dados: Os caminhos possíveis para governos locais (IDB 2020) [Políticas públicas orientadas por dados: Os caminhos possíveis para governos locais](#).

<sup>9</sup> Considering available resources, additional cities can be supported based on similar criteria established in 2.9 and dependent of the receipt of respective request letters and approval by Bank's liaison in Brazil

<sup>10</sup> The three municipalities sent to the IDB request letters to receive Technical Assistant in Big Data solutions and strategies to improve their urban planning process and decision making.

and community development, citizen security, urban mobility, accessibility, social inclusion.

- 2.11 **Strategic Alignment** This operation is aligned with the "Second Update to the Institutional Strategy UIS" (AB-3190-2) through the development challenges of (i) Social Inclusion and Equality by including social needs and perceptions in urban operations; and (ii) Productivity and Innovation by promoting more efficient urban management systems using Big Data solutions and innovative tools. This TC is aligned with IDB Group Strategy with Brazil 2019-2022 on promoting e-government and digital solutions to foster transparency, accountability, and efficiency in delivering public services to citizens and enterprises. It is also consistent with the Housing and Urban Development (CSD/HUD) Sector Framework Document (GN-2732-11) in the dimension of the success of "Boosting Urban Productivity and Promoting Good Urban Governance. This TC contributes to IDB's Vision 2025 Reinvesting in the Americas, supporting strengthening good governance and digital institutions within the opportunity area of "digital economy" to deploy cross-cutting digital solutions to strengthen public management capacities and improve the delivery of citizen services.
- 2.12 The TC coincides with CSD/HUDs the Smart Cities and Civic Data thematic group. This group aims to achieve a more sustainable, inclusive, and equitable urban development in the region by leveraging innovative technology solutions and civic data to improve urban governance, infrastructure, and delivery of public services. Additionally, this TC is aligned with the CIT Fund's objectives, specifically to promote transformative actions of sustainable, inclusive, resilient, and equitable urban development in LAC, using innovation, co-design, experimentation, and lessons learned.
- 2.13 **Lessons learned.** To assist LAC cities in migrating into smarter cities, the Bank successfully designed and executed the TC "Methodology for Evaluation, Identification, and Implementation of Smart Cities Projects in the LAC Region" (RG-T3083; [ATN/FG-16526-RG](#)). This TC developed an innovative methodology applied to 10 cities<sup>11</sup> to identify their maturities and opportunities to implement digital technology and data projects. A key finding is that while the maturity level of cities' physical infrastructure (connectivity, computers) is still "emerging," scoring 2.36 out of 5, their maturities for digital infrastructure (databases, analytical systems) and data potential (data analytics) are "intentional" scoring 2.31 and 2.38, respectively.<sup>12</sup> One of its main lessons learned was that although these cities are collecting data, they are still lagging in incorporating Big Data solutions and tools in their daily activities to respond to urban challenges and policymaking. Additionally, this new TC follows main recommendations and lessons learned from the Big Data for Sustainable Urban Development Project (RG-T3095; [ATN/OC-16463-RG](#)) for creating evidence-based urban policies at a city level in (i) mapping available data and identifying opportunities to create public value to solve urban challenges; (ii) strengthening current municipal technical and analytical skills; (iii) implementing big data action plans; and (iv) promoting the creation of big data offices to take the best value of data.

### III. Description of activities/components and budget

- 3.1 The expected result of this TC is to strengthen the municipal team's digital and managerial capacity in Big Data by providing innovative Big Data solutions to tackle

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<sup>11</sup> Asuncion (Paraguay), Jujuy and Cordoba (Argentina), Manaus, Niterói, and Aracaju (Brazil), Panama (Panama), Mérida (Mexico), Pasto (Colombia), and Santo Domingo (Dominican Republic).

<sup>12</sup> Deloitte, 2021. Technical Note: Application of the smart city methodology in 10 cities (October 2021).

urban challenges.<sup>13</sup> TC has been structured in two components:

- 3.2 Component I: Design Big Data Proofs-of-Concept and Action Plans (US\$150,000).** This component aims to strengthen municipal teams by providing innovative Big Data solutions and strategies to tackle urban challenges. The component prioritizes urban challenges, analyzes urban data, implements proofs-of-concept in Big Data, and designs action plans in each participant city. It will finance individual consultants to carry out the following activities: (i) assessing and analysis (e.g., data structure, formats, storage) of traditional and real-time data gathered by different data streams such as public and private datasets, municipal data, citizen reporting, open data, and remote sensing data; (ii) the analysis and prioritization of urban challenges that could benefit from big data solution; (iii) design and implement Big Data proof-of-concept (pilots) that would include applying predictive analytics using statistics, modeling, visualization, usage of algorithms or artificial intelligence<sup>14</sup>; and (iv) development of Big Data Action Plan and Strategy for each city, which includes assessing technological and digital infrastructure, governance, and the digital team's needed skills to carry on future data projects.<sup>15</sup>
- 3.3 Component II: Capacity Building and Dissemination (US\$50,000).** This component aims to build municipal teams' capacity to use Big Data solutions in urban planning. The component will develop new content and provide municipal officers with new knowledge, training, and capacity building to incorporate Big Data into planning and policymaking. It will finance individual consultants and consulting firms to carry out the following activities: (i) the development of Big Data training material, which includes best practices, reference, audiovisuals, presentations, among others; (ii) the creation of a discussion paper based on the TC results and case studies; and (iii) delivery of capacity building and training to (a) municipal decision-makers, (b) urban planning teams, and (c) technical personnel.
- 3.4** The total project cost is US\$200,000 to be financed through the Multi donor Trust Fund for the Development of Sustainable Cities in Latin America and the Caribbean (CIT). The TC will not have financing from the local counterpart.

#### Indicative Budget (US\$)

Component	Description	IDB	Total Funding
<b>I. Design Big Data proofs-of-concept projects and Action Plans</b>	This component will finance activities related to assessment of urban data, analysis, prioritization of urban challenges, design, implementation of a Big Data proof-of-concept, and development of Big Data Action Plan.	150,000	<b>150,000</b>
<b>II. Capacity Building and Dissemination</b>	The component will finance Big Data training and capacity-building activities and the development and dissemination of knowledge products (discussion paper).	50,000	<b>50,000</b>
<b>Total</b>		200,000	<b>200,000</b>

<sup>13</sup> The products that are developed within the scope of this operation will be the property of the Bank. If, at the request of a beneficiary, specific intellectual property arrangements are deemed necessary (such as the licensing of any of the products), the corresponding contractual arrangement(s) will be prepared with LEG's support.

<sup>14</sup> In collaboration with IDB's CitiesLab team ([Experimentation, Innovation and Participation for Sustainable Urban Development](#)).

<sup>15</sup> The Bank will follow its policies and procedures regarding data privacy.

- 3.5 **Monitoring and Reporting.** The Project team Leader of HUD's Smart City and Civic Data will be responsible for the TC project execution, monitoring, and supervision. The monitoring involves all planned activities according to the result matrix, ensuring cooperation with other projects, and preparing annual and final reports according to Bank requirements.

#### IV. Executing agency and execution structure

- 4.1 The Bank will be the executing agency as requested by the participant cities of Recife, São Luis and Vitória<sup>16</sup> and with the non-objection from SAIN and ABC<sup>17</sup>, IDB's liaison in Brazil (Annex I). The execution of this TC will require a centralized implementation of complex activities and procurement in three Brazilian cities in different states, which do not have the technical and institutional capacities to execute the project during the projected timeframe. Therefore, the Bank's capacity and experience to execute complex projects in multicity<sup>18</sup> will be critical for the project's implementation. The division of CSD/HUD has substantial experience and institutional capacity executing technical assistance in areas related to the activities financed under this TC.<sup>19</sup> This project will be executed in close coordination with each municipality, and in collaboration with HUD/CBR team in Brazil and other divisions at HQ.<sup>20</sup> The role of the team in Brazil will be essential for (i) ensuring prioritized problems are within the framework of existing operations (2.9, and 2.10); (ii) coordinating dialog with municipal teams; and (iii) collaborating with the supervision of consultant work.
- 4.2 Big Data is an emerging topic going hand-in-hand with the smart city approach, and a Bank execution would facilitate knowledge sharing and lessons learned between these cities and within the region. Additionally, the Bank's implementation will give a deeper insight into potential opportunities in incorporating data-driven solutions in current and future projects in Brazil and LAC.
- 4.3 Finally, as part of the capacity building and knowledge dissemination, the Bank team, in its role as a strategic partner, will seek collaboration with IDB's Communication Sector and the Knowledge and Learning division (KIC/KLD), with the Korean Ministry of Land Infrastructure and Transportation (MOLIT)<sup>21</sup> and others.
- 4.4 The Bank classifies this TC as client support, and the Bank will be responsible for: (i) supervision of the work executed by consultants; (ii) coordination of knowledge sharing and capacity building activities; (iii) disbursement of funds; and (iv) generation

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<sup>16</sup> During execution, provided sufficient resources are available, additional municipalities may be interested in benefitting from the activities of this TC and its respective advisory services. In such case, the Bank will review the corresponding request letters and will select any additional municipalities in accordance with the selection criteria set out in 2.9.

<sup>17</sup> SAIN Secretaria Especial de Comercio Exterior e Assuntos Internacionais, Ministério da Economia, Ofício SEI N. 226984/2021/ME. ABC: Agência Brasileira de Cooperação. (see Annex I)

<sup>18</sup> Successful execution steering from IDB's Headquarters the Project "Methodology for Evaluation, Identification, and Implementation of Smart Cities Projects in the LAC Region (RG-T3083)", providing working closely the cities of Manaus, Niterói and Aracaju in Brazil and others in LAC.

<sup>19</sup> Successful execution steering from ID Headquarters the Project "Methodology for Evaluation, Identification, and Implementation of Smart Cities Projects in the LAC Region (RG-T3083)", providing working closely the cities of Manaus, Niterói and Aracaju in Brazil.

<sup>20</sup> Institutions for Development and modernization of the State Division (IFD/ICS) and The Information Technology Department and the Information Technology Operations Division (ITE/ITO), and the Knowledge, Innovation and Communication Sector and the Knowledge and Learning division (KIC/KLD).

<sup>21</sup> This TC will seek the collaboration and knowledge sharing from MOLIT, considering MOLIT's expertise in Smart Cities, digital technologies, urban planning housing, transportation, in Korea and worldwide.

of annual reports. IDB will implement Disbursements in Headquarters, with IDB's Administrative Services and Corporate Procurement Division support (BDA/ACP).

- 4.5 The Bank will contract individual consultants following the guidelines set out in AM-650. The procurement process for consulting firms of intellectual nature will follow the Bank's new Policy for the Selection and Contracting of Consulting Firms for Bank-executed Operational Work (GN-2765-4) and related Operational Guidelines (OP-1155-4). Non-consulting services will be following Bank's current procurement policies and procedures. The project will apply the policy GN-2303-28 for contracting logistic services. The Procurement Plan includes all activities in this project.

## **V. Major issues**

- 5.1 The main risks are (i) changes in the technical teams of the municipalities; (ii) the difficulty in accessing data sources<sup>22</sup> from the participating cities and private partners; (iii) possible delays in the TC implementation due to COVID-19 restrictions to face-to-face meetings. To mitigate these risks, (i) cities will be involved in the initial stage of project design and local focal points will be formally designated; (ii) project will hire a team with broad experience in analyzing data availability within different contexts; and (iii) the TC will hire a local consultant to perform the tasks in addition to designing proofs-of-concept projects that the project can remotely implement.

## **VI. Exceptions to Bank policy**

- 6.1 The project does not require exceptions to Bank policy.

## **VII. Environmental and Social Strategy**

- 7.1 This TC is not expected to have adverse environmental and social effects.

### **Required Annexes:**

- Request from the client
- Results Matrix
- Terms of References
- Procurement Plan

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<sup>22</sup> The Bank will follow its policies and procedures regarding data privacy.