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Part 4

Increasing Data Coordination and Developing Urban Indicators

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More and more cities around the world are experiencing a rapid urbanization process that calls for innovative strategies to address the social, economic, and environmental challenges that come with such accelerated development (Shen et al. 2011; Happio 2012). In order for these strategies to be successful, however, city actors must establish data management systems that promote effective decision-making and coordination. For example, to implement density and compact city policies, planning agencies need to collaborate and share information with different government departments about transport, jobs, hospitals, schools, and public space, all critical factors to ensure quality of life. Unfortunately, however, this information is often dispersed, fragmented or simply unavailable. Moreover, government agencies usually have different organizational structures, political interests and resources available, which further complicates any data coordination effort.

Similarly, the multiplicity of variables involved in urban development requires city planners to constantly develop mechanisms to measure the performance of public policies. One of the main benefits associated with urban metrics is that their implementation not only allows government officials to correct performance deviations but also to set future goals. For example, developing sustainability metrics at a national scale can help local governments to set sustainability programs that are adapted to local particularities while meeting national standards (Mascarenhas et al. 2010). Another benefit associated with the implementation of indicators is increased transparency of government activities and more efficient service delivery. These benefits, however, will only be attainable if the results and methodology for the measurements are adequately distributed for the public to review.

Even though data coordination strategies and urban indicators are fundamental for the planning and policymaking process, the success of these tools, however, might be limited if there is only a top-down approach that leaves out citizens and communities. Emerging technologies and social media can play an important role in bridging the gap between governments, citizens, and businesses to engage in the creation of more sustainable cities.

This section offers a set of tools that facilitate the design and implementation of strategies listed in the previous three chapters. In the first set of strategies, we examine the challenges of coordinating data across levels of government and explore strategies to overcome fragmentation and redundancy. The second set of strategies explores ways to develop effective urban indicators and bridge the gap between top-down and bottom-up approaches to metric development. Finally, the section concludes with recommendations on how to engage the citizens through improving data access and the use of new technologies.

4.1 Intergovernmental Data Coordination



Intergovernmental Data Coordination

What It Is

- **Data coordination strategies facilitate collaboration across government agencies to improve their performance and service-delivery.**
- **Multiple agencies can team up to achieve common goals by providing input from different fields of expertise.**
- **They expedite regulatory and permitting process to develop urban and housing projects by avoiding bureaucracy and corruption.**
- **Sharing data streamlines the internal work of government agencies promoting a more efficient use of resources and reducing redundancies.**

Intergovernmental data coordination and information sharing are fundamental tools for the public administration process. Broadly, these strategies include collecting, processing, storing, and sharing information within the internal structure of a specific government area or across multiple government agencies. In addition, data coordination strategies include the operative, institutional, and legal

Image depicts the project Primero de Mayo, in Oaxaca, Mexico, which is the result of a collaborative effort between municipal, state, and federal agencies.

Photo: Margaret Scott

frameworks necessary to allow an adequate flow of information among organizations.

From an urban planning perspective, as urban areas grow, different agencies and levels of government need to work together. In this collaboration, sharing information and data becomes essential to facilitate performance and streamlined activities. In their analysis of government service delivery coordination in the state of Queensland, Australia, Keast and Brown (2010) argue that it has been increasingly recognized that governments face complex financial, social, and global challenges that can no longer be solved by a traditional “single” agency or stand alone approach. Their research showed that a collaboration system between public agencies resulted in increased efficiency in internal operations, consequently improving service provision (Keast and Brown 2010). Moreover, the results of the research highlighted that the emergence of new data management technologies opens new opportunities to facilitate this coordination and collaboration process, thus strengthening public institution capacity and performance (Keast and Brown 2010; Gilbert et al. 1996).

Despite the benefits associated with data coordination, many countries still face challenges to implement such practices. One of the most important barriers is that different sectors or functional areas of the public administration depend on the decisions taken by higher levels of government, creating “bottlenecks” that impede action (Keast and Brown 2010, 441). In other words, if higher level officials do not approve the sharing process, lower level officials are unable to share the information, even when it would be desirable for all parties. Although this may protect sensitive information, the daily activities of lower level officials may be dramatically slowed down or can become redundant. Another obstacle for sharing data is competing interests between government structures that prevent an efficient flow of information. Agencies or officials may worry that sharing information could expose them or undermine their operative independence.

Carrera and Hoyt (2007) suggest an alternative approach to overcome such barriers at the local level, where governments can take a leadership role in systematizing data collection and integration frameworks. Their research suggests that this approach would create an interaction platform between upper levels of government and smaller local entities, even getting to neighborhood or block levels (Carrera and Hoyt 2007). The authors argue that data is a valuable resource for local government and should be treated as such, acknowledging that even though this approach requires technical and financial investment,

implementing integrated information management systems not only facilitates decision making but also creates a more extensive body of urban knowledge, far outweighing the implementation costs (Carrera and Hoyt 2007, 19).

The following strategies discuss in more detail several data coordination alternatives and key related concepts:

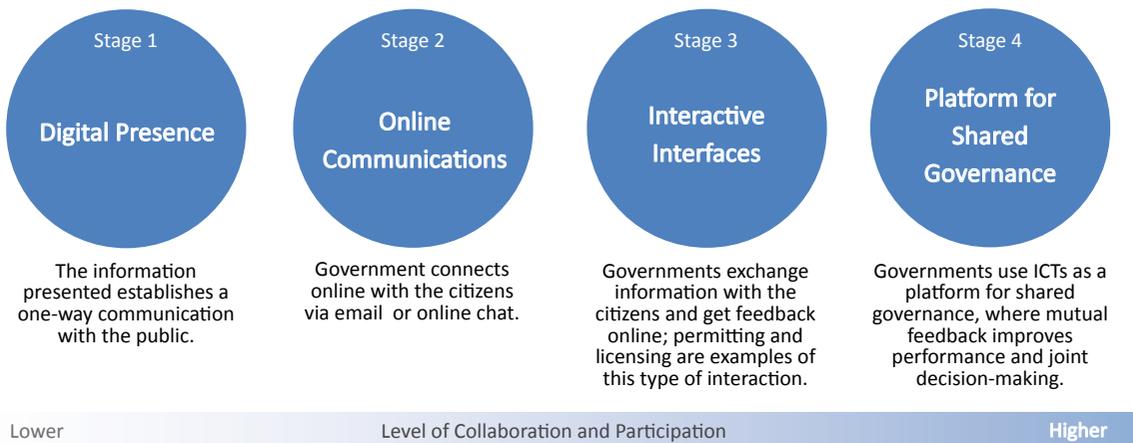
- **E-government**
- **Spatial data coordination**

4.1.1 E-government

What it is: E-government is a term used to describe strategies or platforms targeted at improving government performance through the use of Information and Communication Technologies or ICTs (Chun et al. 2010, 1). These strategies represent a shift from the paradigm of passive citizenry to a collaborative governance model that takes into account public input for policy making and improved service delivery (Chun et al. 2010).

How it works: For planning agencies and policy makers, e-government platforms can be a powerful communication tool that enables interaction and timely engagement with citizens. For example, e-government platforms can help governments to take public input into account in the design and implementation of urban projects such as parks, transport investments, or waste management facilities. Also, e-government strategies can be transformed into urban knowledge platforms and are an excellent resource for citizens to actively participate in urban issues. For instance, local governments can offer online data and the processing tools for the public to analyze

Development stages of e-government portals.
Adapted from Sandoval-Almazán and Gil-García 2012.



and process information that can be useful to formulate bottom up initiatives.

Generally, in early stages, e-government platforms are facilitated by an internal ICT department, and as the platforms become more complex and require more interaction with the public, the projects are outsourced to specialized companies. Some of the basic elements that make a successful e-government model are: 1) adequate use of ICTs; 2) good quality information; 3) privacy protection strategies; and 4) appropriate communication strategies with the public (Chun et al. 2010, 2-3). ICT infrastructure for e-government platforms can range from web-based applications, online platforms, videos, audios, and blogs to social media like Facebook or Twitter (Chun et al. 2010, 2).

Example: In Korea, the Seoul Metropolitan Government launched in 1999 a web-based portal called OPEN (Online Procedures Enhancement) to address unequal access to information and bureaucracy (Bertot et al. 2010). This online platform was part of a larger Korean government anti-corruption agenda aimed at reducing the high levels of corruption in the permitting that the country had experienced for decades. The previous regulatory system, allowed public servants to ask from citizens “express fees” to facilitate the approval process. To minimize those interactions, OPEN was developed to restrict the contact between citizens and public servants in 54 of the government services identified as more inclined to corruption. According to Bertot et al. (2010, 266) in their research about e-government strategies against corruption, OPEN was successful not only in reducing corruption but also in improving public perception about the government.

E-government: Implications for Mexico.

In the Mexican context, e-government strategies could be an excellent way to improve communication channels to overcome barriers against progressive densification and urban development policies. Since municipalities have the constitutional right and duty to conduct urban and territorial planning, e-government strategies could clarify the often obscure urban planning system in Mexico. Sandoval-Almazán and Gil-García (2012) surveyed 108 Mexican municipalities in 2009 to analyze how local governments use websites to engage and collaborate with citizens, businesses, and non-profit organizations. The results showed that although there are efforts to transition to e-government systems, there are still opportunities for improvement. Sandoval-Almazán and Gil-García explain: “overall, the majority of the municipalities analyzed

have not implemented interaction tools, participation mechanism or collaboration applications [and] their websites function mainly as an information channel” (2012, S87).

Takeaways:

- E-government can enhance government performance by improving service delivery and promoting transparency and citizen engagement.
- A major challenge for e-government initiatives is the need for a substantial technical and organizational investment from a sponsoring agency.
- New technologies provide innovative ways to incentivize citizen participation through web-based platforms such as social media, web content, and digital applications.
- Unequal access to digital services is a major drawback of e-government strategies. If the digital divide among citizens is too great, relying solely on these strategies might result in even greater inequities.

4.1.2 Spatial Data Coordination

What it is: Broadly, spatial data coordination refers to organizing the representation, storing, analysis, and sharing of spatial data (Nedovic-Budic 2000). Spatial data includes information about the distribution and location of territorial and geographic elements such as: population, topography, environmental features, climate, and water resources.

How it works: GIS or Geographic Information Systems are one of the most frequently used platforms to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. Since the beginning of their widespread use in the 1990s, GIS and other information systems have evolved to develop integrated spatial decision support systems (SDSS), also referred to as planning support systems (PSS) (Koomen 2008, 8). More and more, countries around the world have recognized the effectiveness of using these systems to support the urban and territorial planning process. Table 4.1 describes the elements that are required for implementing a successful data coordination project for planning purposes.

Spatial data platforms not only inform the work of local planning agencies but also facilitate collaboration with other public entities that are directly related to urban development such as: public works, transportation, housing, social development, police, and natural resources authorities (Nedovic-Budic 2000; Breunig 2012).

Table 4.1 Elements required for implementing a spatial data coordination system for urban planning activities

Requirement	Purpose
Database development	To create a data integration platform with information from the multiple agencies that influence city development.
Standardization	To ensure data quality. Includes establishing common formats, data gathering protocols and developing metadata.
Access to data	To provide uniform access to the information created. Often, the information is presented in a variety of formats to enable multiple actors to use data according to their specific needs.
Tool building and integration	To provide local agencies with the required hardware and software necessary to collect, process, and present information.
Education and technology transfer	To coach local staff on how to use spatial analysis systems and data coordination systems.
Legal framework	To provide legal protection for the information created. Also, to ensure that privacy and sensitive information is protected.

Adapted from Nedovic-Budic 2000, 87-88.

Example: In the United States, over the past 30 years, there has been a significant progress to promoting spatial data coordination projects, both at the national and state level (Nedovic-Budic and Pinto 1999, 54). At the state level, this process has gone from fragmented and department-specific efforts to coordinated multi-agency platforms that stimulate local governments transition to GIS systems, particularly to create land inventories and GIS clearinghouses (Nedovic-Budic and Pinto 1999).

One example of such efforts is the Texas Orthoimagery Program, a state-initiated program to create common base maps (Nedovic-Budic and Pinto 1999, 54). The program, spearheaded by the Texas Natural Resources Information System (TNRIS), gathers, processes, and disseminates cartographic imagery and other geographical data with funding and support mainly from four state level agencies: the Texas Department

of Transportation, the Texas Commission on Environmental Quality, the Railroad Commission of Texas, and the Texas General Land Office (TNRIS 2015). With increasing success and recognition over the years, this example illustrates the possibilities of spatial data coordination and integration from different sources into a single platform, built for public use.

At the federal level in the U.S., the first attempt to promote spatial data distribution was initiated with the creation of the National Mapping Division Digital Cartography Program in 1979 (Nedovi-Budic and Pinto 1999). After that initial push, the most successful progress has been made in the development of national protocols for storing spatial data such as the TIGER products (Topologically Integrated Geographic Encoding and Referencing) (Nedovic-Budic 1999, 54). The TIGER database stores spatial features for all U.S. territories, such as roads, railroads, rivers,

and legal statistical geographic areas. Managed by the United States Census Bureau, the database provides publicly available information in shapefiles format, as well as an online mapping application (United States Census Bureau 2015).

Spatial data coordination: Implications for Mexico.

In Mexico, metropolitan agencies and local governments have promoted initiatives to create spatial data analysis platforms, but they remain isolated examples. One of the main barriers is the unavailability of cadastral information in digital formats. Also, most municipalities have their land use information in AutoCAD formats, which are not designed to analyze dynamic layers of information. In one example, the municipality of Mérida, Yucatán, coordinated spatial information to implement an online GIS platform. The platform includes information about municipal services such as: police stations, parks, schools, markets, and government offices. The main objective of this initiative is to provide reliable sources of information to the public as well as promote government accountability.

Takeaways:

- Coordinating spatial data is fundamental for urban planners because it creates a collaboration tool to interact with relevant stakeholders and government agencies.
- Even though technical barriers are often cited as the main challenges for implementing data coordination, barriers are interorganizational and institutional.
- The visual nature of spatial information provides a foundation for community engagement in policy making and community projects. Tools such as maps, graphs, and infographics help policy makers to convey important information with the public.

Benefits and Challenges of Coordinating Data

Benefits of Coordinating Data

Improves service delivery and policy making: As cities grow, the demand for the information required to plan and provide city services in a sustainable way increases. In this sense, data coordination provides policy makers and planners with a solid foundation of knowledge about the multiple issues to be taken into account for efficient decision making. Additionally, creating interactive platforms where governments and the citizens can share information opens up opportunities to improve service delivery, government activity

monitoring, and program implementation.

In a report published by the National Australian University, Breunig (2012) highlights that one key area of opportunity to improve data collection and promote data efficiency in government activities is small scale surveying and data collection. Many agencies, in order to design their programs and policies, require data that they collect and process in an ad-hoc approach. Once the information is used for its original purpose, it is discarded. According to Breunig (2012), a good way to overcome those inefficiencies is to systematize the collection and processing method across agencies, establish an inter-agency data sharing platform, and delineate legal and privacy concerns. National Governments in Australia, Canada and the United States have started to establish national level legislation and specific programs targeted to share data across states and government agencies (Breunig 2012, 4).

Improves transparency and government accountability: Data coordination, e-government, and knowledge-based initiatives enable citizens to evaluate government performance and reduce opportunities for corruption. However, having a transparent system is not always a direct driver of government accountability. It is essential that the data provided is reliable and timely for citizens to be able to engage with governments to design better policies (Ubaldi 2013). One of the direct benefits of government interaction with citizens through online platforms and social media is that it simplifies important information and provides a foundation for building engagement.

Incentivizes civic participation for the design, planning, implementation, and monitoring of programs and polices: One of the main benefits of coordinating data is that it provides a solid foundation for civic engagement (Chun et al. 2010, 1). Government accountability and credibility rise when agencies share information about projects and initiatives and establish adequate communication channels with citizens (Chun et al. 2010; Sheridan and Tennison 2010; Breunig 2012). In turn, collaboration between the government, public sector, and other stakeholders contributes to more efficient government performance (Chun et al. 2010, 1). Creating organizational coordination helps to ensure that stakeholders across public and private sectors are taken into account in the decision making and participation process. It also provides a platform that allows many voices to be heard with appropriate mediation when conflicts arise (Gilbert et al. 1996).

Challenges of Coordinating Data

Organizational challenges, politics and bureaucracy: For governments, some of the main barriers for implementing a data coordination strategy are organizational structure, politics, bureaucracy, and privacy concerns. To overcome these issues it is necessary to provide clear legal frameworks and communication channels that allow useful and integrated sharing networks that reconcile the priorities, motivations, and internal structure of the parties involved (Chun et al. 2010; Nedovic-Budic and Pinto 1999). A frequent obstacle for coordinating intersectorial or interagency efforts occurs when each entity has its own set of values and organizational structure. In such instances, establishing a clear hierarchy, common objectives, and communication strategies between the parties involved is fundamental (Keast and Brown 2010, 444).

Technical barriers include lack of qualified staff, data protocols, and technological equipment: The shift from an unclear and disarticulated data system to a transparent and coordinated system is not an easy task. It requires overcoming major technical and organizational challenges that represent substantial investment for the sponsoring agency, especially in the initial stages (Nedovic-Budic and Pinto 1999, 54). Several authors agree that creating partnerships to use and reuse data can help overcome data coordination barriers (Chun et al. 2010; Breunig 2012; Nedovic-Budic and Pinto 1999). For instance, to reduce collection costs and maximize data usage, data management strategies to standardize processes such as collection protocols, data formats, and storage platforms, ensures that the information created by a given agency can later be used by another partner agency (Breunig 2012; Carrera and Hoyt 2007; Sheridan and Tennison 2010).

Insufficient political and financial support from higher levels of government: Keast and Brown studied decentralization of data management strategies in the state of Queensland, Australia and found that having strong support from central and higher levels of government enhanced the implementation of coordinating efforts at the regional and metropolitan level (Keast and Brown 2010). Similarly, securing financial support from federal and state sources promotes credibility to secure the long-term viability of a project.

Political and financial support from higher levels of government is helpful leverage to develop a metropolitan data coordination strategy. However, it is key to define the role of each actor involved from the initial stages of the project. If clear implementation rules are not in

place, the success of any strategy is at risk (Keast and Brown 2010). For example, the Government Service Delivery Programme (GSD) to provide city services in Queensland, Australia was dismantled even after initial success because there was no clear support from federal agencies. This lack of support resulted in over-reliance on regional actors, a situation that in turn resulted in the loss of citizen participation when the local project leader was transferred to another position (Keast and Brown 2010).

Intergovernmental Data Coordination: Conclusions

Given the complexity of urban development, urban planners and policy makers require tools that help them coordinate and collaborate with multiple actors. Even though implementing data coordination is not usually a straightforward process, the benefits associated by far outweigh the challenges involved.

Although in Mexico there are entities that disseminate data such as INEGI (National Institute of Statistics, Geography, and Information), SNIIV (National System of Housing Indicators and Information), as well as data produced by government departments, the transition to open government systems has a long way to go. To address this, in 2003 the National Institute for Information Access (IFAI) was created as a platform for the citizens to request information about government activities and debate privacy protection issues. However, the overall perception of the agency's performance remains unclear. Notably, inside federal government there is no department that ensures that the information is available for all agencies and coordinates its efficient use and distribution. Data coordination remains an opportunity area for Mexico to improve government performance, accountability, and public engagement.

4.2 Developing Urban Indicators



Developing Urban Indicators

What It Is

- **Indicators promote transparency and accountability by facilitating the evaluation of government activities.**
- **Developing metrics and indicators helps to monitor the results of policies, projects, and programs.**
- **Development of indicators creates opportunities for civic engagement around urban issues, contributing to the democratization of the urban and territorial planning process.**

Planning and government agencies are constantly searching for better ways to monitor and evaluate their performance in order to improve their work (Bohringer and Jochem 2007, 1). Depending on the stage in the process at which indicators are measured, they can be classified as process or outcome indicators. Outcome indicators help policy makers to assess performance and define objectives (Singh et al. 2009; Happio 2012). Process indicators, on the contrary, provide performance feedback before implementation is completed in order to correct deviations. In both cases, indicators are an excellent communication

Urban indicators can track single topics such as housing production or more multifaceted issues such as sustainability or quality of life.

Photo: Francisco Lara

Table 4.2 Requirements for the design of indicators

Requirement	Description
1. Definition of objectives	Includes defining the audience of the project, who is in charge of developing and implementing it, and the main purpose.
2. Selection of methodology	Involves selecting the appropriate analysis method. For example: “qualitative/quantitative, subjective/objective, cardinal/ordinal, unidimensional/multidimensional” (Singh et al. 2009, 195).
3. Definition of range and scale	Defines the range and scale of the indicators. Additionally, indicators allow comparison across space (cross-section), time (time series), and relative or absolute method (Sing et al 2009, 195).
4. Definition of study approach	Involves defining the measurement approach of the study in terms of input (means) or output (ends) (Singh et al 2009, 195).
5. Ensuring data quality	Ensuring data availability and reliability is fundamental for the validity of the evaluation process (Bohringer and Jochem 2007).
6. Allowing flexibility	Involves defining mechanisms that allow the indicators to be adjusted, either for improvement or to foster comparison with other projects.

Adapted from Singh et al. 2009; Bohringer and Jochem 2007.

tool between governments and citizens. Metrics convey complex information to a broader audience and open up opportunities for dialogue and debate.

Indicators measure and monitor the extent to which variables meet a set criteria (Happio 2012, 168). Singh et al. (2009) add that indicators support a wide range of government initiatives and can help to evaluate conditions and trends, prevent potential challenges, innovate, communicate, and support decision-making (Sing et al. 2009, 193). Singh et al. (2009) also suggest a series of considerations that facilitate the design and implementation of indicators, presented in Table 4.2.

When designing an indicator framework, Turcu (2012) and Singh et al. (2009) point out that

there are two main views: a top-down or expert-led approach and a bottom-up or participatory approach. In a top-down or expert-led approach the experts and researchers design and select the appropriate variables and information to analyze. In contrast, a bottom-up or participatory approach includes different stakeholders in the design of the framework (Singh et al. 2009, 192). These opposing strategies have both pros and cons and their differences and conflicts are well-documented in literature (Turcu 2012, 700). One of the main challenges of selecting a single-sided approach is that it often complicates the communication between policymakers and end-users and vice versa (Turcu 2012, 700).

The following sections provide detailed information about the methodological approaches for developing evaluation frameworks:

- **Top-down or expert-led approach for developing indicators**
- **Bottom-up or participatory approach for developing indicators**
- **Bridging the gap between expert-led and bottom-up approaches**

4.2.1 Top-Down or Expert-led Approach for Developing Indicators

What it is: The top-down or expert-led approach is the traditional way in which governments and agencies develop an analysis framework. Typically such formats are based on statistical information and literature that allows experts to understand the characteristics, behavior or dynamics of the subject of study.

How it works: Generally, the developer of the indices is in charge of the entire analytical process: from setting goals, creating methodology, gathering information, conducting analysis, and disseminating results. The subjects of analysis are passive participants of the process. Frequently the data used for top-down indicators comes from academic institutions or national census and statistic agencies. International agencies, such as the United Nations, the European Commission, and the World Bank frequently use this approach because it allows them to conduct large-scale research projects to compare indicators across countries and regions.

Example: In 2004, the United Nations Habitat program released the Global Urban Indicators (GUI), a set of indicators to help member countries meet the Millennium Development Goals. The GUI comprises a set of 20 indicators, 8 checklists and 16 extensive indicators that measure key elements of the Habitat Agenda in 200 cities across the world (UN Habitat 2014). The elements included in the indicators are: Shelter, Social Development and Eradication of Poverty, Environment Management, Economic Development, and Governance (UN Habitat 2014, 8). Data collection and initial processing of the information is conducted by groups of experts in the regional or country representations of UN Habitat. As an ongoing effort, these indicators have been periodically updated to measure the urban dynamics that the Habitat Agenda establishes and that facilitates decision-making for policy makers and governments across the world (UN Habitat 2014).

This approach has both pros and cons, which depend mostly on the intended use of the information. On the positive side, top-down indicators allow national governments and policy makers to establish metrics of progress and correct deviations. On the downside, this approach could be too reductionist, leaving out possibilities to understand the underlying relationships and dynamics that would be required for a successful implementation of policies and programs (Reed et al. 2001).

Top-down or expert-led approach for developing indices: Implications for Mexico

One current example of a top-down or expert-led approach in Mexico is the “City Prosperity Index” developed by UN Habitat to analyze 130 cities across the country. This index is based on six “axes” of action: productivity, infrastructure, quality of life, equity, environmental sustainability, and urban governance. The results, not yet completed, will help to guide Mexican policies to meet the “City Prosperity Global Initiative” (UN-Habitat 2015). Another example of the use of a top-down approach to develop indicators in Mexico are the evaluation and auditing projects conducted by CONEVAL (the National Council on Evaluation of Social Development Policy). As the federal evaluation agency, CONEVAL measures the effectiveness of public programs and policies to reduce poverty and promote social development.

Takeaways:

- A top-down approach to developing indicators enables comparison across different cities. For national governments and international agencies this approach simplifies the comparison of indicators across different geographical spaces to standardize and set goals. The UN Habitat Global Urban Indicators are an example of this approach.
- The main criticism of this approach is that often the selection of the indicators does not take into account the concerns and opinions of the stakeholders, hindering opportunities for engagement, debate, and use of the information created in the analysis (Turcu 2012, 700).

4.2.2 Bottom-up or Participatory Approach for Developing Indicators

What it is: A bottom-up or participatory approach for developing indicators is a shift from the traditional top-down approach. The strategy intends to measure indicators directly related to the local actors analyzed, involving them in one or all the stages of the evaluation process. Often, research agencies, universities, or non-profit associations provide technology, statistical and methodological guidance to support these initiatives.

How it works: The bottom-up or participatory approach “emphasizes the importance of understanding the local context in defining and prioritizing indicators and on-going learning” (Turcu 2012, 700). Particularly key for local and regional initiatives, this strategy starts the design process by setting common objectives that take into account the different perspectives of the stakeholders, especially if their input is required in the implementation phases (Shen et al. 2012; Bohringer and Jochem 2007). This guarantees not only that the participants will cooperate in the collection of the data, but also that the information generated will be useful for them after the evaluation is completed. The main challenges of this approach are data availability, technical capacity, and an adequate selection of analytic methods (Turcu 2012, 700).

Example: Often, participatory approaches to develop indicators are used when the successful implementation of a specific policy requires

the participation of the actors evaluated. Mascarenhas et al. (2010) documented the participatory approach they took to create a framework for sustainability indicators across the Algarve region in Portugal. The project involved workshops for scoping and surveying 16 of the region's municipalities to evaluate their sustainability practices. Participants in the workshops included local government officials, public works representatives, NGOs, business associations, chambers of commerce, union members, academics, social welfare agencies, among others (Mascarenhas et al. 2010, 647). The research showed that part of the success was the engagement of the participants in a regional agenda, which motivated them for action (Mascarenhas et al. 2010). Additionally, convening the interests, priorities, and vision of the municipalities and actors allowed them a sense of pride and ownership of the project. One of the most important research outcomes on the use of a participatory approach in developing the sustainability indicators was that "bringing together local communities within regional strategies increases their sense of ownership of regional sustainability options, which includes engagement with and an understanding of approaches to assessment" (Mascarenhas et al. 2010, 13-14).

Bottom-up or participatory approach for developing indices: Implications for Mexico

Though not directly linked to urban development issues, one recent example of a participatory approach is a monitoring and evaluation project developed by the Restoration Ecology Laboratory of the Institute of Biology at Universidad Nacional Autónoma de México (UNAM), designed to help protect endemic fish species in the Xochimilco wetland, in Mexico City. The project involved the participation of local fishermen to draw on their knowledge and expertise. Taking a participatory approach was not an easy task but researchers

concluded that: "... group dynamics, local political alliances, and powerful actors turn participation into an intricate social process. Restoration practitioners who are serious about participation should bear in mind that a participatory approach may add complexity to project implementation, but the outcome may be more sustainable restoration projects" (Von Bertrab and Zambrano 2010, 343). Unfortunately this type of approach is not widespread, as Mexican government institutions often develop performance indices without community input.

Takeaways:

- A bottom-up approach to developing indicators is particularly useful when action from participants is needed.
- Taking a participatory approach is also helpful for developing tailored indicators because integrative approaches require interaction and feedback from the study subjects, thus aligning with their needs and interests.

4.2.3 Bridging the Gap between Expert-led and Bottom-up Approaches

What it is: Participatory and expert-led indicators can be combined to make a more robust evaluation by learning from best practices and across scales.

How it works: There is continued debate in academic and policy arenas about the most appropriate way of conducting assessments, especially in projects in which the ultimate goal is the project implementation (Turcu 2012; Reed 2001). There is not a defined strategy to bridge the gap between expert-led and participatory-approaches. Depending on the type of project, the aims, and resources available, there are a number of tools that can be used to integrate both systems. These integrative strategies can be classified in three main areas of focus: methodology,

Table 4.3 Strategies to bridge the gap between expert-led and bottom-up approach

Requirement	Description
Selecting the scale of assessment	Depending on the objectives of the assessment, indicators can be established in a variety of geographic scales; for example: neighborhood, city, regional, national, and international scale. In some instances, Singh and colleagues argue that at the international level, indicators can leverage action towards negotiating environmental protection strategies between countries or across regions (Singh et al. 2009, 191). On the contrary, Shen et al. (2009) argue that there is growing consensus that it is at the local level where implementation of sustainability policies is more relevant.
Using comparative frameworks to learn from the best practices	Using a comparative framework helps to understand the goals, drivers, context, and methodology used in similar projects, to avoid replicating errors (Shen et al. 2011). In their analysis of 9 sustainability policies in India, Mexico, Taiwan, Singapore, Hong Kong, Malaysia, Spain, and Australia, Shen et al (2011) recognized similar challenges across all cases that could have been overcome if they had used a comparative framework with best practices.
Defining the roles of experts and policy-makers	Making a clear definition of the role of experts (researchers, scientists) and policy makers (government, NGOs or the public) enhances the performance of the evaluation process. Understanding everybody's role, interests, and capabilities helps to make a more efficient use of resources (Turcu 2012, 701).

Adapted from Singh et al. 2009; Bohringer and Jochem 2007.

intersections between the two approaches, scale of integration, and using comparative frameworks (Turcu 2012). Table 4.3 summarizes strategies to integrate expert-led and bottom-up approaches.

In order to bridge the gap between expert-led and bottom-up approaches to developing indicators, Turcu (2012) suggests that at least the participation of local stakeholders and citizens should be taken into account in the design stage, as these same actors will be key later on in the implementation stage. Once the indicators reflect the participants' vision, then experts and researchers can take over the processing and dissemination of the results (Turcu 2012, 700).

Example: Even when there are clear efforts to bridge the gap between expert and local knowledge, the results of such strategies can

be difficult to measure. The Sustainable Seattle initiative developed a set of 40 urban sustainability indicators to align efforts to meet the city's sustainability agenda (Turcu 2012). Although the methods used have been acknowledged as a successful integration model between experts and citizens, the implementation results have not yet demonstrated how the integration model worked in practice (Turcu 2012).

Example: Another example of indicators that bridge the gap between expert-led and bottom-up approaches is the STAR Community Rating System, a certification program for sustainable communities across the United States and Canada. The STAR system stands for "Sustainability Tools for Assessing and Rating Communities," and is geared toward local governments and communities to "identify, validate, and support

implementation of best practices to improve sustainable community conditions” (STAR Communities 2015, 7). The system considers the following key areas: Built Environment, Climate and Energy, Economy and Jobs, Education, Arts and Community, Equity and Empowerment, Health and Safety, Natural Systems, and Innovation and Process. The system has been used by a number of governments across North America, including cities such as Seattle, WA; Austin, TX; or Atlanta, GA. Although the STAR system appears to be an expert-led approach because of the technical approach to evaluating sustainability, the ratings system nonetheless incorporates significant flexibility and autonomy at the local level.

One critical feature of the STAR System is the analysis of “community level outcomes” as well as key “local actions” that contribute to those outcomes, including actions taken by organizations outside of local government (STAR Communities 2015, 12). The system also incorporates flexibility by providing a range of objectives upon which a community can be evaluated, ranging from housing affordability to community water, and including a number of simpler strategies to build toward more sustainable solutions (STAR Communities 2015, 19).

Bridging the gap between expert-led and bottom-up approaches: Implications for Mexico

Recent efforts to create a comprehensive housing database that encompasses the types, locations, prices, and developers of housing supply and demand is one example of a hybrid between the expert-led and bottom-up approaches. The *Sistema Nacional de Informacion e Indicadores de Vivienda* (SNIIV) created by the *Comisión Nacional de Vivienda* (CONAVI) is a collaborative effort to make information about the Mexican housing market publically available in order to

facilitate its evaluation (CONAVI 2014). The evaluation of the accessibility and usefulness of the platform will be key for further improvement and making the process of sharing information more transparent.

Takeaways:

- A number of strategies can be used to bridge between expert-led and bottom-up approaches to develop indicators such as: selecting the appropriate methods, building comparative frameworks, selecting the scale of assessment, and defining the points of convergence in the interest of experts and citizens (Turcu 2012).
- Literature often recommends using a bottom-up approach to develop indicators when the objective of the assessment is project implementation.

Benefits and Challenges of Developing Urban Indicators

Benefits of Developing Urban Indicators

Improved project performance: Indicators set performance criteria for plans, policies, and programs. They also help identify deviations from goals, areas for improvement, and weaknesses in the process. Creating indicators that monitor and evaluate outcomes and processes is vital for improving performance. However, while many evaluation tools focus on the final outcomes of the projects, it is very important to build a flexible framework to evaluate the project in its different stages.

Enhanced coordination and comparison across scales: Creating indicators that compare performance across scales promotes coordination and negotiation for establishing common projects. In regional and metropolitan contexts this becomes particularly relevant because multiple actors at different scales of operations

need to meet an integrated criteria. As Happio (2012, 167) highlights, “assessment enables the comparison of municipalities and urban areas, and notably supports decision making processes.” Even though comparison across scales is very useful to build common criteria and to reinforce interaction between stakeholders, the process can be challenging (Happio 2012, 167). For example, in the case of sustainability indicators, the metrics used by each of the actors involved depends on their specific perspective. Thus, consolidating all points of view into a single platform becomes complicated (Happio 2012, 169).

In setting up a framework to build a regional sustainability agenda in the Algarve region in Portugal, Mascarenhas et al. (2012) surveyed 16 municipalities to identify their sustainability efforts. They discovered that there were a variety of scattered actions towards sustainability goals. While some municipalities had clear agendas, others had only initial ideas. The outcome, beyond achieving the goal of creating a regional framework for sustainability initiatives, was improved participation and engagement. The process of sharing each municipality’s objectives and concerns towards sustainability allowed them to understand their role in advancing regional efforts.

Evaluation targeted to prompt action: Kingsley (1998), when describing his experience working with the Neighborhood National Indicators Partnership (NNIP) on community projects, highlights the importance of establishing metrics not only to monitor trends but to facilitate change. Even though this idea may seem evident, it is common that assessment projects are only developed in order to measure rather than promote project implementation (Kingsley 1998, 6). The NNIP in Cleveland started to work with data about recipients of the Aid to Families with Dependent Children (AFDC) program to analyze if these families were going to be affected

by welfare reforms. Using data from the AFDC, the results showed that the most affected people lived in the peripheral areas of the city and that transportation for them was critical to reduce the impacts of the welfare reform. Although the results of the analysis were not surprising, the graphic visualization of the results that showed people affected were already living in underserved areas received attention from the media, the community, and policy makers. This prompted the city and other actors to develop a series of programs targeted at helping the recipients of the AFDC (Kingsley 1998). This is an example that shows the importance of developing indicators to prompt local action.

Challenges of Developing Urban Indicators

Inadequate selection of indicators: In their analysis of sustainability indicators, Singh et al. (2009) and Boringher and Jochem (2007) highlight that an adequate selection of indicators is key for ensuring the success of the monitoring process. This selection involves several requirements such as having clear objectives, data availability, and a consistent methodological approach. However, the authors conclude that the main reason behind an inadequate selection of indicators is the ambiguous conceptual definition of the term “sustainability.” Selecting the most applicable indicators and clearly defining the central goals and ideas behind a monitoring process is basic to getting the most out of the assessment project, reducing efforts and creating synergy among participants. Table 4.4 provides basic criteria for choosing the most suitable indicators.

Inadequate scientific methods to perform analysis: As previously mentioned in the introduction of this chapter, Bohringer and Jochem (2007) conducted an analysis of international sustainability indices frequently used by policy makers in which they tested the

Table 4.4 Basic requirements for selecting indicators

Requirements	
1.	Define needs of scales of application
2.	Create a short list of indicators, flexible for later revisions and adding
3.	Identify instruments and resources to conduct the assessment
4.	Recognize the capacity and training required to design, evaluate, implement, and monitor indicators
5.	Establish a frequency analysis to allow comparison over time

Based on Mascarenhas et al. 2010; L.-Y. Shen et al. 2011.

Table 4.5 Basic scientific methods required for developing indicators

Method	Description
Normalization	Normalization refers to process applied to single variables to make them comparable.
Weighting	Specifies the correct interrelationships between indicators. For example, if one indicator is more important than the other; this has to be reflected in the aggregation by assigning to the former a larger weight than to the latter.
Aggregation	Aggregation refers to the functional relationships by which the data is processed. For example, an arithmetic mean, median, or mode.

Based on Bohringer and Jochem 2007.

indices' ability to meet basic scientific methods of aggregation, normalization, and weighting. They discovered not only that most of the indices did not pass the test but also that adjusting and revising the methodology could easily reverse this condition. Although international indices are frequently used for policy making, the methodology for processing information in those indices is not often scientifically adequate (Bohringer and Jochem 2007). Several authors agree that, even though it is often an overlooked issue, it is important to critically analyze the criteria and methodologies used in the development of internationally known indices (Bohringer and Jochem 2007; Shen et al. 2011). This is especially relevant for policy makers that base their programs on the results of such indices and trust the agencies that develop

them. According to the testing framework created by Bohringer and Jochem (2007), the scientific methods described in Table 4.5 should be well-used in creating meaningful indicators.

Data availability: Data is a basic component of the evaluation process. The availability and accuracy of information is critical to create useful indicators. Moreover, having data available across time and at different scales strengthens the ongoing evaluation process, facilitating comparative analysis (Singh et al. 2009). Often, indicators are developed to match available data rather than to measure what is really important. Although literature about urban sustainability indicators mentions the importance of data (Singh et al. 2009; Kingsley 1998) most of the argument centers on the selection of the indicators and the

scientific methods to process the information, rather than raising the importance of the availability, quality, and accessibility of data, all of which are essential to the validity of the assessment project.

Developing Urban Indicators: Conclusions

Developing indicators to monitor and assess urban issues provides an excellent opportunity to promote sustainable urban development. On the one hand, for the government, developing indicators helps to identify priority areas of action and facilitates decision making. On the other hand, developing urban metrics gives the public an opportunity to participate in the improvement of their neighborhoods and cities. Accurate and timely information provides a powerful tool to demand effective service provision, sustainable programming, and engagement opportunities. However, even though this process is desirable, the suitability and effectiveness of evaluation systems depends on the motivations of the developers, the quality of data, an adequate selection of analysis methods, and communication strategies. To address these issues researchers argue that public input is vital, especially in the design and scoping stages. If the targeted audience is taken into account, the likelihood of a successful outcome is greatly improved.