Actionable Business Architecture for Smarter Cities

Enabling better services, greater prosperity and higher productivity
For the first time in history, more people live in cities and towns than in rural areas.

Experts predict urban population will double to 6.3 billion by 2050, making up two thirds of the world’s population. Today, cities consume 75 percent of the world’s energy and generate 80 percent of greenhouse gas emission. Each year, U.S. drivers spend an estimated 4.2 billion hours, the equivalent of five days, sitting in traffic while burning 2.8 billion gallons of fuel. In Europe, traffic congestion costs the European Union over one percent of GDP, or 100 billion euros per year. And in developing nations, as much as 45 million cubic meters of water is wasted every day due to infrastructure leaks, enough to serve 200 million people.

Given the urbanization trend, will cities cope with these pressing challenges and continue to prosper? Yes, but only if civic leaders and policy makers go beyond the conventional focus on individual departments, programs or services. Indeed, they must start to consider cities as complex ecosystems and adjust strategy, governance and operations accordingly.
Actionable Business Architecture for Smarter Cities offers a new approach to managing cities.

Cities as complex ecosystems
The ecosystem perspective reflects the fact that cities rely on multiple core systems and various stakeholders to provide citizens and businesses with services that are needed today or will be demanded in the future. The core systems, such as transportation, public safety and utilities, frequently interact with one another, to achieve common goals, share resources, or exchange information. For instance, a severe storm often causes sewer overflow, power outage and traffic chaos, which can be managed most effectively by enabling water companies, power suppliers, local police, and others to collaborate efficiently.

While many of the core systems are managed directly by local government, it is common to see other government agencies, private companies and non-profit organizations actively involved. Nevertheless, citizens frequently hold city leadership accountable for their end-to-end services, regardless of who actually provides them.

A new approach to strategy and transformation
The ecosystem perspective calls for a rethink of the way policies and decisions are made in cities. To help local government take on the leading role, IBM Research and IBM Global Business Services have jointly developed an integrative approach to formulating a city’s strategy and driving transformational changes, known as Actionable Business Architecture for Smarter Cities™.

The new approach draws upon IBM’s proven methods of Component Business Modeling and Actionable Business Architecture,4,5 which have been successfully applied in multiple industries including the public sector. It also uses IBM’s extensive knowledge and rich experience in engaging local government in cities, towns and counties alike.

As shown in Figure 1, Actionable Business Architecture for Smarter Cities consists of a set of operating models, including a model for the city ecosystem (city ecosystem model), models for individual systems of cities and models for shared functions like finance, HR, and payroll. These models, in turn, can be further examined using performance metrics, process models, IT models, business solutions and project initiatives. This way, business elements can be aligned with the city’s priorities while their complexity can be reduced to a manageable level.
**Actionable Business Architecture for Smarter Cities** represents an integrated approach to planning and managing a city’s transformation journey.

Operating models

City Ecosystem Model

- Aligned with Vision and Strategy
- Applied through Business Scenarios
- Contain crucial contents, including metrics, activities and relationships

Core Systems
- Public Safety
- Citizen Health
- Energy
- Environment
- Urban planning
- Economic Development
- Education
- Culture and Recreation
- Judicial and Justice
- etc.

Shared Services
- Procurement
- Asset Management
- Tax Collection
- etc.

Business of IT
- Finance
- Payment
- Human capital

Process models
- IT Models
- Solutions and projects

*Figure 1: Actionable Business Architecture for Smarter Cities: An Overview*
The city ecosystem model

Central to the business architecture is the city ecosystem model. It describes the functional activities performed within a city to provide services to residents, businesses, visitors and other stakeholders, regardless of which organization is actually providing the service. Figure 2 shows the base version as an illustration. The city ecosystem model is organized into 11 competencies that represent the major functional areas in a city. Within each competency are business components that represent decisions and actions at three accountability levels. Various business elements can be defined in each component. When analyzed together, the model helps decision makers understand the dependencies across the city's core systems.

While the base version has 33 business components, the full version in comparison includes a total of 185 business components, each with a detailed description of its purpose and attributes. The full version is used by IBM as the basis for city strategy and transformation engagements.

<table>
<thead>
<tr>
<th>Competency</th>
<th>City Strategy &amp; Governance</th>
<th>Public Safety</th>
<th>Transportation</th>
<th>Citizen Health</th>
<th>Energy &amp; Water</th>
<th>Environmental Sustainability</th>
<th>Planning &amp; Building Management</th>
<th>Economic Development</th>
<th>Social Services</th>
<th>Education, Culture &amp; Recreation</th>
<th>Municipal Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>City Performance Management</td>
<td>Crime, Fire and Emergency Management</td>
<td>Transportation Service Management</td>
<td>Health Service Management</td>
<td>Utilities Service Management</td>
<td>Sustainability Programs Management</td>
<td>Development Permit Management</td>
<td>Economic Programs Management</td>
<td>Social Programs Management</td>
<td>Education and Culture Programs Management</td>
<td>Administration Services Management</td>
</tr>
</tbody>
</table>

*Figure 2: Actionable Business Architecture for Smarter Cities: The City Ecosystem Model Base Version*
Applying the new approach
Along with IBM’s advisory services and business solutions, Actionable Business Architecture for Smarter Cities can help leaders of local government in the following areas:

- **Define the city’s strategy and governance** – the new approach can be used to facilitate the formulation of the city’s vision and strategy that covers multiple systems and stakeholders. Achievable goals include better city services, improved quality of life, reduced budget deficit and economic development. The new approach can also serve as a governance framework for devising and executing transformation road maps. This approach is applicable to new and existing cities in both developed and developing nations.

The model for the city’s ecosystem provides a whole-business view of the city’s main functions.

- **Improve the city’s performance** – the new approach can help the city define a set of performance indicators that are relevant to the city’s strategy and objectives. With historical and industry data, city leaders and managers can track progress and benchmark with peers. Moreover, the new approach can help identify and address the root causes of performance shortfalls.

**Case in Point**
As a spearhead of economic progression in Asia Pacific, one city was seeking new development opportunities driven by urbanization and ‘internet of things’ related information technologies. Recognizing IBM as the thought leader in both areas, the city government turned to IBM for help to define their smarter city vision and formulate an industry policy on IT and ‘internet of things.’ The ecosystem model was used as the framework. Dozens of business areas were identified as crucial to the city and its citizens. Major challenges were identified and responses were suggested, resulting in a road map of major programs and tasks.

**Case in Point**
Shi Jia Zhuang, the capital city of China’s Hebei Province, planned to build up a 135 km² new district to boost its sustainable development. IBM created a planning project for the city, which identified the vision and framework for development, the key elements, performance indicators and supporting mechanisms required to execute this vision as well as the key implementation tactics. IBM used the ecosystem model and developed a city framework, covering transportation, building, infrastructure, city services and city information, and put forward 66 capability modules that the city should focus on to realize the vision. From these capability requirements, IBM also formulated 35 development projects that the city should start on in the next three to five years, with project definition and investment scope estimation.
• **Align resources with priorities** – as circumstances change, existing resources often become misaligned with the city’s latest priorities. Related projects are underway in the city, yet the managers of those projects are unaware of the work in other departments. Similarly, IT applications that were developed separately in different departments may no longer fit for purpose and must be rationalized. The new approach can provide a holistic view of the resources to help decision makers prioritize for the best results. It also offers a comprehensive urbanization framework that can help new cities cope with rapid growth.

• **Adopting emerging practices** – new business practices, such as shared services and cloud computing, can offer many benefits and cost savings. For instance, different cities within a region can be served by a combined police force, a shared IT center or a single finance department, leading to higher utilization and lower spending per citizen. The new approach offers ways to help you envision these kinds of emerging opportunities.

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**Case in Point**

A 25-year vision had been created by the municipal government of a major city in the southern hemisphere, laying out aspirations to improve service quality, develop the local economy and ensure decision transparency, among other goals. To realize this vision, the government recognized the pressing need to get all of its capabilities and resources aligned with their top priorities. As the city’s strategic partner, IBM built a component business model for the city and designed a city-wide IT governance framework with specific transformation road maps. This model-based approach was embedded into the overall city strategic planning process, ensuring ongoing business and IT alignment.

**Case in Point**

The local government of a European city was feeling the pain of economic downturn; its tax income and revenue had dropped, while demands for services continued to grow. To reduce budget deficit, the local government was looking into cloud computing to reduce the city’s IT budget without compromising on service standards. However, the government was uncertain about the exact areas in which cloud computing could be adopted. To address their challenges, IBM proposed a systematic method to assess the suitability of the city’s front-line services and back office operations to applying cloud computing. Using IBM’s deep cloud computing expertise, each component service area was reviewed for the likely cloud benefits and delivery attributes to assist with the creation of a client business case, and the assessment was one of several feeds into the city ecosystem model to support the formulation of an IBM market offering for Local Government and Smarter Cities.
Why IBM? Why now?

More than just providing consulting services, IBM is innovating on the spot. Backed by the world’s largest private research organization, IBM has developed Actionable Business Architecture for Smarter Cities, leveraging decades of experience in partnering with cities and local governments across various domains.

Actionable Business Architecture for Smarter Cities serves as a jump-start for innovation, helping you create an integrated set of vision, strategy and road map that promotes well-being, prosperity and productivity.

In this era of disruptive changes, now is the time to act.

For more information

To learn more about IBM Smarter Cities solutions, please contact your IBM representative or visit:

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2 David Schrank and Tim Lomax, “2009 Urban Mobility Report” (Texas Transportation Institute, July 2009).

