

IBM Smarter City Solutions on Cloud



Contents

- 2 Disclaimer
- 2 Executive summary
- 3 Challenges faced by governments today
- 4 Cloud: How city managers can lower costs and improve services
- 9 Defining a smarter city
- 10 IBM Smarter City portfolio
- 11 IBM Smarter City Solutions on Cloud: SaaS
- 14 Deployment choices for IBM Smarter City Solutions
- 16 Considerations for selecting a deployment model
- 17 Governments as a cloud service provider
- 19 Conclusion
- 19 About the authors

Highlights

- Manage both planned and unplanned events using the Intelligent Operations Center on IBM SmartCloud
 - Use situational information and analytics to make smarter and more timely decisions
 - Drill down into problem areas and examine root causes in near real-time
 - Protect data from unauthorized use while enabling appropriate information sharing between government entities
 - Use cloud computing to reduce capital costs and increase IT effectiveness, while taking advantage of the latest technology
 - Pay for the services that you use when you use them
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Executive summary

Governments today are confronting serious challenges that affect their economies and their abilities to deliver core services to their citizens. They are faced with the harsh realities of swelling city populations that demand more services, aging infrastructure, declining budgets and increasing threats. To help address these challenges, governments are looking at cloud computing as a way to acquire new capabilities more quickly, with less investment upfront. IBM® Smarter City Solutions on Cloud enables cities to become “smarter” by intelligently connecting city events and data, in their jurisdictions, in a single integrated solution.

IBM Smarter City Solutions on Cloud are services accessible over the Internet that cities can use to streamline and integrate their own services while bringing added visibility to their operations. The base service, IBM Intelligent Operations Center on IBM SmartCloud, is used to integrate data and manage city-wide services and events. Additionally, IBM Intelligent Transportation on Cloud can help city traffic managers visualize and analyze traffic conditions. Additional integrated services for water management and public safety might be offered.

This white paper is the first of a series that describes IBM’s vision of a smarter city—one that can use sensor-based systems to gather information about the environment of a city, correlate situational events with historical data and communicate essential information to help city managers make critical decisions. It depicts how IBM Smarter City Solutions on Cloud, which run on the IBM SmartCloud, provides key technologies to help lower initial costs, provides attractive and predictable operating costs compared with traditional deployments and offers the flexibility to be implemented at a city’s own pace. It also covers cloud deployment options and includes a set of considerations to help governments choose which option would most closely match their requirements.

Challenges faced by governments today

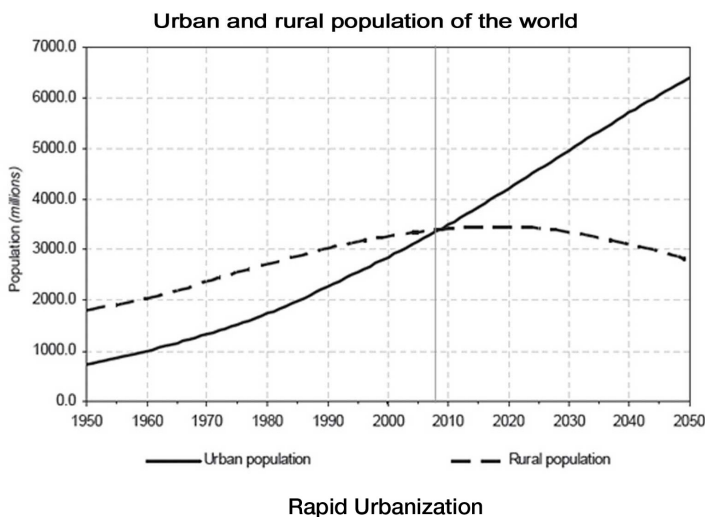
Governments are considering how to adapt their operating models so they can better address the delivery of services to citizens. They are looking for new ways to overcome the following challenges.

Rapid Urbanization

According to the United Nations, over half the global population lives in urban areas, and city planning officials are faced with critical decisions of how to deal with these swelling city populations.¹ Large population centers such as China and India are expected to surge in urbanization, with cities in China growing from 40 percent to 70 percent of their country’s total population by 2050. Indian cities are expected to grow from 30 percent today to 55 percent of its total population during that same period (see Figure 1).²

Financial pressures

Over the last decade, governments have faced economic headwinds from reduced income-related tax revenue, swelling budget deficits, costly infrastructure needing upgrades and large debt service costs. As a result, unfunded budget gaps are increasing and becoming difficult to manage (Figure 1).³



Rapid Urbanization

State	Est. FY 2011 Gap	Percent of General Fund
IL	\$12.5 Billion	45.0%
NV	\$1.81 Billion	45.0%
MA	\$2.75 Billion	40.8%
NJ	\$11 Billion	33.0%
AZ	\$3 Billion	30.0%

Financial pressures

Figure 1: Challenges faced by governments today

Unfunded mandates

National governments have begun to impose mandates on agencies and local governments and have not provided resources, infrastructure or funding for implementation and delivery. For example, in the US, the White House Open Government Directive requires agency data to be more readily accessible by citizens and sets deadlines, but provides no implementation support.

To address these challenges, cloud computing can play an essential role by helping cities acquire new capabilities more quickly, reduce initial capital costs and closely match the cost of services to the increasing number of citizens requiring them.

Cloud: How city managers can lower costs and improve services

Globally, city and municipal government leaders recognize the importance of cloud computing to tie budgets directly to service consumption and to lower upfront capital costs when compared to a traditional deployment. According to a survey by the Public Technology Institute (PTI), 45 percent of local governments are using some form of cloud computing, and another 19 percent plan to do so by the end of 2011. PTI reported a common reason for local governments to turn to cloud was for resource savings (for example, staff time, maintenance and support costs).⁵ A former United States Chief Information Officer also estimated, in his Federal Cloud Computing Strategy, that by using a cloud computing model, US federal datacenter infrastructure costs can drop by 30 percent, amounting to approximately \$7.2 billion in total savings.⁶

Reducing capital costs and operating expenses with cloud

To help governments realize the benefits of cloud computing, IBM is introducing Smarter City Solutions on Cloud, a new software-as-a-service (SaaS) offering. The solution is available on the IBM SmartCloud Enterprise, a public cloud platform that includes hardware, network and storage. It is designed for cities of all sizes to manage their operations and facilitate collaboration between multiple agencies. By providing cities with a comprehensive “pay-as-you-go” solution that includes application software, infrastructure, networking, systems software, middleware and maintenance, it lowers the barrier of entry, while enabling them to deliver excellent service to their citizens.

The benefits from cloud are compelling. Early adopters of cloud computing, including IBM’s own IT organization and IBM customers, have already realized significant savings. These savings include reduced IT labor costs by up to 50 percent in configuration, operations, management and monitoring, as well as lowering IT support costs by up to 40 percent.⁷

Additional financial benefits for running applications in a cloud model include lower upfront capital costs when compared to a traditional application deployment. Actual savings will depend on factors such as capital budget restrictions, size and complexity of integrating applications, existing operating expenses, IT infrastructure capacity and the skills of the existing IT staff.

Figure 2 is an illustrative view of the potential total cost of ownership savings that a city might realize by moving to cloud. In addition to lower up front costs, which reduce barriers to adopting new solutions, the total cost of ownership for the cloud model may be significantly lower during the first five years of operation than a traditional deployment model. Figure 2 indicates that city leaders might be able to better plan for future growth of agency services by matching them to predictable services contracts and defined service level objectives.

Potential Lower Total 5 Year “Cost of Ownership” through Cloud Computing

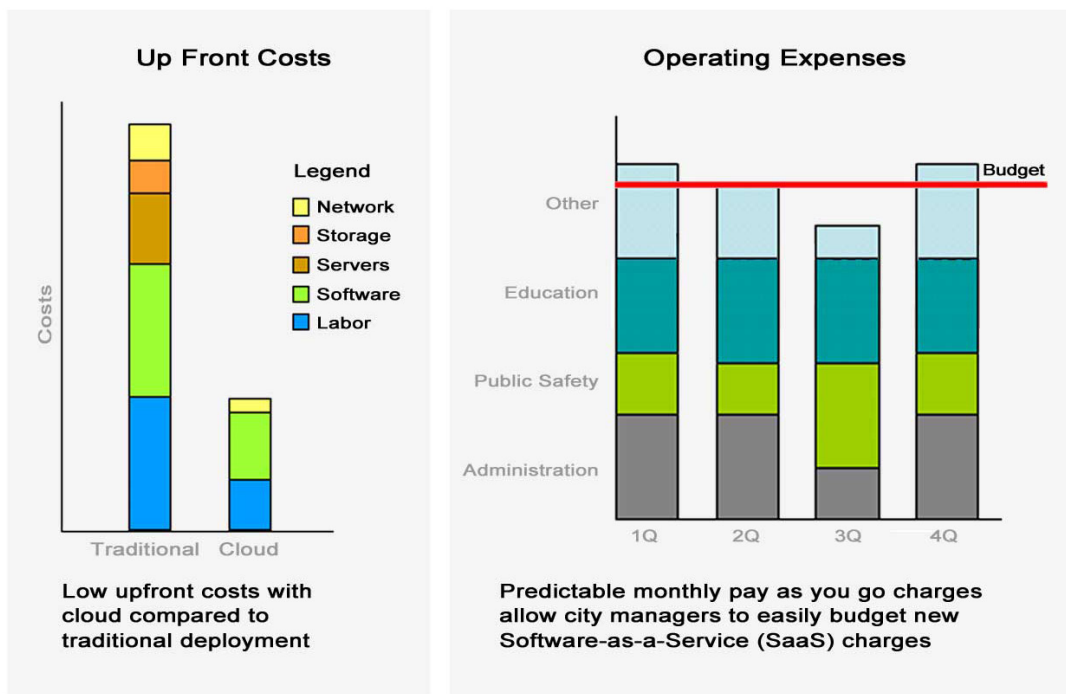


Figure 2: Potential lower total cost of ownership compared to traditional deployment and predictable operating expenses may align better to the cash flow and operating requirements for city governments (Comparative models are based on IBM internal projections. Actual costs and implementation times might vary by customer)

Operation benefits of the cloud

In addition to cost savings, cities can start their programs more quickly and realize benefits sooner by using a SaaS model. Because there is no installation and deployment to be done, they can get started with a preconfigured environment right away. Furthermore, if city governments start small, such as implementing by department or agency, they should be able to realize faster deployments and time to market with new services on the cloud.

A typical 3-4 month setup might be shortened to less than one month by reducing or eliminating the cycle times associated with capital acquisition, procurement, ordering, configuration, shipping and installation. Also, the city pays only for the resources and services that it uses on the cloud, leading to higher utilization of IT resources and more efficient IT spend. The associated IT savings could then be re-allocated to other city operations to increase service levels, support the addition of new capabilities or increase the user base to allow other departments and towns to take advantage of the cloud services.

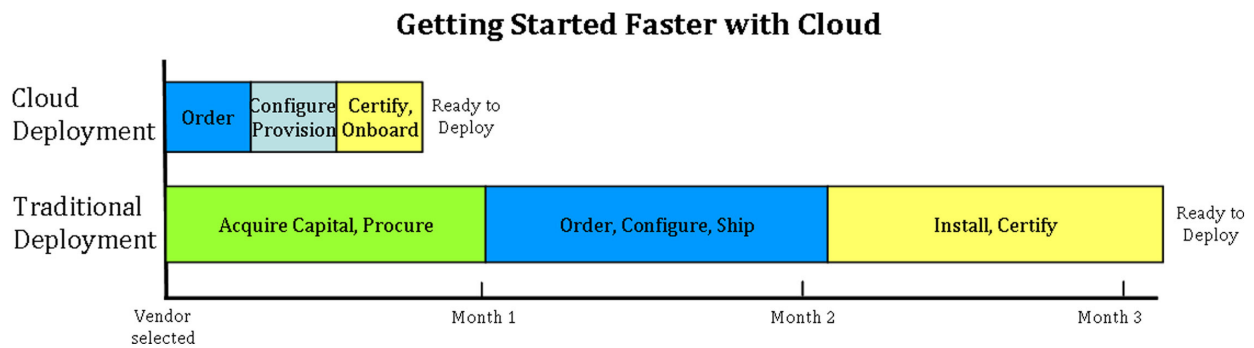


Figure 3: Cloud offers dramatically faster deployment and time to market (weeks instead of months) for cities looking to start small and implement incrementally (for example, by department, region and others) (Comparative models are based on IBM internal projections. Actual costs and implementation times might vary by customer)

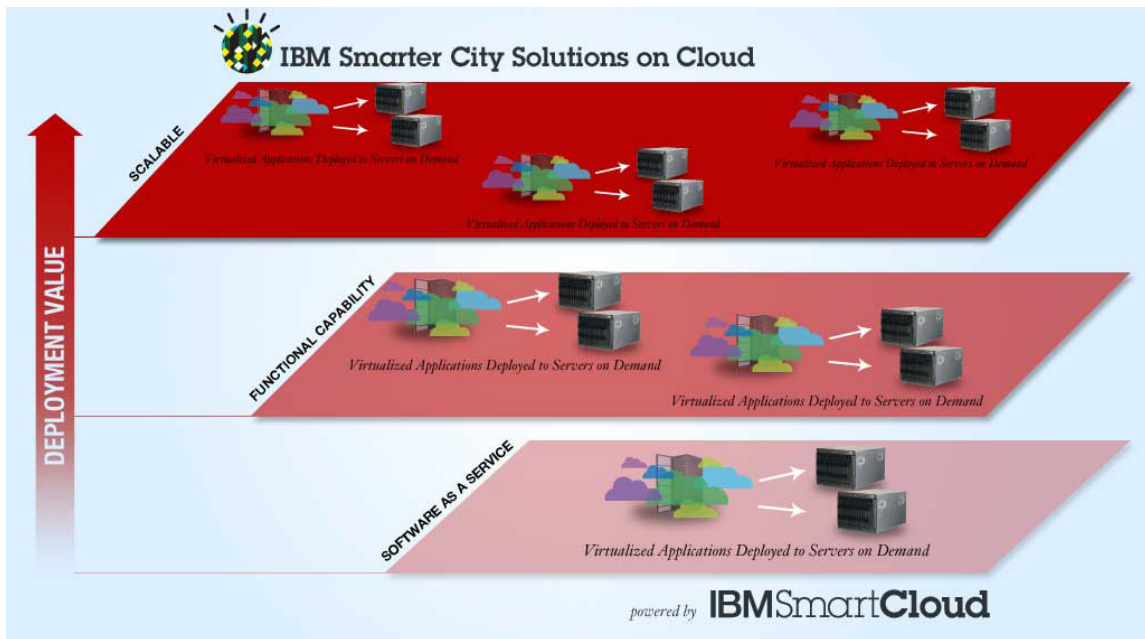
IBM Smarter City Solutions on Cloud enables governments to realize financial, service delivery and operation benefits. It helps governments become “smarter” by gathering data about a city’s environment, communicating essential information with other government entities and correlating situational events with historical data. Table 1 highlights the many benefits of deploying IBM Smarter City Solutions on Cloud.

Table 1: Benefits of deploying IBM Smarter City Solutions that runs on IBM SmartCloud

IBM Smarter City Solutions on Cloud	
Benefits	Value Proposition
Financial benefits	
<i>Lower upfront capital costs</i>	There is no need to purchase or upgrade hardware and software resources
<i>IT managed for you</i>	Pay no additional costs for system upgrades because they are done behind the scenes and IT infrastructure is managed for you.
<i>Pay as you go</i>	Pay only for the services that you use when you use them.
<i>Architecture and software flexibility</i>	Scale your deployment at your pace so you have the time to plan and budget when to add departments, towns and other capabilities or services
Benefits for citizens	
<i>Enable improved quality services</i>	Use information for better decision-making. Anticipate problems to resolve them proactively. Improve coordination of resources to operate more effectively.
<i>Offer services from the Internet</i>	Enable citizens to access government information and services on the Internet from multiple devices (for example, computers, tablets, smart phones and more).
<i>Improve traffic management</i>	Help city traffic managers visualize and analyze traffic conditions so that they can better manager incidents, improve commuter experience, reduce pollution and more.
<i>Reduce water services disruptions</i>	Better manage inventory, supply chain and people associated with water assets, thereby reducing costs, decreasing downtime and improving overall efficiency.
Operational benefits	
<i>Enterprise-level reliability and security</i>	Experience affordable enterprise-level reliability and security capabilities in a cloud model.
<i>Quick startup</i>	Hardware, operating system and software ready to be configured and customized as needed. Reduce 4 - 12 weeks of deployment cycle time compared to a traditional deployment model.
<i>24x7 support</i>	Receive continuous support provided by IBM with assurance of enterprise-level backup, disaster recovery and managed availability
<i>Anywhere/anytime access</i>	Get access when you need it with services available from a web browser.
<i>Fast provisioning</i>	Provision applications rapidly .

Pay only for the services you use

One of the key advantages of the cloud for governments is the ability to pay only for the services they use and to have infrastructure that can scale whenever new functional capabilities are needed or additional governmental entities are added. For example, a government can start small, adding a particular department or town and paying only for that usage. Other departments, even entire towns and cities, can be added later—paying only for what they use with the knowledge that IBM can provide the architecture on demand to support their growing needs.



Cloud deployment flexibility: Just in time software and hardware

Defining a smarter city

IBM defines a smarter city in terms of three key characteristics: instrumented, interconnected and intelligent. These characteristics suggest that a city must be able to sense and respond to its environment. It can observe its surroundings with sensors and other data-gathering mechanisms (instrumented). It can communicate and share information gathered with other government entities (interconnected), and it can use the data to make optimal service choices (intelligent). To make truly intelligent decisions requires data to be collected and analyzed from a diverse group of regional and local agencies.

With the right instruments, each of the service departments (Figure 4) has the capability to provide cities the opportunity to gather tremendous amounts of details about their physical environment. Details from diverse sources such as traffic flow, electrical usage, water quality and citizen emergencies are then analyzed to make predictions about resource needs and intelligent operations.

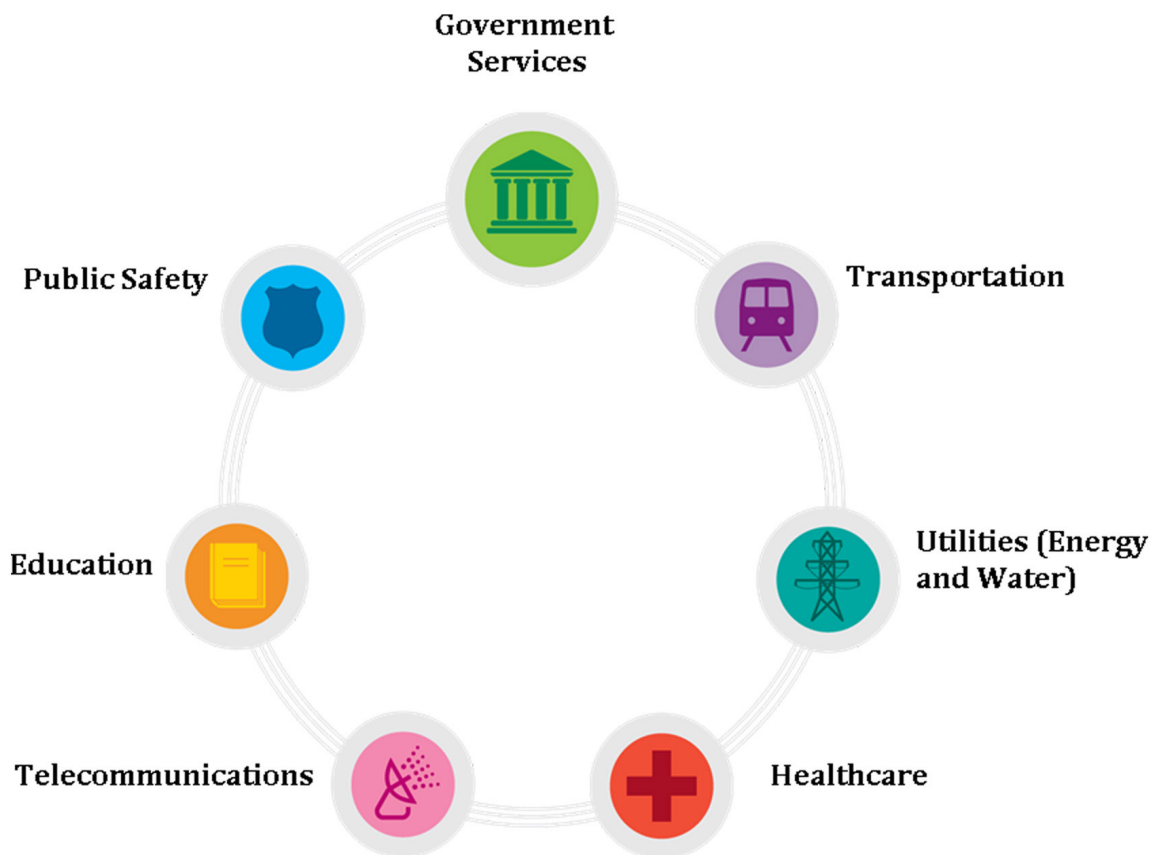


Figure 4: Departments and services comprising a smart city

“As city managers consolidate IT infrastructures to cut costs and reduce duplication, they are putting more of a focus on operating smarter cities. Gaining a holistic view of city operations is a wave of the future.”⁸

— Thom Rubel, Vice President of Research at IDC Government Insights

IBM Smarter City portfolio

Growth, economic value and competitive differentiation of cities will increasingly be derived from people and their skills, creativity and knowledge, along with the capacity of the economy to create and absorb innovation. To compete in this new economic environment, cities will need to apply advanced information technology, analytics and systems thinking to develop a more citizen-centric approach to services.

To help cities thrive, IBM has a solutions portfolio (Figure 5) to help planners, managers and departments improve their infrastructure and deployment services. Future white papers will focus on additional areas in Figure 5, including business domains such as city management, city development and city deployment services, along with their associated business content and reference architecture designed to speed implementation.

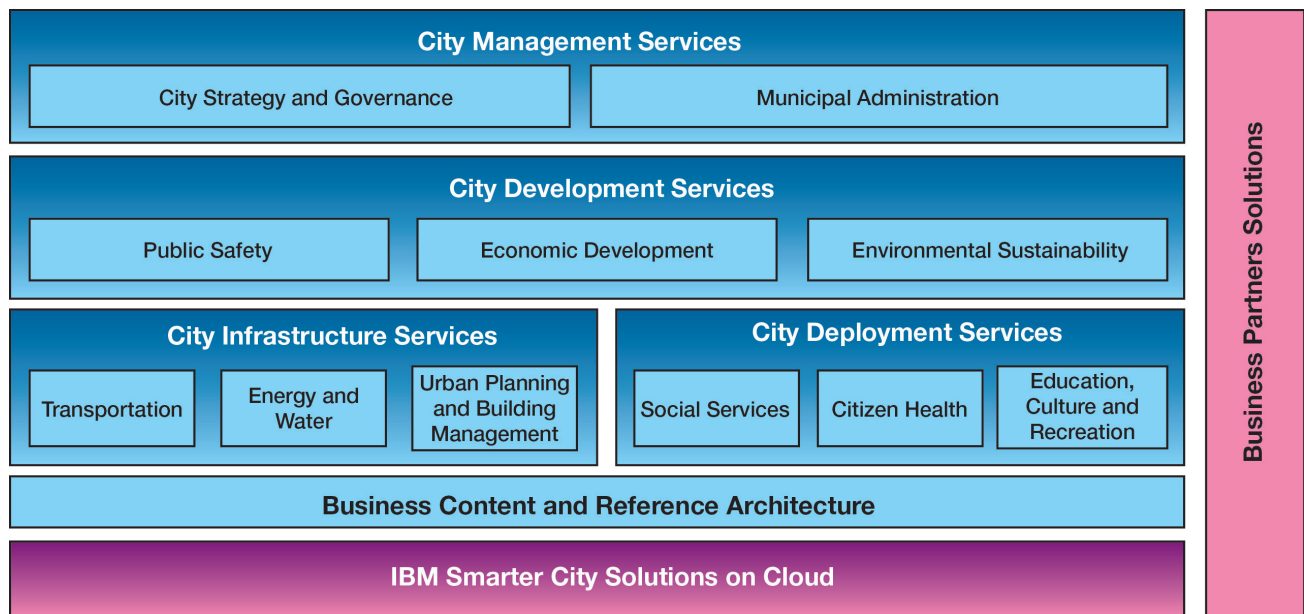


Figure 5: Smarter City Solution Areas

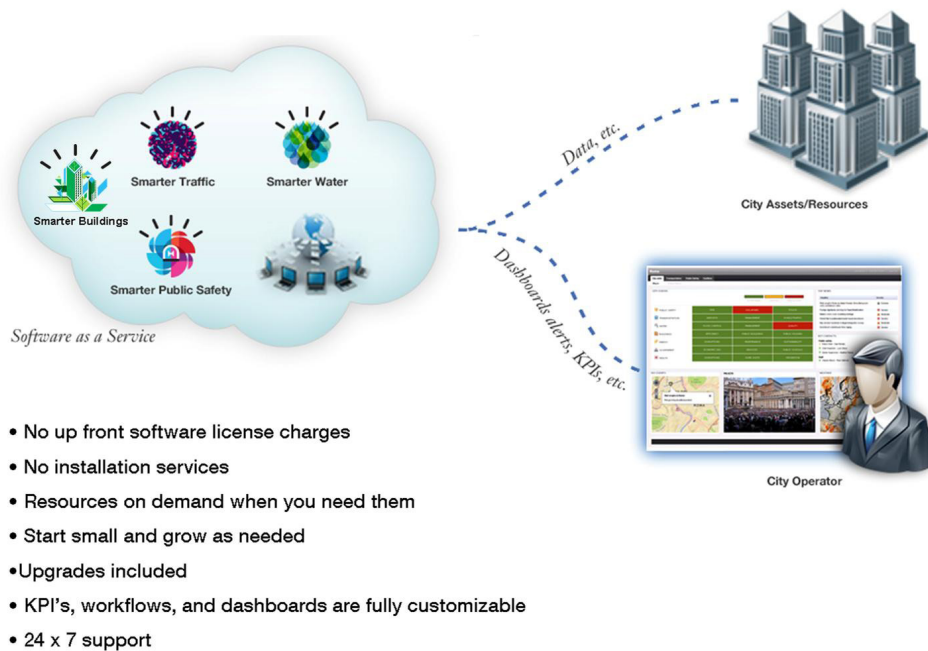


Figure 6: IBM operations management software coordinates with government agencies, including transportation and water management, to improve quality of service to citizens

IBM Smarter City Solutions on Cloud: SaaS

IBM has developed technologies to help governments become more instrumented, interconnected and intelligent, or in a word: *smarter*. **IBM Smarter City Solutions on Cloud can enable officials to manage critical communications between citizens and agencies.** The solutions are fully bundled sets of applications software, hardware, network and support. They are sold as a service with different deployment options. A separate environment will be deployed per client, providing additional data security and a high degree of customization. Data is physically separate and changes made by one client do not affect other clients.

Offerings and future services

IBM Intelligent Operations Center on IBM SmartCloud lies at the heart of IBM Smarter City Solutions on Cloud. It acts as a nerve center, transforming traditional government agency silos into a coordinated city or regional management response network. At a glance, it makes it possible for officials to view the overall status of a city and drill down into underlying domains such as traffic, water or public safety in order to monitor and direct response efforts.

The IBM Intelligent Operations Center on IBM SmartCloud is based on the application of leading practices and solutions that IBM has gleaned from over 2,000 Smarter Cities™ engagements. With IBM's knowledge and expertise, cities can achieve a fast return on their investments, reduce risk and gain the flexibility to extend their solutions to address future needs. **The IBM Intelligent Operations Center on IBM SmartCloud will enable cities to use information and analytics to make smarter and more timely decisions, helping local leaders manage a spectrum of events, both planned and unplanned.** These events can

include deploying water maintenance crews to repair pumps before they break, alerting fire crews to broken fire hydrants at an emergency scene or anticipating traffic congestion to prepare redirection scenarios. The technology, which is designed to process data feeds and event information from individual departments, will allow for views into intra and inter-agency operations, report generation based on personalized key performance indicators, customization of individual agency portals and the geospatial display of events on a map.

“The aim (of the IBM Intelligent Operations Center) is to help cities of all sizes use analytics more effectively to make intelligent decisions based on better quality and timelier information. City managers can access information that crosses boundaries, so they’re not focusing on a problem within a single domain. They can start to think about how one agency’s response to an event affects other agencies.”⁹

— Mark Cleverley, IBM Director of Public Safety Solutions

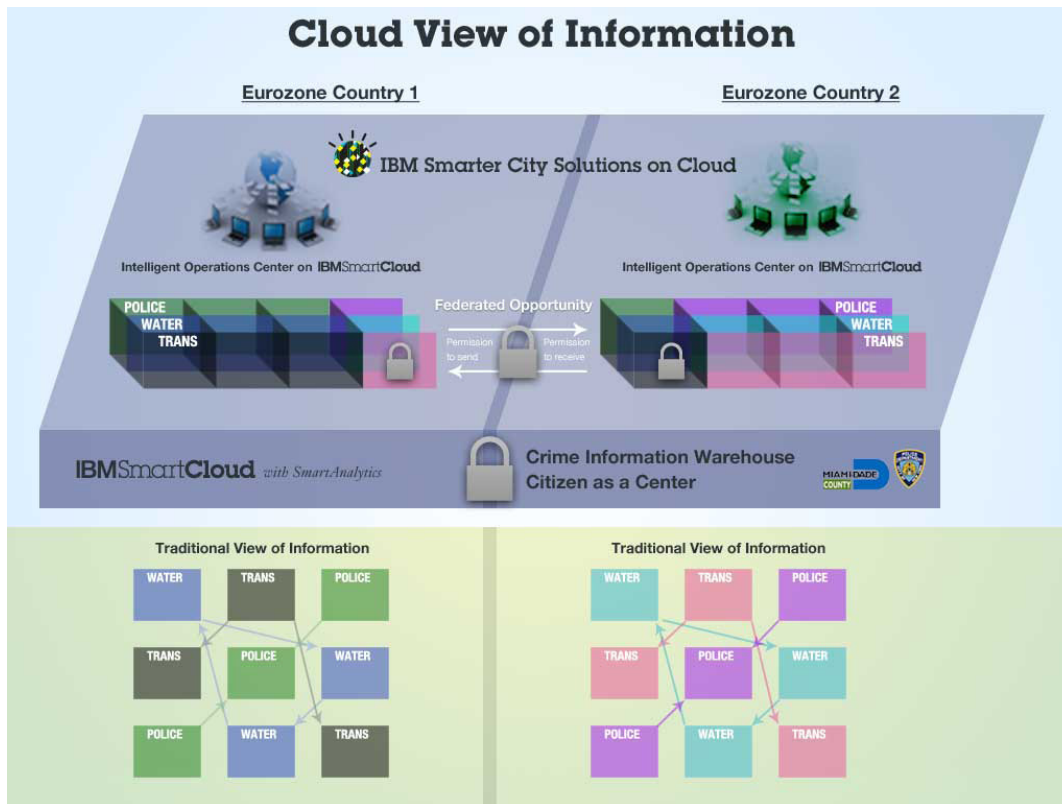
IBM also offers **IBM Intelligent Transportation** to help city traffic managers visualize and analyze traffic conditions so they can better manage incidents, increase performance, improve the commuter experience, reduce pollution and maximize the utilization of transportation assets. IBM Intelligent Transportation can aggregate traffic and incident information from multiple regions or locales and incorporate information captured from a diverse set of data input source types. It is designed to provide access to historical and real-time information regarding traffic performance, conditions, configurations and incidents. The software solution also enables personnel to visualize traffic volumes, speed and incident data for road links on a geospatial map. Finally, it offers a standard information model to facilitate scalability and provide a foundation on which a variety of transportation applications can be easily built.

IBM intends to deliver additional IBM Smarter City Solutions on Cloud. Table 2 lists planned solutions that will provide agency-specific application data to the IBM Intelligent Operations Center on IBM SmartCloud.

Table 2: Additional intended IBM Smarter City Solutions on Cloud that can provide agency-specific application data to the IBM Intelligent Operations Center on IBM SmartCloud

Future Services	Use Case Description	Potential Benefits
Water management	<p>Work optimization: Link asset maintenance data with crew skills and work orders</p> <p>Usage analytics and reporting: Analyze customer water usage to identify usage patterns and analyze historical and near real-time information about assets</p>	<p>Reduce service backlogs</p> <p>Reduce costs</p> <p>Improve pricing models</p> <p>Drive water conservation efforts</p>
Public safety	Use of video surveillance and other communications data to provide real-time information and situational awareness solutions to enable greater anticipation and prevention of crimes and emergencies	<p>Provide real-time alerts of potential threats</p> <p>Help catch offenders</p> <p>Assist in preventing crime</p>
Buildings	<p>Combining real-time systems monitoring with facilities and event management to help analyze and optimize operations.</p> <p>Enable building owners and managers to collect energy and operational metrics, store them for enterprise-wide analytics and view the data in a cohesive dashboard</p>	<p>Improve management of heating, air conditioning and power consumption to lower costs and emissions</p> <p>Use data and analytics to address service issues pro-actively</p> <p>Predict equipment maintenance issues</p>

The data and security options to meet your government's specific needs



IBM Smarter City Solutions on Cloud provide opportunities for governments at all levels to respond rapidly to real-time situations and securely collaborate over geographic regions. Emergency responsiveness depends on dynamically scaling your data-processing power to match an escalating crisis while correlating complex events. Getting the right data to the right department, over all communication channels (video, voice, messaging and transaction systems) can make the difference in an effective response or a catastrophic loss.

In a traditional deployment, data from departments is often in silos, and sharing information between departments is slow, leading to an inefficient crisis response. The cloud is an information-sharing platform that enables an operations center with the right security to reach out over departments, or even cities, to look for patterns in diverse pieces of information and coordinate resources during a crisis. For example, crime patterns can be collected from multiple regions by looking for the next trend or target area; water resources can be correlated for the spread of chemical impurities or even temperature patterns; and power consumption can be monitored for effectiveness or rationalization during a crisis.

Data security is of primary importance for any government. Data from police departments might need to be physically secure from utility departments, such as water and transportation. Because the cloud is a data aggregator, there are great opportunities for sharing information between communities that are providing the right security levels.

IBM has made substantial investments in solutions that secure and manage data based on country, city, region and department boundaries. With IBM VLAN isolation, hypervisor and application security protocols, plus intrusion detection systems, we can protect your data from unauthorized use while also building in the right flexibility to allow critical information-sharing in a particular country, department or both. With our common cloud management platform, authentication procedures, services framework and leading work in federated cloud communications, we can extend the reach of collaborating countries by selectively sharing agreed-upon pieces of information in real time.

Deployment choices for IBM Smarter City Solutions

IBM offers a full range of deployment choices for implementing your solutions. From traditional licensed models, to hosted solutions and public clouds, **IBM offers its customers the choices they need to match their implementation requirements.** The following options are available for IBM Intelligent Operations Center on IBM SmartCloud and Intelligent Transportation Management on Cloud and are also intended for future services centered on water management and public safety.

Public cloud: IBM SmartCloud Enterprise

IBM Smarter City Solutions on Cloud will run on the IBM public cloud offering that supports the common emerging public deployment approach called “shared cloud services.” Unlike other public clouds, IBM SmartCloud Enterprise is specifically tuned to the needs of commercial and public agencies, helping to provide a safe and secure cloud infrastructure environment.



Figure 7: IBM Smarter City Solutions on Cloud deployment models

IBM Smarter City Solutions on Cloud will be offered as SaaS and payment will be based on the number of users or other measurable entitlements. For the IBM Intelligent Operations Center on IBM SmartCloud, the IBM SaaS charges will be based on the number of monthly concurrent users. IBM Intelligent Transportation on Cloud will consider other SaaS billing approaches, such as roadway mileage. Future IBM SaaS solutions will consider SaaS billing based on the entitlements and characteristics of each specific solution.

IBM SmartCloud Enterprise provides a standard architecture footprint that can be configured to turn on and tune specific business process and application features. Implementation and configuration services are available for IBM Smarter City Solutions on Cloud from the IBM Global Services organization.

Hosted models

IBM currently offers a hosted (non-cloud) model that will be configured to your specifications and supported at an IBM Global Delivery Center. At each IBM Global Deliver Center, IBM maintains the highest levels of operational excellence,

security and service management. A single executive dashboard that clients can access at any time provides service delivery performance and operational reporting.

Additionally, IBM plans to offer a hosted private cloud where governments can add core cloud characteristics, such as provisioning, a self-service portal, metering, as well as cross charging or billing using IBM's cloud computing software and reference architecture, to meet their application virtualization needs.

Traditional (non cloud) deployment choice

Government entities can purchase licensed software directly from IBM, similar to the traditional purchase methods for other software such as database and middleware. The licensed software solution can then be rapidly installed into a datacenter with preconfigured images.

Comparative overview of deployment choices

Table 3 compares high-level implementation, ownership and management characteristics associated with each deployment model outlined above.

Table 3: IBM Smarter City Solutions deployment comparisons

Comparative overview of deployment choices				
	Traditional	Hosted (Non-cloud)	Hosted (Private cloud)	IBM SmartCloud Enterprise
Implementation	Implemented on client premises	Client on and off premise implementation options	On or off client premises with cloud attributes of provisioning, self service, and metering	Implemented at an IBM Cloud Deployment Center
Ownership	Client owned and managed	Client owned and IBM managed	Client owned and managed or client owned and IBM managed	Client-based subscription model managed by IBM
Management	Dedicated resources, private facility	Dedicated resources, shared facility	Mix of shared and dedicated resources	Dedicated software instances with shared environment for hardware, networking and facilities, VPN, segregation of data
Payment options	Licensed software	Licensed software. Hardware and implementation paid by the month.	Licensed software. Hardware and Implementation paid by the month	SAAS based on fixed-term contract plus quantity of entitlement

Considerations for selecting a deployment model

There are many factors to consider when deciding which deployment model is right for your government. Listing deployment attributes and making a relative comparison to each of the different deployment options can help in your analysis.

Deployment attribute considerations

Figure 8 depicts the relative weighting of each deployment attribute to the traditional, hosted and IBM SmartCloud Enterprise cloud models.

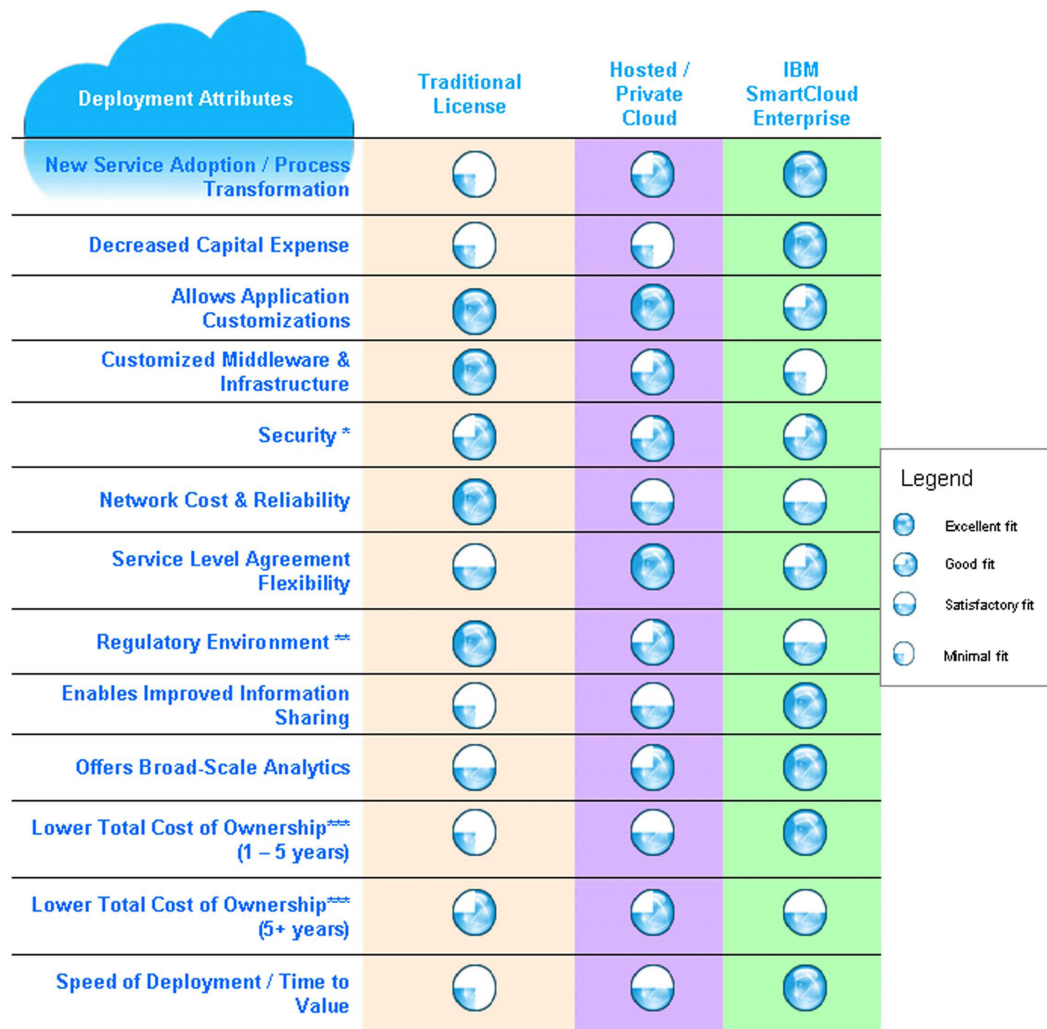


Figure 8: Comparison of the deployment considerations in terms of specific capabilities¹⁰

*Traditional and hosted or private cloud security options: To achieve IBM's standard security mode might require substantial investment.

** Regulatory environment may dictate where physical data can be located.

*** Total cost of ownership: High-availability options are readily available on IBM SmartCloud Enterprise and might be costly to build in a traditional or private on-premise environment

Depending on your situation, the relative weighting and comparison for each deployment attribute might be different from that shown in Figure 8; therefore, you should identify your requirements and then weigh them against each deployment option. For the IBM SmartCloud Enterprise option, IBM provides a consistent level of service for each deployment attribute. For the traditional license, as well as hosted and private cloud options, there will be a high degree of variability between customers and the level of datacenter investments, which might change how you rate them.

Additional private versus public cloud considerations

A primary benefit of a public cloud-computing model is that it reduces the need for internal IT infrastructure. However, to access data and services in the public cloud, devices such as notebook computers, tablet computers or mobile phones rely on usage of the Internet through a network infrastructure. Therefore, the network must be robust enough to handle the increased traffic, provide suitable bandwidth for continuous usage and provide redundancy and reliability.

When the overall benefits of a public cloud deployment are considered, the location of IBM SmartCloud datacenters might be an important factor. There are currently six centers located around the globe, providing expansive coverage and accommodating the need for geographic-specific data privacy. IBM plans to add new locations regularly, expanding global coverage and giving governments an even broader set of options. Consult an IBM solutions representative for the latest list of delivery centers.

Governments that are located significant distances from an IBM SmartCloud datacenter will need to weigh the tradeoffs with private cloud deployments because of potential latency issues. Additional considerations, such as the amount of investment required to modernize a customer datacenter to enhance security and add high availability options, must also be factored in when choosing a deployment model.

Governments might also have specific restrictions on where data may be located. Potential IBM SmartCloud clients would have to ensure that the cloud datacenter they use would adhere to their particular regulations or consider a private cloud solution.

Finally, as you consider your requirements and want to reap benefits gained from the services IBM offers with Smarter City Solutions on Cloud, you can consider starting on the IBM SmartCloud and scale at your own pace. Later, you can move from the IBM SmartCloud model to a more traditional model should your requirements change.

Governments as a cloud service provider

Governments and their associated agencies operate some of the largest datacenters in the world economy. As previously stated, the US federal government alone operates 2,100 datacenters and plans to close 800 of them by 2015.¹¹

Similar to many large telecommunication companies, government agencies at all levels have vast arrays of datacenter space, processing power and infrastructure. Therefore, when considering a Smarter City Solution, it is important to determine how city centers need to be connected to different regions, network performance, when and how data is to be shared, as well as efficiencies that can be gained by applying standard implementation patterns (Figure 9).

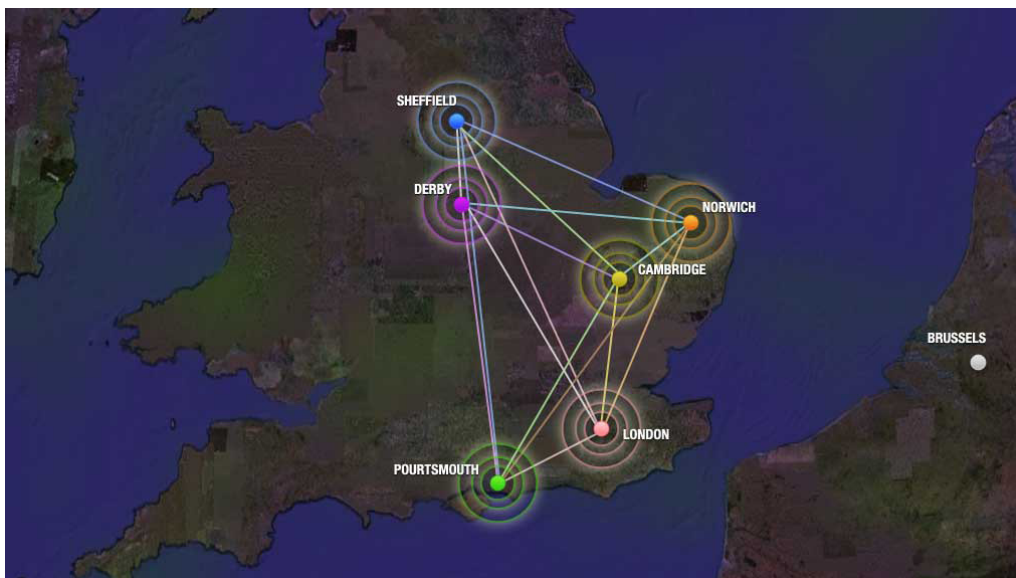


Figure 9: Individual Smarter Cities implementations connected by data sharing and traditional collaboration patterns

Pressed by budgetary needs, governmental agencies around the world are beginning large-scale consolidation and standardization programs. Leaders of the consolidation programs have been instructed by their respective CIOs to use cloud computing technology to simplify and standardize their application and datacenter footprint while offering improved and easy access to citizen services (Figure 10).

For those government agencies considering an in-house cloud program, IBM has the supporting technology to transform a government from a traditional datacenter into a cloud service provider, effectively creating your own government cloud services environment. IBM has the “carrier grade” software and processes to offer a variety of cloud services rapidly and cost-effectively—and provide secure, self-service portals where customers obtain, manage and pay for these cloud services.

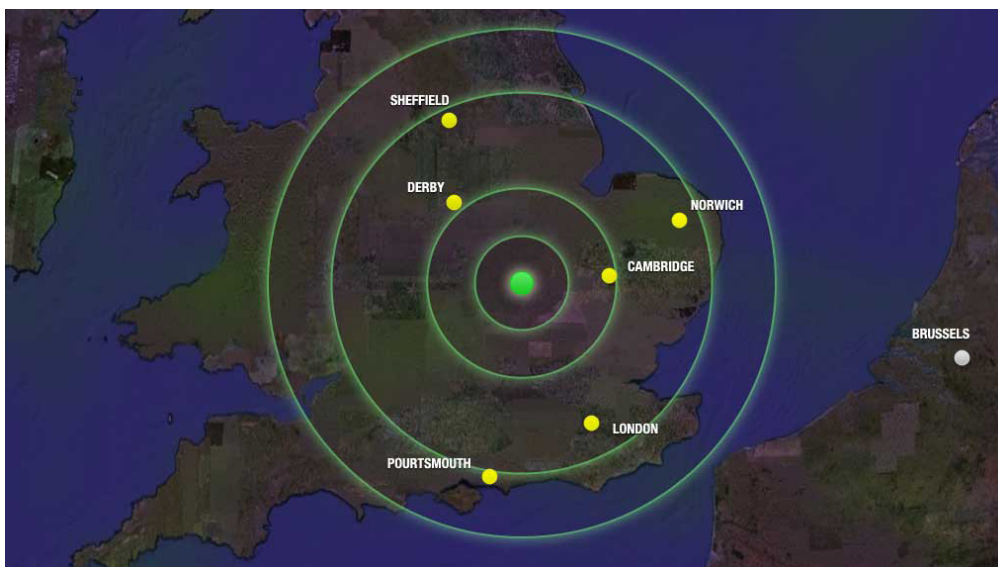


Figure 10: Regional governments, acting as cloud service providers, can simplify and standardize their deployments, while making infrastructure and secured data readily available to respond to critical events

IBM believes that the IBM Smarter City Solutions on Cloud will help governments exceed their expectations with regard to cost savings and operational dexterity by combining cloud technologies, improved citizen services and enhanced traffic and water management efficiencies. By delivering IBM Smarter City Solutions on Cloud and serving as the cloud service provider to their tax bases, larger governments can:

- Obtain operational efficiencies through scale.
- Assist smaller towns and communities in realizing the benefits with easy to implement services.
- Effectively use the additional information received from the multiple regions they serve to improve decision-making and citizen services.
- Correlate water and transportation management in unique ways to help attract and retain new businesses for communities.
- Connect government to business.

Conclusion

Governments are keenly interested in ways they can significantly reduce costs and increase operational efficiency while improving quality of service to their citizens. The intersection of two areas, Smarter Cities and cloud computing, offers unique opportunities for governments to achieve these goals. IBM Smarter City Solutions on Cloud provides key technologies to help lower initial costs, provides attractive and predictable operating costs compared with traditional deployments and offers the flexibility to be implemented at a city's own pace. By providing cities with a comprehensive "pay-as-you-go" solution that includes application software, infrastructure, networking, systems software, middleware and maintenance, the solution lowers the barrier of entry, while enabling them to deliver excellent service to their citizens.

When they choose to migrate to a cloud-computing environment, governments have a number of public and private deployment options available to them. IBM's professional services team can help determine the deployment choice that best fits their needs.

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Mr. Naccarati is the Cloud Computing Industry Leader for the IBM Enterprise Initiatives organization, where he is responsible for scaling industry SaaS solutions on the IBM SmartCloud platform. He has over 25 years of experience with leading large technology transformation programs for major corporations and building mission-critical systems using the latest advanced technologies.

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Dr. Hobson is a Research Staff Member in the Services Research organization. As a human-to-computer interaction researcher, her interests lie in studying people. Her current research is in Smarter Cities with a focus on intra- and inter-agency information-sharing in government. Her prior work has included studying the use of cloud computing in municipal governments.

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