How Cities Can Stop Wasting Money, Move Faster, and Innovate

Simplify and Streamline IT with AWS Cloud Computing

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Notices

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Abstract

Local and regional governments around the world are using the cloud to transform services, improve their operations, and reach new horizons for citizen services. The Amazon Web Services (AWS) cloud enables data collection, analysis, and decision making for smarter cities. This whitepaper provides strategic considerations for local and regional governments to consider as they identify which IT systems and applications to move to the cloud. Real examples that show how cities can stop wasting money, move faster, and innovate.

Stop Investing in Technology Infrastructure

Faced with pressure to innovate within fixed or shrinking budgets while meeting aggressive timelines, governments are turning to Amazon Web Services (AWS) to provide cost-effective, scalable, secure, and flexible infrastructure necessary to make a difference.

The cloud provides rapid access to flexible and low cost IT resources. With cloud computing, local and regional governments no longer need to make large upfront investments in hardware or spend a lot of time and money on the heavy lifting of managing hardware.

AWS Cloud Computing
AWS offers a broad set of global compute, storage, database, analytics, application, and deployment services that help local and regional governments move faster, lower IT costs, and scale applications.

"I wanted to move to a model where we can deliver more to our citizens and reduce the cost of delivering those services to them. I wanted a product line that has the ability to scale and grow with my department. AWS was an easy fit for us, and the way we do business. By shifting from capex to opex, we can free up money and return those funds to areas that need it more—fire trucks, a bridge or a sidewalk"

Chris Chiancone
CIO
City of McKinney

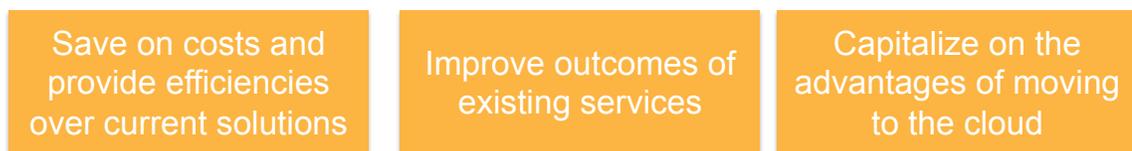Instead, government agencies can provision exactly the right type and size of computing resources needed to power your newest bright idea and drive operational efficiencies with your IT budget. You can access as many resources as you need, almost instantly, and only pay for what you use.

AWS helps agencies reduce overall IT costs in multiple ways. With cloud computing, you do not have to invest in infrastructure before you know what

demand will be. You convert your capital expense into variable expense that fluctuates with demand, and you pay only for the resources used.

Trend Toward the Cloud

Local and regional governments are adopting cloud computing, however, identifying the correct projects to migrate can be overwhelming. Applications that deliver increased return on investment (ROI) through reduced operational costs or deliver increased business results should be at the top of the priority list. Applications are either critical or strategic—if they do not fit into either category, they should be removed from the priority list. Instead, categorize applications that aren't strategic or critical as legacy applications, and determine if they need to be replaced or, in some cases, eliminated.

Save on costs and provide efficiencies over current solutions	Improve outcomes of existing services	Capitalize on the advantages of moving to the cloud

Figure 1: Focus Areas for Successful Cloud Projects

When considering the AWS cloud for citizen services, local and regional governments must first make sure that their IT plans align with their organizations' business model. Having a solid understanding of the core competencies of your organization will help you identify the areas that are best served through an external infrastructure, such as the AWS cloud.

The following example shows how a city is using the AWS cloud to deliver more with less and reduce costs.

City of McKinney

City of McKinney, Texas Turns to AWS to Deliver More Advanced Services for Less Money

The City of McKinney, Texas, about 15 miles north of Dallas and home to 155,000 people, was ranked the No. 1 Best Place to live in 2014 by Money Magazine. The city's IT department is going all-in on AWS and uses the platform to run a wide range of services and applications, such as its land-management and records-management systems. By using AWS, the city's IT department can focus on

delivering new and better services for its fast-growing population and city employees instead of spending resources buying and maintaining IT infrastructure.

City of McKinney chose AWS for our ability to scale and grow with the needs of their department. AWS provides an easy fit for the way they do business. Without having to own the infrastructure, the City of McKinney has the ability to use cloud resources to address business needs. By moving from a capex to an opex model, they can now return funds to critical city projects.

Move Faster

AWS has helped over 2,000 government agencies around the world successfully identify and migrate applications to the AWS platform, resulting in significant business benefits. The following steps help governments identify, plan, and implement new citizen services that take advantage of current technology to boost efficiencies, save tax dollars, and deliver an excellent user experience.

Business Benefits of Agile Development on AWS

- Trade capital expense for variable expense

  — Instead of having to invest heavily in data centers and servers before you know how you're going to use them, you can pay only when you consume computing resources, and pay only for how much you consume.

- Benefit from massive economies of scale

  — By using cloud computing, you can achieve a lower variable cost than you can get on your own. Because usage from hundreds of thousands of customers is aggregated in the cloud, providers, such as AWS, can achieve higher economies of scale that translate into lower pay-as-you-go prices.

- Stop guessing capacity

  — Eliminate guessing on your infrastructure capacity needs. When you make a capacity decision prior to deploying an application, you might end up either sitting on expensive idle resources or dealing with limited capacity. With cloud computing, these problems go away. You can access as much or as little as you need, and scale up and down as required with only a few minutes' notice.

- Increase speed and agility

  — In a cloud computing environment, new IT resources are only a click away, which means you reduce the time it takes to make those resources available to your developers from weeks to just minutes. This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower.

- Stop spending money on running and maintaining data centers

  — Focus on projects that differentiate your business, not the infrastructure. Cloud computing lets you focus on your own customers, rather than on the heavy lifting of racking, stacking, and powering your data center.

Pick Your Project, Pick One Thing

A common mistake is starting too many projects at once. A good first step is to identify a critical need, and focus your development efforts on that service. Completing the following actions will help drive success of the new service throughout the development cycle:

- Find the right resources.

- Get all team members on board during initial planning phases.

- Secure executive buy-in.

- Clearly communicate status through regularly scheduled meetings with all stakeholders.

Be flexible throughout the project. Periodically take a fresh look to review the progress, and be open to changes that may need to be incorporated into the project plan.

Many organizations choose to begin their cloud experiments with either creating a test environment for a new project (since it allows rapid prototyping of multiple options) or solving a disaster recovery need given that it is not physically based in their location. Below is an example of an ideal first workload to start with. The City of Asheville started with a disaster recovery (DR) solution as their first workload in the cloud.

City of Asheville

The City of Asheville, NC Uses AWS for Disaster Recovery

Located in the Blue Ridge and Great Smoky mountains in North Carolina, the City of Asheville attracts both tourists and businesses. Recent disasters like Hurricane Sandy led the city's IT department to search for an offsite DR solution. Working with AWS partner CloudVelox, the city used AWS to build an agile disaster recovery solution without the time and cost of investing in an on-premises data center.

The City of Asheville views the geographic diversity of AWS as the key component for a successful DR solution. Now the City of Asheville is using AWS for economic development, using tools to develop great sites that attract large businesses and job development.

Validate with a Proof of Concept

A proof of concept (POC) demonstrates that the service under consideration is financially viable. The overall objective of a POC is to find solutions to technical problems, such as how systems can be integrated, or throughput can be achieved with a given configuration.

A POC should accomplish the following:

- **Validate the scope of the project**. The project team can validate or invalidate assumptions made during the design phase to make sure that the service will meet critical requirements.

- **Highlight areas of concern.** Technical teams have a clear view of potential problems during the development and test phase, with the opportunity to make functional changes before the service goes live.

- **Demonstrate a sense of momentum**. Projects can sometimes be slow to start. By testing a small number of users acting in a "citizen role," the POC shows both development progress and helps to establish whether the service satisfies critical requirements and delivers a good user experience.

King County used a POC to realize cost savings in the use case below validating the project's viability.

King County

King County Saves $1 Million in First Year by Archiving Data in AWS Cloud

King County is the most populous county in Washington State with about 1.9 million residents. The county needed a more efficient and cost-effective solution to replace a tape-based backup system used to store information generated by 17 different county agencies. It turned to AWS for long-term archiving and storage using Amazon Glacier and NetApp's AltaVault solution, which helps the county meet federal security standards, including HIPAA and the Criminal Justice Information Services (CJIS) regulations. The county is saving about $1 million in the first year by not having to replace outdated servers and projects; an annual savings of about $200,000 by reducing operational costs related to data storage.

King County selected AWS due to the mature services and rich feature set that is highly available, secure, cost competitive, and easy to use. King County has a long-term vision to shift to a virtual data center based on cloud computing.

Manage the Scope

Defining the scope of your cloud migration or cloud application development project is key to success. Often, when developing new citizen services, there is a desire to address all citizen needs with a single project, while insufficient resources and changing definitions (requirements, scope, timeframes, purpose, deliverables, and lack of appropriate management support) add to the challenge. With a flexible cloud computing environment, it is possible to tightly focus on a single issue, develop an application that addresses that need and then iterate upon it with updates while the application is in flight. This can minimize the impact of these issues, allowing real-world piloting and improvements.

Since processes are always linked to other processes, any unplanned changes affect these other interfacing processes. With just a little structure and some checkpoints, most of the major changes in scope can be avoided. Start with a project that will involve a limited number of users. This will allow you to control and manage the service development and production process more efficiently and effectively. To get started, select a service and define scope using the following actions:

- Define terms related to the project.

- Involve the right people in defining the scope.

- Accurately define processes.

- Define process boundaries explicitly.

- Outline high level interfaces between processes

- Conduct a health check on the process interfaces.

- Realize that certain aspects of the project still make it too large to manage.

By minimizing the project scope, local and regional governments can reduce development and administrative costs, as well as achieve time savings.

Release Minimally Viable Product and Iterate

When is the right time to release a citizen service? If released too soon, it may lack necessary functionality and deliver a poor user experience. If it is too elegant, developers may spend too much time on functionality.

Releasing a minimally viable service and then iterating based on feedback can be an effective design process when designing citizen services. With this approach you still guide the development, but an iterative process allows citizens to provide feedback to help shape the functionality before it is locked down. Only the local or regional government knows the "minimum." With no upfront costs and the ability to scale, the cloud allows for this to happen quickly and easily from anywhere with device independence. By the time the citizens access the site, IT has already made several iterations, so the public sees a more mature site.

It's more productive to release early. This minimizes development work on functionality that citizens do not want. Most people are happy to help test the service to make sure that it meets their needs. Additionally, this stress testing will help uncover bugs that need to be fixed before the site goes into production. This will help meet the ultimate goal: an excellent user experience.

The City of Boston is an example of how a city released a minimally viable product and continued to iterate on the product to get the best version for the needs of their citizens.

City of Boston
Quickly Identifies Road Conditions that Need Immediate Attention and Repair

The City of Boston, with technology partner Connected Bits, has created the Street Bump program to drive innovative, scalable technology to tackle tough local government challenges.

They are using AWS to propel machine learning with an app that uses a smartphone's sensors – including the GPS and accelerometers - to capture enough (big) data to identify bumps and disturbances that motorists experience while they drive throughout the city. The big data collected helps the Boston's Public Works Department to better understand roads, streets, and areas that require immediate attention and long term repair.

They have chosen AWS to create a scalable, open, and robust infrastructure that allows for this information to flow to and from city staff via the Open311 API. This solution was created as a large multi-tenant software-as-a-service platform so other cities can also leverage the same repository, creating one data store for all cities. Several other cities are interested in testing the next version.

Take Advantage of New Innovations

Engage Your Citizens in Crowdsourcing

The idea of soliciting customer input is not new. Crowdsourcing has become an important business approach to define solutions to problems. By tapping into the collective intelligence of the public, local and regional government can validate service requirements prior to a lengthy design phase.

Crowdsourcing can improve both the productivity and creativity of your IT staff, while minimizing design, development and testing expenses. Let the citizens do the work—after all, they are the ones who will be using the service. Make sure it is designed to meet their requirements.

Two examples of using crowdsourcing to provide real-time updates to the citizens are Moovit and Transport of London.

Moovit

With AWS, Moovit Now Processes 85 million Requests Each Day

 Moovit, headquartered in Israel, is redefining the transit experience by giving people the real-time information they need to get to places on time. With schedules, trip planning, navigation, and crowdsourced reports, Moovit guides transit riders to the best, most efficient routes, and makes it easy for locals and visitors to navigate the world's cities. Since launching in 2012, Moovit's free award-winning app for iPhone, Android, and Windows Phone serves nearly 10 million users, and is adding more than a million new users every month. The app is available across 400 cities in 35 countries, including the U.S., Canada, France, Spain, Italy, Brazil, and the U.K.

Moovit's goal was to continue to add metros quickly, and it needed a solution that would scale just as fast. Moovit now uses AWS to host and deliver services for its public transportation trip-planning app — using Amazon CloudFront to rapidly deliver information to its users. The company made the decision to use AWS because it has servers that can handle the app's heavy request volume and different types of information, and because it supports multiple databases, including SQL and NoSQL, and includes storage options.

Transport for London

Transport for London Creates an Open Data Ecosystem with Amazon 4 Web Services with AWS

 Transport for London (TfL) has been running its flagship tfl.gov.uk website on AWS for over a year, and serves over 3 million page views to between 600,000 and 700,000 visitors a day, with 54% of visits coming from mobile devices. TfL has been able to scale interactive services to this level (its previous site was static), by leveraging AWS services as an elastic buffer between its back-office services and the 76% of London's 8.4 million population that uses the site regularly to plan their journeys.

Enhanced personalization for customers is now available on this site; in parallel, the department is fostering closer relationships with the third-party app and portal providers that contribute digital solutions of their own for London's travelers, based on TfL's (openly licensed) transport data. TfL has chosen to

release this data under an open data license, which has helped to establish an ecosystem of third-party developers also working on digital travel-related projects. Some 6,000 developers are now engaged in digital projects using TfL's anonymized open data, spawning 360 mobile apps to date.

Automate Critical Functions for Citizens

People are more connected to each other than ever before, and the increased connectivity of devices creates new opportunities for the public sector to truly become hubs of innovation, driving technology solutions to help improve citizens' lives. The Internet of Things (IoT) is the ever-expanding network of physical "things" that can connect to the Internet and the information that they transfer without requiring human interaction. "Things" in the IoT sense, refer to a wide variety of devices embedded with electronics, software, sensors, and network connectivity, which enable them to collect and exchange data over the Internet.

AWS is working with local and regional governments to apply IoT capabilities and solutions to opportunities and challenges that face our customers. While the possibilities for IoT are virtually endless, the following diagram highlights use cases we are discussing with customers today.

Transportation	Public Safety	Health & Well-Being	City Services
• Parking solutions • Connected smart intersections • Smart routing / navigation • Fleet tracking / monitoring	• Crowd control / management • Officer safety • Emergency notification • Security solutions	• Air / particle quality • Water control management • Trash / garbage collection • Lighting control • Water metering	• Infrastructure monitoring • Building automation systems

Figure 2: Internet of Things Use Cases for Local and Regional Governments

London City Airport

IoT Technologies Enhance Customer Experience at London City Airport

The 'Smart Airport Experience' project was funded by the government-run Technology Strategy Board in the UK and implemented at London City Airport, working with a

technology team led by Living PlanIT SA. The goal of the project was to demonstrate how Internet of Things technologies could be used to both enhance customer experiences and improve operational efficiency at a popular business airport that already offers fast check-in to boarding times. The project used the Living PlanIT Urban Operating System (UOS™) hosted in an AWS environment as the backbone for real-time data collection, processing, analytics, marshaling, and event management.

Start Your Journey

AWS provides a number of important benefits to local and regional governments as the platform for running citizen services and infrastructure programs. It provides a range of flexible, cost effective, scalable, elastic, and secure capabilities that you can use to manage citizen data in the AWS cloud.

Work with AWS Government & Education Experts

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