AWS and Local Government
City on a Cloud
City on a Cloud Innovation Challenge 2016

AWS helps local and regional governments innovate by simplifying IT workloads that governments struggle with and depend on every day, such as Geographical Information Systems (GIS), Content Management Systems (CMS), Open Data portals, and more. All of these applications run on AWS and make it easier for governments to deliver services to their citizens.
How AWS Views Smart Cities
Smart City

A city that leverages technology and data to provide better services, and better quality of life for its citizens, while optimize cost of operations.

There is no pre-defined list of solutions that if deployed will make a city “smart”.
Key Ingredients

OPEN DATASETS
- Open Data
- Citizen Data

DATA ANALYTICS
- Real Time
- Data Warehousing
- Machine Learning

SENSOR DATA
- Device Data
- Mobile Data / “Citizen Sensors”
Smart solutions spans numerous areas...

**City Planning**

Cities are using cloud-based tools for permitting, planning and historic preservation. Learn about San Francisco’s City Planning efforts.

**Sanitation**

GIS technology has revolutionized many aspects of city life – including sanitation. Learn how Jerusalem is using Clean City to track and manage garbage collection and give citizens greater control over collection of waste.

**Air Transportation**

Transit hubs can be an asset or a hindrance to those trying to reach their destination. Learn how London City Airport has employed an Internet of Things approach to help travelers be more efficient and productive.

**Open Data**

The most basic function of a local government is to communicate to the public about the area. Learn how Santa Clara is realizing savings from moving their website infrastructure from an premises to the cloud.

**Parks**

Urban areas value green spaces for recreation, public health and aesthetics. Learn about the Open Tree Map application being used by many cities and towns.

**Voting**

There is nothing more central to civic life than the opportunity to express your opinion and elect your leaders. Cloud technology is making the voting process more efficient and reliable. Learn how Rhode Island is deploying cloud-based voting systems to move democracy forward.

**Utility Monitoring**

Utilities are a core piece of the critical infrastructure of a city. Learn how the City of Houston, Texas, deployed a cloud-based water monitoring application that helped to reduce water usage and cut down on billing complaints.

**Public Websites**

Healthcare is becoming increasingly dependent on data. As the government becomes more involved in the healthcare marketplace, adoption of technology to drive efficiency and effectiveness is accelerating. Learn how Michigan Health Connect is addressing these challenges.

**Street Maintenance**

Whether in the wake of a major storm or simply for routine maintenance, cloud-based applications can help direct street maintenance efforts. Learn how New York City Transit dealt with the aftermath of Hurricane Sandy.

**Disaster Preparedness**

The cloud offers a compelling alternative to backup on premises data centers for disaster recovery. Learn how the City of Asheville, NC is implementing disaster recovery.

**Public Safety and Policing**

Police departments need to focus their resources in the right place at the right time. Through data analytics, HunchLab helps police departments anticipate crime patterns and focus resources where they are needed most.

**Healthcare**

Healthcare is becoming increasingly dependent on data. As the government becomes more involved in the healthcare marketplace, adoption of technology to drive efficiency and effectiveness is accelerating. Learn how Michigan Health Connect is addressing these challenges.

**Route Planning**

Visitors and commuters alike need up-to-date information to help them plan their journeys in major cities. Learn how Transport for London used cloud technology to speed travelers from point A to point B.

**Job Creation**

Government entities are increasingly opening their data to citizens, businesses and other governments to improve the flow of information and the basis for innovation. Learn about Sabae City, Japan’s “Data City Initiative.”

**Sensor Monitoring**

At the heart of the Internet of Things is sensor monitoring. Enabled by the AWS platform, the data can be transferred and processed with ease and efficiency.

**Archives**

Vast amounts of data require a new approach. Learn how cities are digitizing and storing their records - and making them more available to their citizens. Read about Dorset History Centre in Southwest England.
AWS - Platform for Smart City Solutions
Smart City solutions typically rely on...

**Real-time Streaming Data**
Collect and process big data in real-time with Amazon Kinesis Services. Load massive streams, analyze them with SQL or build your own custom applications.

**Data Warehousing**
Query & analyze large datasets for less than $1,000 per TB per year with Amazon Redshift, a fast, fully managed, petabyte-scale data warehouse.

**Hadoop & Big Data Analytics**
Easily provision and dynamically scale a Hadoop cluster with Amazon EMR, a managed Hadoop framework. Create and run managed Apache Spark clusters.

**Machine Learning**
Create powerful predictive models & machine learning applications without the need to learn complex algorithms, using Amazon Machine Learning.

**Data Storage**
With trillions of objects stored across 11 regions worldwide, Amazon S3 provides a highly reliable, secure, scalable store for all your data, big or small.

**Relational Databases**
Easily set up, operate, and scale relational databases in the cloud with Amazon RDS. Choose from MySQL, MariaDB, Oracle, Microsoft SQL Server, PostgreSQL or Amazon RDS for Aurora.

**NoSQL Databases**
Deliver consistent, single-digit millisecond latency at any scale with Amazon DynamoDB - a managed NoSQL database for unstructured data and low latency applications.

**Elasticsearch Analytics**
Easily configure, scale, and operate Elasticsearch clusters, for powerful search, log analysis, and data visualization with Amazon Elasticsearch Service.
AWS: Comprehensive set of services

DATA SOURCES
- Smart Devices
- Citizen Data
- Public Data Sets

DATA RETRIEVAL
- AWS IoT

DATA PROCESSING
- AWS Lambda
- Amazon Kinesis
- Amazon Machine Learning
- Amazon EMR

DATA OUTPUT
- Processed Data
- Amazon DynamoDB
- Amazon Redshift

DATA VISUALIZATION
- Custom Dashboards
- Citizen Apps
- Amazon QuickSight / Other BI Tools
Global Infrastructure

13 Regions
35 Availability Zones
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INCREASE INNOVATION
Lower the cost of experimentation

ELASTIC CAPACITY
+ NO CAPEX
+ PAY AS YOU GO
+ AVAILABLE ON-DEMAND

= NO RISKS
AWS Differentiators

- Experience
- Platform capabilities (breadth & depth)
- Serving 1M active customers across 190 countries, including 2300 Govt. customers
- Partner Eco System (Integrators, ISVs)
- Continual Iteration & Innovation
- Cost Savings and Flexibility
AWS IoT - For Connected Smart City Solutions
AWS IoT Strengths

• Focus on Security, End to End
• It’s a Serverless, managed service
• Built on modern architecture: messages, events, rules, functions – at scale
• Front door to all of AWS

• Any Chipset
• Any Operating System
• Protocol Agnostic
• Cost follows usage
Smart City IoT Solution Examples

- Assisted Vehicles
- Traffic & Parking
- Transportation
- Energy & Utilities
- Waste Management
- Public Safety
- Citizen Connection
Smart Solutions on AWS
Customer Solutions

Partner Solutions
One Nation, One Map

First Government-Wide National Intelligent Map Portal:
Integrated map system for gov’t agencies to deliver location-based services and information
  • Multi-agency collaboration platform

“AWS has helped my organization to provide better service availability and handle higher traffic load at a lower cost”
— Chan Chin Wai, Chief Information Officer, SLA
Moovit: Smart Public Transportation

Mobile app turns bus and train riders into real-time sensors for city gov’t
Integrates with city back-end systems to improve both service and rider experience
Powered worldwide by the AWS cloud

65 Countries
1,000 Cities
40M Users
Case Study – Missouri DOT doubles data collection with 84% less labor

July 1, 2011 / in Case Studies / by miovision

As part of a regular data collection program, the Missouri Department of Transportation District Five had historically conducted between 60 – 75 Intersection and Roundabout Counts per year. In 2009, the district set a goal and made progress towards doubling the amount of counts to 130 – 140 per year. In early 2010, a statewide reduction in labor forces meant eliminating a part-time role whose primary responsibility was data collection, making it extremely difficult to meet their newly established goals.

PROFILE

Missouri DOT District Five is headquartered in Jefferson City, Missouri and is home to over 450,000 people and 205 traffic signals throughout 13 counties. The District is also home to four colleges, including the University of Missouri located in Columbia.
EASY AND SECURE CONNECTIVITY FOR YOUR CITY

Access to data from existing and new transportation infrastructure is fundamental to building a Smarter City. Spectrum provides quick and easy connectivity for data and insights.

TURNKEY SOLUTION
Install Spectrum hardware in your traffic cabinets in 20 minutes. Gain access to your signal data from Miovision Signals or your CMS. No software to install. No servers. No cable runs.

EASY TO INTEGRATE
Spectrum integrates with all your traffic cabinet equipment to make data easily accessible through the AWS IoT cloud hosted platform.

BUILT-IN SECURITY
Spectrum provides added network security to legacy traffic control equipment. It’s designed to secure your data, network applications and equipment.

13,000 MUNICIPALITIES SERVED IN 66 COUNTRIES

Miovision’s mission is to empower cities to use data to improve the transportation experience for everyone.

MOVISION TECHNOLOGY IS BEING USED AT CLOSE TO 50% OF THE TRAFFIC INTERSECTIONS IN NORTH AMERICA.
SMART PARKING
Smart Routing

GreenOwl Mobile: The 2015 Pan Am / Parapan Games held in Toronto (North America’s 4th largest city) attracted more than 1,000,000 spectators to the city. The program created a transportation challenge for the city to manage its static road and transit infrastructure, while ensuring a positive experience for spectators and residents. GreenOwl Mobile developed a mobile and web-based solution designed to manage customized routing for spectators, transit, and points of interest. This was the official tool to manage increased transport demands. More people used the solution (20% of spectators) than competitive products such as Google Maps.

Connected Vehicles

Veniam turns vehicles into Wi-Fi hotspots and builds city-scale vehicular networks that expand wireless coverage and collect terabytes of urban data. In controlled spaces such as ports and container terminals, Veniam’s solutions ensure that all mobile workers and assets are securely connected, no matter where they are or at what speed they are moving. Our hardware, software, and cloud components are running in the world’s largest network of connected vehicles, including taxis, waste collection trucks and the entire public bus fleet in Porto, Portugal, offering free Wi-Fi to more than 350,000 active customers.

Smart Analytics for Transportation

Citi Logik is a British technology company established in 2011 to develop demand insights derived from anonymized mobile phone network data, in compliance with UK data privacy laws. Citi Logik has developed unique algorithms and applied these to aggregated anonymized mobile network data that allows cities to make sense of their pedestrian, vehicle and rail journeys. The data collected provides a comprehensive view of a city transport system including travel patterns, peak, off-peak, seasonal and historic patterns allowing cities to make informed decisions for future transportation projects and improvements.

Smart Transit Screens

TransitScreen is a global information company. Our network of connected screens help make cities healthier, sustainable and more accessible for everyone. Information about your transportation choices is displayed at a glance, live and in real-time. Compare train times to bus arrivals on your way to work in the morning. Know when your employee shuttle arrives so you aren’t caught waiting in the cold. Our service is active in every major city in the US and Canada, and select European cities in over 10 languages.

https://aws.amazon.com/stateandlocal/transportation/
Example: Predictive Maintenance

A comprehensive set of diagnostic and operational insights to evaluate and monitor equipment and system performance, identify assets at risk of failure, and avoid costly downtime.
C3 IoT SMART GRID APPLICATIONS
Enterprise IoT Platform

State Department Deploying Internet of Things Platform to Monitor Energy Use

The platform will collect and analyze hundreds of thousands of data points, using machine learning and cloud-based infrastructure, in an effort to support energy management.

Analytics platform to manage energy use and sensor health in real time across 22,000 buildings in more than 190 countries.
Example: First Responder

- A Wireless Services Gateway based upon Intel Edison connects with peripheral devices such as the Intel Basis watch, bodycams, and other environmental sensors. It encrypts the data and employs a LTE modem to transmit the information to the command center.

- The command center aggregates the data streams from individual first responders and provides a UI dashboard enabling monitoring of this information by command center personnel.
Example: Congestion Charge (London)

Sensor data from 8 separate channels fed into A/D inputs of DK100

- Intel DK100 Gateway
- AWS IoT Gateway
- MQTT broker
- AWS EC2
- DynamoDB
- AWS IoT
- Things Shadows
- Things registry

Cloud based dashboard (UI) on client PC/tablet

DynamoDB

AWS IoT

Things Shadows

Things registry

MQTT broker

AWS EC2
Example: Water Conservation

Water Data & ML Models

Weather Sensors

Connected Homes

Weather Sensors

Connected Homes

Weather Sensors

Connected Homes
Customer – Rachio Sprinkler Control

Easily calibrate soil, vegetation, slope, sun exposure, and nozzle types.

Choose From National And Personal Weather Stations To Get The Most Accurate Weather Data Available.

No One-size-fits-all Experience - You Have The Freedom To Make Adjustments Over Time And Tune Your Rachio To Your Unique Landscape.
AWS – Enabling Cities
AWS partners with USDOT on Smart City Challenge; provides solution architecture and best practices guidance to finalists.