

# 5 Ways the Cloud Can Drive Economic Development

*August 2018*



© 2018, Amazon Web Services, Inc. or its affiliates. All rights reserved.

## Notices

This document is provided for informational purposes only. It represents Amazon Web Services's ("AWS") current product offerings and practices as of the date of issue of this document, which are subject to change without notice. Customers are responsible for making their own independent assessment of the information in this document and any use of AWS's products or services, each of which is provided "as is" without warranty of any kind, whether express or implied. This document does not create any warranties, representations, contractual commitments, conditions or assurances from AWS, its affiliates, suppliers or licensors. The responsibilities and liabilities of AWS to its customers are controlled by AWS agreements, and this document is not part of, nor does it modify, any agreement between AWS and its customers.

## **Contents**

Introduction	1
Sharing More Data and Information	1
Increasing Productivity	3
Preparing Citizens for the Workforce & Building Skills	5
Driving Local Development	6
Allocating Resources More Effectively	8
Key Takeaway	9
Contributors	9

# Abstract

Government agencies often look to promote new technology for cost-savings and efficiency, but it does not stop there. The second and third-tier effects of technology can be long lasting for citizens, businesses, and economies. When public institutions adopt the cloud, they experience an internal transformation. Inside an organization, cloud usage drives greater accessibility of data and information sharing, increases worker productivity, and improves resource allocation.

The external benefit of the cloud is recognized through a government's ability to put reclaimed time and resources toward serving citizens. This includes provisioning public services, such as occupational-skills training, quicker and more effective service delivery, a pathway to a more productive workforce, and ultimately, a boost to local development.

This whitepaper examines the enterprise-level benefits of the cloud, as well as the residual impact on economic development. The [U.S. Economic Development Administration](#) defines economic development as “[creating] the conditions for economic growth and improved quality of life by expanding the capacity of individuals, firms, and communities to maximize the use of their talents and skills to support innovation, lower transaction costs, and responsibly produce and trade valuable goods and services.” We explore this concept through the lens of the cloud.

## Introduction

Technology empowers governments to improve how and when they reach citizens. It improves the quality and accessibility of public services, ultimately creating a more productive environment where citizens can thrive. Leveraging the cloud is one way governments can accelerate this shift, with benefits occurring first inside the institution.

## Sharing More Data and Information

One enterprise-level benefit of the cloud is its emphasis on data and information sharing. The cloud's data-sharing tools encourage staff to store information in a central location, adding visibility inside the workplace. A more collaborative environment can lead to increased communication and idea sharing among agencies and teams that might otherwise operate in siloes.

This is true for federal, regional, and local governments, as well as for businesses and entrepreneurs. The result is near real-time access to critical information across an array of industries. Examples include data on job creation by location and level, retention statistics, payroll by industry classification – or North American Industry Classification System codes in the U.S. – in addition to information on health services, trade and commerce, weather patterns, and more.

## Data and IoT solutions can help address development challenges

[Nexleaf Analytics](#) is one organization harnessing the power of data to tackle global development issues. From climate change to public health and food insecurity, its mission is to preserve human life and protect the planet through sensor technologies and data analytics, and by advocating for data-driven solutions.

The organization developed Internet-of-Things (IoT) platforms ColdTrace and StoveTrace to help governments ensure the potency of life-saving vaccines at the 'last mile' and to facilitate the adoption of cleaner cookstoves, respectively.



“Data is at the core of creating sustainable change. By getting meaningful, real-time data flowing from the bottom-up, people have the tools and insights they need to take responsive actions,” according to Martin Lukac, Nexleaf’s CTO and co-founder.

[Nexleaf’s solution](#), powered by Amazon Web Services, Inc. (AWS), aggregates crucial data that can lead to responsive interventions. By collaborating with governments and NGOs in 10 countries across Asia and Africa, the organization ensures its solutions adhere to local country laws and preferences, and identifies the right tools and analytics to benefit constituents. Engaging people on the ground empowers a data-driven approach to improving the efficiency of their systems, advocating for better resources, and tapping into potential avenues for economic and social development.

## Data drives community collaboration and innovation

The cloud encourages partnerships and collaboration within communities. It can lead local governments to facilitate relationships with small and medium-sized enterprises (SMEs), which according to [an Organisation for Economic Co-operation and Development \(OECD\) report](#), “account for over 95% of firms and 60%-70% of employment and generate a large share of new jobs in OECD economies.”

In Boston, Massachusetts, the Mayor's Office of New Urban Mechanics took an innovative approach to problem-solving through crowdsourcing. Teaming with a technology firm, the government sought creative ideas from across Boston to help improve Street Bump, its app to collect roadside maintenance and plan long-term investments for the city.

The use of [big data and community engagement](#) helped the agency find a creative solution to a public issue. Street Bump’s website now reports that tens of thousands of bumps have been detected through the app. The public-private partnership brought automation and speed to an otherwise manual city-improvement process, and also gave local startups a platform to voice and implement innovative ideas that otherwise may not have been discovered.

[Newport, Wales](#), is another example of a city optimizing public data, in this case, to assess environmental conditions. It began using IoT sensors to collect

data such as pollution levels, augmenting earlier processes of collecting air samples in glass vials across 85 different locations. Together with Pinacl Solutions and Davra Networks, Newport is working toward a solution for improving air quality, flood control, and waste management, gleaning timely insights from sensor data via solutions hosted on AWS. The effort aimed to boost citizens' safety and quality of life, as part of a vision to improve Newport's economy.

The Humanitarian OpenStreetMap Team (HOT) is yet another global organization applying the principles of open-source and open-data sharing to humanitarian response and economic development. Known for its ability to rapidly coordinate volunteers to map sites impacted by disaster, [HOT relies on a collaboration with DigitalGlobe, Inc.](#) for critical satellite-imagery data, accessible through its [Open Data Program](#) and imagery license. If not for this partnership, HOT would not exist as it is today, according to HOT's Director of Technology, Cristiano Giovando.

Additionally, through the [AWS Public Datasets Program](#), anyone can analyze data and build complementary services using a broad range of compute and data analytics tools. The cloud combines fragmented data from a variety of sources, improving users' access and enabling more time for analysis. This can facilitate innovation and the possibility of new discoveries.

## Increasing Productivity

Consistent reliability and a lack of physical infrastructure can drive productivity gains inside and out of a cloud-using organization. Workforce productivity can improve up to 50% following a large-scale AWS migration, [according to AWS migration experts](#). In addition, AWS's more than 90 solutions offers organizations faster access to services they would otherwise have to build and maintain themselves.

Government organizations around the world, including a road and traffic agency in Belgium and Italy's public finance regulator, have realized increased productivity from the cloud – both for the benefit of their operations and their citizens.



## Productivity gains help institutions better deliver on their mission

The [Agentschap Wegen & Verkeer \(AWV\)](#) deploys new maintenance capabilities up to eight times faster thanks to the automation of services and databases through the AWS Cloud, according to Bert Weyne, planning & coordination lead at AWV. The agency manages 6,970 kilometers of roads and 7,668 kilometers of cycle lanes in Belgium, with its team of 250 road inspectors having a direct impact on citizen safety.

In the event of a pothole, for example, [the team uses an app](#) to log information about the issue and prioritize repairs. “When we were running on in-house servers, our road inspectors complained about the app’s reliability. At times, they were unable to access the app and would have to use paper and pen instead. It was embarrassing,” says Weyne.

In addition to better performance, Weyne’s team has used the cloud to reduce costs, speed development, and cut infrastructure management time. He adds, “... by using managed services, we’ve slashed system admin time by 67 percent, which has improved our agility. We can now develop and test features three times faster.”

The cloud has also enabled Italy’s auditing and oversight authority for public accounts and budgets to operate more effectively as a remote team. Prior to working with AWS, [Corte dei conti \(Cdc\)](#) felt constrained by physical IT infrastructure. “We wanted to change the way our 3,000-plus employees worked, enabling them to access applications from anywhere, on any device. But we had to ensure that this flexibility for staff didn’t jeopardize the safety of data,” said Cdc’s IT officer, Leandro Gelasi.

This was attainable through a hybrid-architecture migration approach, and through collaboration with AWS Advanced Consulting Partner, XPeppers Srl. “As a result, [employees are] much more productive. Decisions get made faster and the whole system works better. It’s a brilliant result for our entire organization,” said Gelasi.

As Gelasi and his team prove their ability to fulfill duties securely from any location, it may lend an opportunity to employ more workers in small towns and rural locations.





## Preparing Citizens for the Workforce & Building Skills

Skill-development and education programs offer meaningful contributions to economic development. [In line with the United Nations' 2030 Sustainable Development Goals](#), which includes training and skill-building for youth, cloud technology provisions the scaling of educational content and innovative teaching formats to reach learners wherever they are. Quality, inclusive, and relevant education is a key factor in breaking cycles of poverty and reducing gender inequalities worldwide.

By expanding learning beyond the confines of a physical classroom, technology helps increase access to courses and levels the playing field for learners of diverse geographical and socio-economic backgrounds. For schools and educators, the cloud offers not only cost savings and agility, but also the opportunity to develop breakthroughs in educational models and student engagement.

### Reaching diverse job seekers wherever they are

[Digital Divide Data \(DDD\)](#) is a nonprofit social enterprise that uses AWS to support regional workforce development. Its goal is to create sustainable tech jobs for youth through [Impact Sourcing](#), a model that provides economically marginalized youth with training and jobs in next-generation technologies such as cloud computing, machine learning, cyber security, and data analytics.

In collaboration with Intel, AWS worked with DDD to launch the first-of-its-kind [AWS Cloud Academy in Kenya](#) to train, certify, and employ underserved youth in cloud computing as a stepping-stone to more advanced IT careers. The program's first cohort included 30 high school graduates from Kibera, Nairobi, with the second cohort comprised of 70% women. The social enterprise plans to train five cohorts annually, graduating 150-200 cloud engineers per year – all of whom have the option to work for DDD as cloud-computing engineers or to pursue cloud opportunities in the growing, local tech sector.

In terms of workforce benefits, DDD and AWS graduates earn [five times more than their peers](#). While informal workers in Kenya earn an average of \$116 USD

per month, AWS graduates earn an average of \$575 USD per month. The combination of training and work experience propels DDD graduates to earn higher income, gain economic security, and ultimately, create better futures for themselves and their families.

In the U.S., the [Louisiana Department of Public Safety and Corrections](#) manages nine state correctional facilities that house 19,000 adult prisoners. The state-run agency offers educational and vocational programs with the goal of helping inmates earn degrees, gain job training, secure employment, and avoid re-incarceration.

The agency sought to implement a new IT environment that would support a better and more reliable online learning solution. It also needed effective system security to prevent inmates from accessing the internet, amid concerns about victims' safety and other criminal activity.

After opting for [Amazon WorkSpaces](#) – a managed, secure desktop computing service on AWS – the agency, along with partner ATLO Software, succeeded in launching educational training labs at four Louisiana correctional facilities. With the addition of an [Amazon Virtual Private Cloud](#), they were operating on a secure network. Thanks to onsite labs, inmates now have better access to vocational training, have the opportunity to earn college credits or degrees, and can potentially participate in the labor market.

## Driving Local Development

### Retaining Local Talent

Retaining local talent can be a challenge for cities. Moreover, a concentration of intellectual capital and innovative businesses and startups can be a strong indicator of economic development.

Cloud technology can help give new businesses a boost in their forecasting, demand generation, and innovation when bringing their products or services to market. AWS accelerates this process through [AWS Activate](#), a program designed to provide startups with resources and credits to get started with the cloud; through access to tools like [Amazon LightSail](#), which provides technology like virtual private servers to enterprises of all sizes for the cost of a cup of

coffee; and by encouraging public-private partnerships and small-business linkages, namely through the strength of the [AWS Partner Network \(APN\)](#).

Additionally, [AWS CloudStart](#) formed to encourage the growth of SMEs and economic development organizations by providing resources to educate, train, and help these entities embrace the cost-effectiveness of the AWS Cloud. “As small businesses leverage a broader portfolio of digital solutions, they can see an increase in agility, while simultaneously lowering costs and reducing time to innovation,” according to Zandile Keebine, founder of participating organization GirlCode, a nonprofit that aims to empower girls through technology.

In the U.S., Kansas City, Missouri, is one example of a city that is successfully using smart technology to attract talent to an emerging business center.

Along the two-mile corridor of the [Kansas City Streetcar](#), a \$15 million public-private partnership supports the deployment of 328 Wi-Fi access points and 178 smart streetlights that can detect traffic patterns and open parking spaces. It has also funded 25 video kiosks, pavement sensors, video cameras, and other devices, all connected by the city’s nearly ubiquitous fiber-optic data network.

The successful use of smart-city technology has been a key component in bringing people back to Kansas City’s core. “Ten years ago, we had fewer than 5,000 people living downtown,” said Bob Bennett, Kansas City’s chief innovation officer. “We have seen a 520 percent growth in the number of residents in downtown and a 400 percent growth in development investment. I believe our smart city project has played a prominent role in getting people excited about living here.”

## Entrepreneurship and public-private partnerships

Cloud technology provides governments with the means to educate and train citizens, boosting workforce participation and eligibility. Driving local entrepreneurship is an important outgrowth of this investment. “A vibrant entrepreneurial sector is essential to small-firm development,” according to the OECD. It adds that regions with “pockets of high entrepreneurial activity” and public-private partnerships can lead to more job opportunities and innovation.

A municipality in Sweden is feeling the effects of a strategic partnership aimed at helping small businesses adapt and thrive. Consultant [C.A.G Malardalen](#) in Västerås, Sweden, uses the cloud to help constituents make more data-driven decisions, deploy resources more efficiently, and help shape the economic conditions essential for attracting new economic activity.

“[We are] striving to bring the region the latest in cloud technology. Our ambition is to always deliver the most relevant IT solutions to our customers. Through working with AWS CloudStart, our customers benefit from the foundational knowledge we have gathered and we are already seeing a lot of new possibilities for us as a service provider across Sweden,” says Tomas Täuber, CEO of C.A.G Malardalen.

## Allocating Resources More Effectively

Cloud technology allows governments to rethink critical processes. It builds new efficiencies across procurement, security, compliance, and data protection. Additionally, the cost-effectiveness of the cloud enables agencies to redirect resources toward advancing their mission, freeing up capacity to create more innovative public services. Increased access to new and better citizen services ushers in a higher standard of living, offering the potential to draw new inhabitants to a city or region.

The cloud can act as a catalyst for this type of development, driving organizations toward increased operational efficiencies, and enabling a greater focus on the mission. In the Middle East, the Kingdom of Bahrain underwent a shift in how it procures resources in its plan to digitize its economy.

### Using the cloud to efficiently deliver services to constituents

The [Kingdom of Bahrain Information & eGovernment Authority](#) (iGA) is accountable for moving all of its government services online. It is responsible for information and communications technology (ICT) governance and procurement for the entire Bahraini government. The iGA launched a cloud-first policy to support its economic development plans.

Bahrain’s adoption of a cloud-first policy boosted efficiency across the public sector and trimmed IT expenditures by up to 90% in 2017, according to the Economic Development Board [annual report](#).

“Through adopting a cloud-first policy, we have helped reduce the government procurement process for new technology from months to less than two weeks,” [said Mohammed Ali Al Qaed, CEO of Bahrain iGA](#).

With cloud-based technology as the focus for public ICT procurement, the Bahraini government can exercise minimal upfront investment by paying only for the services it needs. With tools for cost allocation and service provisioning, the AWS Cloud offers built-in resource discipline, enabling governments to shift their focus toward advancing development goals.

## Key Takeaway

Technology-driven innovation is one way public institutions can drive economic development. With the right technology, governments, nonprofits, economic development organizations, and other entities can improve their internal operations, become more productive, and, ultimately, focus more acutely on serving citizens. This can create conditions in which citizens enjoy improved quality of life and where businesses flourish. As organizations increasingly embrace cloud-based solutions, long-lasting effects can be realized in the form of community-wide collaboration, partnerships with local businesses, and increased innovation. This can help these institutions wield greater influence on economic development.

## Contributors

The following individuals and organizations contributed to this document:

- Carina Veksler, Public Sector Solutions, AWS Public Sector
- Randi Larson, Public Sector Content, AWS Public Sector
- John Brennan, International Expansion, AWS Public Sector
- Mike Grella, Economic Development, AWS Public Policy