



# IBM: Cloud Computing and Open Standards

## A Perspective for the U.S. Federal Government

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IBM believes strongly in the concept of open computing. The success and power of the Internet have created business opportunities and societal good that would not been realized without a pervasive commitment to open standards. For example, the high degree of standardization of the protocols upon which the Internet is based has allowed for dramatic new efficiencies in the way that customers interact with businesses and the way that business and suppliers interact with each other, thus enabling the creation of brand new business models with greater associated value.

New converging developments in technology -- mobile, social and cloud -- are creating new opportunities for tremendous growth and value. And, just as open standards were critical to the success of the Internet, they must continue to play a critical role for users to reap maximum value from these developments, especially cloud, on which most social and mobile applications run.

Most importantly, as public administrations deploy mobile, social, big data, and cloud technologies to share information and to share workloads and services seamlessly among various departments and with citizens, they should ensure open standards based solutions are preferred in public procurements<sup>1</sup>.

Information is the lifeblood of governments. Being able to consume, manage, and produce massive amounts of information, governments deliver the greatest value when it is readily accessible to citizens, businesses, and government counterparts. As technologies continue to evolve into ever more complex, hybrid public-private clouds, interconnected systems, social, and "always-on" networks, governments are under considerable pressure to provide, often with less resources, efficient and reliable information sharing services—including those supporting military operations, trade and travel security, social services delivery, and a range of citizen services.

Open standards for software interoperability enable the seamless connection of internal and external entities using different technologies. Only with this open standards based seamless connection can information flow – without bridging technologies – in real-time to those in need.

Shared services are increasingly being adopted by governments to reduce costs and to improve business process efficiencies. Some of the key federal programs seeking to share infrastructure and software solutions include continuous monitoring, asset management, threat & fraud detection and prevention programs. Increasingly, these services cross departmental and even federal-state-local boundaries. Thus, interoperability is needed vertically and horizontally, within and across all organizational and administrative boundaries. The most challenging areas of system interoperability are found in software.

Open standards form the essential framework needed to position government agencies to overcome these challenges. Moreover, the shared-services interoperability delivered by open standards is

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<sup>1</sup> "ICT procurement policies based on open standards are the opposite of proprietary government standards mandates. The later forces citizens to buy a specific vendor's products while product procurement policies based on adherence to open standards inherently attempt to maximize free markets." See Dr. Laura DeNardis' "E-Government Policies for Interoperability and Open Standards, Yale Information Society Project Working Paper, pages 12-13, [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1629833](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1629833).

independent of whether open source software or proprietary software, or COTS or in-house software is used to implement these standards.

Cloud solutions are already maximizing government efforts to increase information and workload sharing. Cloud adoption models allow the flexibility to deploy more current services with elastic capacity. The government programs supported by them are becoming increasingly agile and responsive to changing business conditions.

Yet, as promising as cloud computing is, one of the biggest hurdles to widespread adoption may be the confusion over standards. Governments, as well as industry, fear jumping into muddy waters where choice, competition, future-proofing and interoperability are in doubt; with good reason. A quick look under the covers of certain solutions often shows a patchwork of proprietary products that lack integration and optimization – a little server virtualization here, some specialized apps there, and a little “something-as-a-service” somewhere else – with no real thought to the enterprise as a whole nor interoperability.

For government to gain the full advantages of this technology, a strategic cloud solution should include virtualization, standardization and provisioning for efficiency, cost-effectiveness, ease of management and fast deployment. Just as important, that solution should cover software, servers and storage, with deep roots in open standards, to ensure that clients can take advantage of cloud’s benefits today while beating a path to the future.

That’s why open standards are critically important to be preferred in public procurements, especially as governments begin to look at clouds of different sorts with multiple vendors. To solve complex, cross-agency problems and ensure efficient government, agencies must be able to share workloads, application and data, seamlessly, and in real-time regardless of which vendor they have selected. Open standards alone enable that interoperability. Accordingly, governments should create procurement rules that demand “openness” and substitutability in the IT products they buy.

Forward-looking leaders understand the value of openness. They have seen the value that open standards have enabled in healthcare, smart grid and service-oriented architecture. Increasingly, there is agreement that open standards deliver results<sup>2</sup>:

- **Prevent vendor lock-in**; spawning instead the creation of multiple competing products on different platforms from which government procurers and citizens can choose
- **Place the government, not vendors, in control**; lessening risk so that no one company can pace, control or block technology
- **Reduce investment risk and barriers to entry**; knowing emerging technologies are “future-proof” as they are based on industry accepted, widely used standards
- **Enhance efficiency and service levels**; ensuring software interoperability for information, workload and service sharing, as well as data and application portability
- **Cost-saving**; optimizing total cost of ownership, including any needs to migrate to a new solution

Confusingly, in the Cloud, as in the traditional software marketplace, many companies brand their

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2 In Australia, the New South Wales government recently mandated open standard based cloud solution procurements for “the best value sustainable investment.” The policy calls for open standards, security, interoperability, and data portability consideration to mitigate “technology lock-in and inadequate data portability”. <http://www.finance.nsw.gov.au/ict/sites/default/files/Endorsed%20-%20%20Cloud%20Services%20Policy%20and%20Guidelines%20finalx.pdf>

The Government of India has a similar policy preferring open standard based cloud solutions. “Adoption of open standards as per Government of India’s policy on open standards (<http://egovstandards.gov.in/>) on interoperability and data portability is required in order to reduce the risk of vendor lock-in and inadequate data portability.” <http://deity.gov.in/content/gi-cloud-initiative-meghraj>

offerings and architectures as open. There are a few conflicting definitions offered by cloud solution providers on what is open and what is not. One simple solution to determine openness is to ask – does the solution offer the above benefits?

A good acid test for Cloud open standards is whether or not it actually permits substitutability and choice among independent, multi-vendor implementations on different technology platforms with acceptable levels of functionality. Acceptable levels of functionality mean that when switching from one solution to another, the government should not require retraining for its cloud technicians nor having to waste time to design bridging technologies. The diversity of competing applications that support the standard is also an indication of its openness.

Conversely, proprietary cloud interfaces are developed by and controlled by a given company. When the owner of the proprietary interface has sole control, including when and how the interface changes, they alone determine who can adopt it and how it is to be adopted. Not knowing when or how the interface could change creates an uncertain environment making further developments risky. Flexibility and agility are lost when proprietary interfaces are used. Further, proprietary interface based solutions stifle innovation and make collaboration challenging.

One promising effort to increase the adoption of open standards for Cloud is OpenStack, which began at NASA and has grown into a vibrant, open source software project. OpenStack is supported by more than 269 companies and has more than 1,200 individual code contributors including NASA, NSA, IBM, Rackspace, Red Hat, AT&T, Cisco, HP, and Dell. Through these open collaborative efforts, open standards such as IETF's OAuth, OASIS TOSCA and DMTF Cloud Audit and Data Federation are getting widespread adoption. A vibrant, innovative ecosystem is developing offerings – the acid test for openness – enabling choice to governments who wish to procure open standards based cloud solutions. Governments who demand open standard such as those mentioned can have confidence that solutions implementing them can best enable the information and service sharing interoperability they need.

Openness cannot be achieved in one big step nor with one policy alone. People are needed to advocate for this, pilot and play with open solutions and share experiences, implement procurement preferences for openness, and help build a community of open proponents both within and outside of government. OpenStack is a good first step. We encourage government to join and participate.

Taking a strategic approach to cloud and calling for open standards, liberates governments from the dilemma of having to decide between short-term benefits or long-term advantages. That's because it allows them to do both. We also offer seven open principles to help filter out the noise and help officials to pragmatically procure truly open clouds.

Procurers can ask themselves how well does the solution allow for:

- Greater user-flexibility
- Broader (data, information, service, application, etc.) interoperability
- Vendor lock-in avoidance
- Cost effectiveness
- Ensuring future access to innovation
- Preserving technology choice
- Maximizing freedom of action

As federal agencies are poised to make their first investments, now is the right time to make the right decision on openness. The choice of open versus closed is one that will have a lasting effect. An open cloud will create a more efficient, citizen-centric government and ultimately, a better society for the future.

## **About IBM Standards**

IBM works with industry partners, academics, individual entrepreneurs and governments to develop open standards and conduct interoperability testing. For decades, we have been participating in hundreds of standards bodies and working groups from collaborating in the NIST Cloud Forum, the Automotive Industry Action Group (AIAG) and ACORD (auto and insurance industry standards) to the Organization for the Advancement of Structured Information Standards (OASIS) and the World Wide Web Consortium (W3C). IBM has also helped to establish the Cloud Standards Customer Council and the Health Level 7 (HL7) standard setting organization.

Furthermore, IBM has thousands of employees working on the development of open source software and has a rich history of successes from our early involvement with Linux to our work with Apache, Eclipse and most recently OpenStack and Cloud Foundry.