

At the time of its creation, DTGOV had approximately 1,000 employees, operational branches in 60 localities nation-wide, and operated two mainframe-based data centers. Over time, DTGOV has expanded to more than 3,000 employees and branch offices in more than 300 localities, with three data centers running both mainframe and low-level platform environments. Its main services are related to processing social security benefits across the country.

DTGOV has enlarged its customer portfolio in the last two decades. It now serves other public-sector organizations and provides basic IT infrastructure and services, such as server hosting and server colocation. Some of its customers have also outsourced the operation, maintenance, and development of applications to DTGOV.

DTGOV has sizable customer contracts that encompass various IT resources and services. However, these contracts, services, and associated service levels are not standardized—negotiated service provisioning conditions are typically customized for each customer individually. DTGOV's operations are resultantly becoming increasingly complex and difficult to manage, which has led to inefficiencies and inflated costs.

The DTGOV board realized, some time ago, that the overall company structure could be improved by standardizing its services portfolio, which implies the reengineering of both IT operational and management models. This process has started with the standardization of the hardware platform through the creation of a clearly defined technological lifecycle, a consolidated procurement policy, and the establishment of new acquisition practices.

Technical Infrastructure and Environment

DTGOV operates three data centers: one is exclusively dedicated to low-level platform servers while the other two have both mainframe and low-level platforms. The mainframe systems are reserved for the Ministry of Social Security and therefore not available for outsourcing.

The data center infrastructure occupies approximately 20,000 square feet of computer room space and hosts more than 100,000 servers with different hardware configurations. The total storage capacity is approximately 10,000 terabytes. DTGOV's network has redundant high-speed data links connecting the data centers in a full mesh topology. Their Internet connectivity is considered to be provider-independent since their network interconnects all of the major national telecom carriers.

Server consolidation and virtualization projects have been in place for five years, considerably decreasing the diversity of hardware platforms. As a result, systematic tracking of the investments and operational costs related to the hardware platform has revealed significant improvement. However, there is still remarkable diversity in their software platforms and configurations due to customer service customization requirements.

Business Goals and New Strategy

A chief strategic objective of the standardization of DTGOV's service portfolio is to achieve increased levels of cost effectiveness and operational optimization. An internal executive-level commission was established to define the directions, goals, and strategic roadmap for this initiative. The commission has identified cloud computing as a guidance option and an opportunity for further diversification and improvement of services and customer portfolios.

The roadmap addresses the following key points:

- *Business Benefits* – Concrete business benefits associated with the standardization of service portfolios under the umbrella of cloud computing delivery models need to be defined. For example, how can the optimization of IT infrastructure and operational models result in direct and measurable cost reductions?
- *Service Portfolio* – Which services should become cloud-based, and which customers should they be extended to?
- *Technical Challenges* – The limitations of the current technology infrastructure in relation to the runtime processing requirements of cloud computing models must be understood and documented. Existing infrastructure must be leveraged to whatever extent possible to optimize up-front costs assumed by the development of the cloud-based service offerings.
- *Pricing and SLAs* – An appropriate contract, pricing, and service quality strategy needs to be defined. Suitable pricing and service-level agreements (SLAs) must be determined to support the initiative.

One outstanding concern relates to changes to the current format of contracts and how they may impact business. Many customers may not want to—or may not be prepared to—adopt cloud contracting and service delivery models. This becomes even more critical when considering the fact that 90% of DTGOV's current customer portfolio is comprised of public organizations that typically do not have the autonomy or the agility to switch operating methods on such short notice. Therefore, the migration process is

expected to be long term, which may become risky if the roadmap is not properly and clearly defined. A further outstanding issue pertains to IT contract regulations in the public sector—existing regulations may become irrelevant or unclear when applied to cloud technologies.

Roadmap and Implementation Strategy

Several assessment activities were initiated to address the aforementioned issues. The first was a survey of existing customers to probe their level of understanding, on-going initiatives, and plans regarding cloud computing. Most of the respondents were aware of and knowledgeable about cloud computing trends, which was considered a positive finding.

An investigation of the service portfolio revealed clearly identified infrastructure services relating to hosting and colocation. Technical expertise and infrastructure were also evaluated, determining that data center operation and management are key areas of expertise of DTGOV IT staff.

With these findings, the commission decided to:

1. choose IaaS as the target delivery platform to start the cloud computing provisioning initiative
2. hire a consulting firm with sufficient cloud provider expertise and experience to correctly identify and rectify any business and technical issues that may afflict the initiative
3. deploy new hardware resources with a uniform platform into two different data centers, aiming to establish a new, reliable environment to use for the provisioning of initial IaaS-hosted services
4. identify three customers that plan to acquire cloud-based services in order to establish pilot projects and define contractual conditions, pricing, and service-level policies and models
5. evaluate service provisioning of the three chosen customers for the initial period of six months before publicly offering the service to other customers

As the pilot project proceeds, a new Web-based management environment is released to allow for the self-provisioning of virtual servers, as well as SLA and financial tracking functionality in realtime. The pilot projects are considered highly successful, leading to the next step of opening the cloud-based services to other customers.

2.3 Case Study #3: Innovartus Technologies Inc.

The primary business line of Innovartus Technologies Inc. is the development of virtual toys and educational entertainment products for children. These services are provided through a Web portal that employs a role-playing model to create customized virtual games for PCs and mobile devices. The games allow users to create and manipulate virtual toys (cars, dolls, pets) that can be outfitted with virtual accessories that are obtained by completing simple educational quests. The main demographic is children under 12 years. Innovartus further has a social network environment that enables users to exchange items and collaborate with others. All of these activities can be monitored and tracked by the parents, who can also participate in a game by creating specific quests for their children.

The most valuable and revolutionary feature of Innovartus' applications is an experimental end-user interface that is based on natural interface concepts. Users can interact via voice commands, simple gestures that are captured with a Webcam, and directly by touching tablet screens.

The Innovartus portal has always been cloud-based. It was originally developed via a PaaS platform and has been hosted by the same cloud provider ever since. However, recently this environment has revealed several technical limitations that impact features of Innovartus' user interface programming frameworks.

Technical Infrastructure and Environment

Many of Innovartus' other office automation solutions, such as shared file repositories and various productivity tools, are also cloud-based. The on-premise corporate IT environment is relatively small, comprised mainly of work area devices, laptops, and graphic design workstations.

Business Goals and Strategy

Innovartus has been diversifying the functionality of the IT resources that are used for their Web-based and mobile applications. The company has also increased efforts to internationalize their applications; both the Web site and the mobile applications are currently offered in five different languages.

Roadmap and Implementation Strategy

Innovartus intends to continue building upon its cloud-based solutions; however, the current cloud hosting environment has limitations that need to be overcome:

- scalability needs to be improved to accommodate increased and less predictable cloud consumer interaction
- service levels need to be improved to avoid outages that are currently more frequent than expected
- cost effectiveness needs to be improved, as leasing rates are higher with the current cloud provider when compared to others

These and other factors have led Innovartus to decide to migrate to a larger, more globally established cloud provider.

The roadmap for this migration project includes:

- a technical and economic report about the risks and impacts of the planned migration
- a decision tree and a rigorous study initiative focused on the criteria for selecting the new cloud provider
- portability assessments of applications to determine how much of each existing cloud service architecture is proprietary to the current cloud provider's environment

Innovartus is further concerned about how and to what extent the current cloud provider will support and cooperate with the migration process.