APPLYING THE
SOFTWARE AS A SERVICE MODEL TO
AIR EMISSIONS INVENTORY COLLECTION

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ABSTRACT

Current air emissions inventory data collection methods generally fall into two categories: (1) paper or electronic systems that require manual importation into agency databases, or (2) agency hosted data collection systems that feed directly into the databases. As agencies streamline operations by moving away from the first methodology, they are confronted with significant cost and infrastructure issues associated with the second option. Many agencies do not have the budgets and/or internal IT structures to enable them to make this move. For these agencies, the Software as a Service (SaaS) model may be the optimal solution.

SaaS is a software deployment model where an application becomes a service provided to customers across the Internet. In this model, software is hosted and maintained by a vendor on hardware outside the agency, eliminating the need to install and run the application on the agency's own computers. SaaS alleviates the agency's software maintenance and operational support burden, thus reducing infrastructure and staffing requirements. It can also reduce up-front expenses through less costly, on-demand pricing.

From the point of view of the facility users, this model appears identical to the agency hosted system. From the agency's point of view, it can dedicate more resources to the actual inventory work since the software operation has been offloaded to the service vendor.

This paper describes how the SaaS model can be implemented and used to enhance the data collection capabilities of an agency.

INTRODUCTION

Air emission inventory data collection is a recurring process that is becoming more important as policies are developed to address conventional or hazardous pollutant and greenhouse gas emissions into the atmosphere. With any process of this sort it is necessary to ensure that it is conducted in the most efficient and cost-effective manner possible to reduce existing costs and allow for future increases in the amount of data to be collected. In the current economic environment, this means effectively utilizing computer and software technology to maximize returns in the data collection process.

In addition to improving the data collection process, these same technologies must also provide for the delivery of collected data to the eventual end-users. In many cases this delivery is via EPA's

Emission Inventory System (EIS) database, which requires electronic submission of emission data. But the collected data could also be used by other state agencies or for presentation to the public in an electronic format. This paper will focus on an application dedicated to collecting the required EIS data.

Agencies that submit to the EIS database must begin planning now to meet the requirements of the Air Emissions Reporting Requirements (AERR) final rule that became effective on December 17, 2008. This rule shortens the timeline for agencies to collect, review and report their emissions data to EPA from 17 months to 12 months starting with the 2009 data year. This means that emissions data for 2009 must be submitted to EPA by the end of 2010 instead of May 2011. EPA has announced that it will increasingly rely upon automated procedures that will reduce their processing steps and allow for completion of the NEI on this expedited schedule. Agencies that are required to follow this rule should assess the capability of their current systems to meet the new deadline.

What SaaS is

Fundamentally, SaaS is a software deployment model in which an application is provided and managed by a vendor to be shared among many users in a cost-effective manner. Examples of this are Google Spreadsheet, a web spreadsheet application, TurboTax Web, or the ADP service which provides payroll and other services to multiple organizations. The EIS Gateway is a SaaS example of a software application provided for agencies to manage their facility inventory data stored in the EIS.
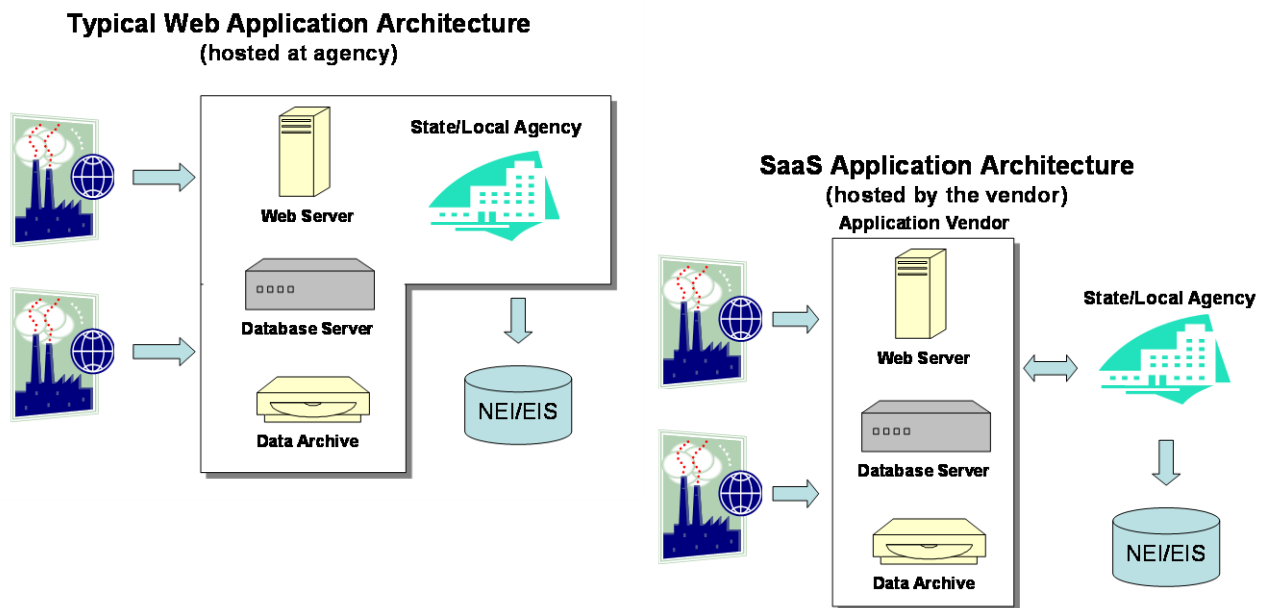

Figure 1. Typical Web Application Architecture Compared to the SaaS Architecture

Unlike traditional desktop solutions, SaaS solutions are delivered via a network, most often the Web. They are usually priced on a subscription service basis, often based on the number of users or seats.

The SaaS model:

Shifts the burden of getting and keeping an enterprise application up and running from the customer to the vendor. It permits users to leverage the software functionality without the burden of deploying and managing the software themselves.

Eliminates the added costs and complexities of deploying additional hardware and software, or dedicating additional staff resources to support the enterprise application on an ongoing basis.

Enables every customer to benefit from the vendor's latest technological features without the disruptions and costs associated with software updates and upgrades.

Since the primary concern of agencies is managing the actual emissions data rather than managing the data collection process, the SaaS model can improve agency efficiency by removing the database management burden. Time previously spent on user support, infrastructure management, and computer system maintenance can now be spent on activities which will improve the accuracy and completeness of the emission inventory.

Why the EIS is good for SaaS

Year by year, agencies must dedicate time and resources to collecting, reviewing and processing their emission inventories. This is a time-consuming effort that can be challenging due to time constraints, staff turnover, and tight budgets. In addition, as reporting formats and rules change over time, additional efforts are required, and for some agencies extra time is required to work with and coordinate changes with their IT organization.

The SaaS approach allows the agency to focus on reviewing and managing its inventory data, and lets the SaaS vendor handle the software application, data security, and IT infrastructure. The SaaS application provides the data collection platform, with built-in data QA, and a data export function in the required reporting format.

To be a good candidate for SaaS, an application must be somewhat generic since individual customization can push operating costs higher that can be supported by the revenue model, and is most suited to a community that has a common task to perform. Applications like Google Spreadsheet and TurboTax Web fit this common task scenario. In the case of the emission inventory community, this common task is data collection for use in fulfilling the new EIS reporting requirements. Since the EIS data structure is explicitly defined and the data validation rules are rigidly controlled by EPA, SaaS becomes a reasonable approach.

Based on EPA guidance documents, the SaaS application can be constructed to conform to the EIS data structure and validation rules and made available for use by any agencies or facilities that choose to use it. The resulting single code base can be used by all customers in a multi-tenant architecture. Access for many diverse agencies to this kind of focused task with established and well-defined guidelines is what SaaS applications are best at providing.

The SaaS model provides the vendor with development cycle stability. If EPA EIS QA rule and reporting changes are limited, time managing modifications will be controlled. The vendor's cost will be recovered across multiple users so that cost/user should be less than for an agency trying to accomplish the same feat on an individual basis. Compatibility and upgrades across several versions of the software can help keep maintenance costs low. In addition, having a single SaaS software version running for multiple users on the same equipment should translate to less customer support required for installation and upgrades.

How SaaS works

The software vendor establishes a hosting environment using either its own hardware and infrastructure or contracting with an established host provider for use of their services. When establishing this hosting environment, the vendor must take into consideration all of the usual factors

that would impact the functioning of the system, including the availability of the system to the users and the security of the application and the data.

Agencies contract with the vendor to be granted access to the system with the usage, number of users, bandwidth, or some other measure, and the time period being considered as part of the pricing for the service. The vendor provides a mechanism that allows agencies to grant access to the system to their defined user base.

SaaS benefits for agencies

Switching to or initiating an emission data collection system is only a reasonable idea if the benefits in doing so are tangible and sufficient to outweigh the costs. Services delivered under the SaaS model do have a number of potential benefits that should be examined:

- **Faster Implementation.** There is essentially no startup deployment of the software involved. With the SaaS model, the software application resides entirely on the vendor host machines and there should be little or no installation of software on the user client machines or the agency internal network.

- **Vendor is Responsible for the Host Machine Environment.** This includes all updates and patches to the operating systems, other software components and necessary hardware upgrades. It removes from the agency or its IT department these responsibilities and costs. It also means that access to current technology can be quicker across the entire user base.

- **One Code Base.** Having one code base focused on a single well-defined task will result in more stable software with fewer bugs and lower maintenance costs.

- **Database Security and Archival Functions Performed by the Vendor.** This relieves the agency of these responsibilities and costs. Since the SaaS application is designed to support users for many organizations, these functions should be far more robust than is typical in systems that are supporting a smaller data volume.

- **EIS and CERS Compatibility.** The vendor maintains the compatibility of the system with the EIS and the Consolidated Emissions Reporting Schema (CERS) export. There would be no internal effort on the part of the agencies to insure that the software remains compliant when changes to the EIS are announced by the EPA.

What to look for when considering SaaS

As an agency considers a software service there are a number of issues that should be assessed. Many of these issues are common to any data collection application, but others are specific to the SaaS model and to the EIS requirements. Considerations are:

- **Vendor Stability** – Since the application and data will be hosted and maintained by the vendor, it is imperative that the vendor be identified as an organization that will be able to provide the service for the duration of the contract. In addition, the vendor should demonstrate that they have sufficient infrastructure to support the level of service that they are offering.

- **Vendor Knowledge** – The vendor will have developed and be maintaining the application per EPA rules and reporting requirements. It is essential that the vendor understands the EIS data, QA requirements, and reporting standards.

- **Application Suitability** – The application service being offered should be suitable for the tasks that it is designed to accomplish. In a SaaS environment, the service may not provide every functionality that an individual agency needs but it must successfully fulfill the requirements of the common task.

- **Data Security and Availability** – Ownership, availability, and security of the collected data is the most important consideration in this process. The vendor service agreement must make clear that the data ownership resides with the agency and contain clear and viable processes by which the agency can retrieve the data. The vendor should also have sufficient security measures in place to protect data from loss or tampering and archival functions to successfully restore the data if necessary.

- **System Security** – Since the service being provided is delivered over the Web, it is necessary that the vendor have in place measures to combat attempts to disrupt the service, corrupt the service for damaging purposes, or to deny users access to the service. These measures should be independent of any additional security measures required by the service as part of the functionality required by the common task for EIS data collection.

- **Integration Needs** – Agencies need to consider any integration needs with regard to moving the data collected from users of the service into their own systems and work flow. If the service is the only method of data collection that the agency is using, this integration could be as simple as downloading the data from the vendor to the agency. For agencies with existing systems and work processes, this integration will be more complex and may be pursued as an additional separately contracted task. Generally this integration will largely be the responsibility of the agency but if properly done should be a one-time development of a reusable data integration process.

- **Agency-Specific Needs** – Many agencies will have data collection needs that go beyond the scope of the data collected for EIS. The agency should explore any features of the service being offered to determine if the service can accommodate its needs. If it can not, then the agency must inquire whether the vendor is willing to add modules to support the desired functionality or if there is a process that can be established outside of the service to enable gathering of the additional data. Note that in the SaaS model, developing modules that provide additional functionality will be preferable to modifying the behavior of the common task.

- **Preloading Existing Data** – Most agencies have existing data sets and having a method to populate the service database with these values would greatly shorten the startup time. Agencies should inquire if the vendor has any process available for doing this pre-population and whether it is available as an integral part of the service or as an additional setup cost.

- **Service Cost** – Ultimately, if all other considerations are favorable, the decision to use a service will come down to cost. If the service can deliver the same or better functionality for a cost at or below the amount the agency currently spends then it becomes a viable solution. When evaluating the relative costs, agencies must remember to factor in all of the internal costs, some of which are frequently overlooked. These include staffing costs that are not directly born by the agency, infrastructure provided to the agency for little or no cost, and most importantly, the cost of employee time devoted to the data gathering process. Especially in the case of support and infrastructure from within the agency and other

government organizations, careful consideration must be given to the likelihood that budgetary constraints could reduce these services.

- **Software support** – As part of the service agreement the vendor should provide support of the software to the users. This frees the agency staff from this responsibility so that they can focus on the data and inventory processing.

Who should consider SaaS

Each agency must make their own determination as to how they will respond to EPA's recurring and changing emission inventory needs. The following are issues that should be considered in making this determination:

- Agencies that have existing systems that they wish to continue to use but whose systems are not yet compliant with the EIS collection requirements. In this case, the SaaS application could be considered as a supplemental data collection tool to bridge the gap until EIS capability is added to the existing system or as the default data collection tool with the data being imported into the existing system.

- Agencies that have no IT infrastructure to support a data collection system or who are looking to reduce their IT infrastructure costs. Here a main benefit of the SaaS model becomes the reduction or elimination of internal IT infrastructure requirements.

- Agencies that have no existing electronic or EIS compatible system and have no budget available to create one internally or that wish to implement one more quickly and cost-effectively than can be accomplished by creating one themselves.

SaaS will not be a viable solution for the data collection needs of every agency. However, it is reasonable for every agency to review their data collection process to determine if it is currently performing well and if it will continue to fulfill their needs in the future. An emission data collection system using the SaaS model should be one of the options evaluated in the review.

Conclusions

SaaS is gaining widespread acceptance and adoption because it overcomes many of the inadequacies of traditional, legacy, on-premise software products and "hosted" or "managed" applications. The number of new SaaS applications is expected to grow in the near future as customers find that it is a viable replacement for existing systems or provides new functionality that they do not have access to with other models.

Given the specific nature of the emission inventory data collection task for the EIS, SaaS can be an ideal model to provide agencies with a cost-effective and efficient system. Each agency should look closely at the relative benefits and issues to determine if their current data collection model is sufficient for their needs now and will be sufficient in the future.

As the EPA moves forward with its plans to speed acquisition of the inventories, agencies must also look for ways to streamline their inventory workflow. A SaaS solution can shorten the data collection schedule and provide emission data that conforms to the EIS submission requirements and minimizes errors, while removing the software and infrastructure responsibilities. As agencies look for ways to stretch their air program management dollars, SaaS is an important option to consider.

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KEY WORDS

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