Information Technology

As workplaces continue to evolve with technical advances, Information Technology, or IT, is the backbone that allows governmental organizations to efficiently and effectively provide services, distribute information, and manage data. An organization's IT department provides critical support that makes it possible to perform all types of daily operations. From providing basic technical support to developing and maintaining complicated databases, IT supports the organization and ensures more efficient operations.

Background

ODE's Information Technology Office (ITO or the Office) is tasked with providing both operational support for the Department and access to educational tools, services, and data for external stakeholders. The ITO maintains and updates the Department's technology tools such as computer hardware, software, and applications. There are 92.0 full-time equivalent (FTE) employees and 20.2 FTE contractors working within the ITO. These individuals are responsible for a variety of tasks including:

- Application Development and Support;
- End User Computing Support;
- IT Administration;
- Production/Storage Infrastructure and Operations; and,
- Network Administration.

While infrastructure management and services are provided by the Department of Administrative Services, Office of Information Technology (DAS OIT), ODE's ITO must continually adjust to the changing demands of a user base that is becoming increasingly dependent on technology as a means for obtaining data and information quickly and reliably.

Why We Looked At This

Based on our planning interviews, we identified the potential for improved operations within IT. Our 2013 performance audit identified weaknesses in ODE's IT governance structure, and subsequent implementation tracking of report recommendations informed our scoping process. Because ITO is a critical component for Departmental operations, we included this area in our audit scope. The specific areas of review and objectives were developed in collaboration with ODE.

What We Looked At

In collaboration with ODE and in order to identify opportunities for increased efficiency and effectiveness, we identified the following scope areas:

- Overall ITO staffing;
- IT governance and strategic planning processes; and,
- Cloud migration.[1]

What We Found

We found that, based on state averages maintained by the Office of Budget and Management, ODE's ITO is staffed consistent with industry standards. ODE dedicates a higher percentage of employees to application development and support compared to other agencies, however this is based on an internal management decision to complete application development work internally rather than outsourcing. Additionally, DAS OIT's efforts to consolidate and centrally operate infrastructure frees up agency resources for application development.

Our review of other scope areas identified two recommendations that could improve operational efficiency and effectiveness and one noteworthy accomplishment or best practice:

- **Recommendation 5.1:** Building its implementation of an IT Governance Committee, ODE should further enhance its IT governance by developing an IT strategic plan aligned with the Department's broader strategic plan. An IT strategic plan that contains project prioritization and encourages portfolio management would allow the ODE to better plan and budget for key technology projects
- **Recommendation 5.2:** ODE should develop a cloud migration strategy that identifies funding sources and prioritizes migration based on business use case justification.

[1] Cloud migration is the process of moving data, applications, or other business elements to a cloud computing environment.

Recommendation 5.1: IT Governance

ODE has addressed weaknesses identified in the 2013 performance audit within IT governance, the process by which it selects and identifies projects to fund, through the creation of an IT Governance Committee and project roadmap. Building on these improvements, ODE should further enhance its IT governance by developing an IT strategic plan aligned with the Department's broader strategic plan. An IT strategic plan that contains project prioritization and encourages portfolio management would allow the ODE to better plan and budget for key technology projects.

Background

IT governance is a formal framework that provides a structure for organizations to ensure that IT investments support business objectives.[2] Information Technology projects and investments can be costly, and without proper governance and business involvement may not fully support the needs of a department.

ODE has had a system of IT governance in place since July of 2014. This is attributable to recommendations provided to it in the 2013 performance audit. The existing IT governance structure includes senior leaders representing all of the ODE program and operations offices as well as four members from the ITO. This group is responsible for:

- Ensuring ITO is performing project work and supporting investments according to ODE's mission;
- Ensuring projects are aligned to the ODE strategic plan "Each Child Our Future"; and,
- Approving project management assignments and start dates.

While ODE has some components of IT governance in place, it does not have a strategic plan for ITO which ties to Departmental needs and goals. A strategic plan is the formal document which guides policies and procedures over an extended period of time and is a critical component of IT governance.

Methodology and Analysis

We reviewed the existing IT governance structure within ODE and compared it to best practices and industry standards.

It is critical that Departmental leadership be involved with IT governance in order to ensure that internal IT sustains and extends the organization's strategies and objectives. Governance offers a formula for success and allows leaders within governmental organization to be active in the strategic management of IT and make sure the following basic elements are in place:

- **Alignment and responsiveness:** Working with IT portfolio management to align IT investments with agency objectives, which allows managers to improve responsiveness to operational challenges;

[2] "What is IT governance? A formal way to align business & IT strategy," *CIO* (2017).

- **Objective decision making:** Allowing leadership to actively commit to improving management and control of IT activities in the agency;
- **Resource balancing:** Enabling control in planning and organizing IT initiatives to allow for adequate IT support for current and future IT investments;
- **Organizational risk management:** Understanding risks associated with IT initiatives and providing the basis to implement risk mitigation strategies;
- **Execution and enforcement:** Providing managers with a single point for IT project management and control, which allows for project prioritization and standardization; and,
- **Accountability:** Allowing managers to enforce the responsibilities that relate to IT program management.[3]

IT governance is the framework for aligning IT strategy with business strategy. The policies associated with IT governance ensure projects stay on track and on plan and meet the needs of stakeholders. Ineffective IT governance can result from a variety of issues including a lack of budgetary control, poor quality of data used in decision making, and lack of timely decision making.

Conclusion

ODE should develop a strategic plan for ITO. This plan will allow the Department to ensure that projects can be prioritized based on Departmental needs and goals and that funds are directed to the most critical investments and projects.

[3] "Understanding IT Governance and Why it Often Fails," *Architecture & Governance Magazine,* (2014), artchitectureandgovernance.com

Recommendation 5.2: Cloud Migration

ODE should develop a cloud migration strategy that establishes funding sources and prioritizes migration based on business use case justification. This strategy should be included in the IT strategic plan that is created as a result of **R5.1**. By planning and budgeting for cloud migration, ODE will be able to ensure that these projects receive priority funding and attention.

Background

ODE maintains databases with an extraordinary amount of information. These databases feed into numerous services that are updated on a regular basis and can be created on-demand when requested by an end-user, either internally or externally. These reports, in aggregate, take a significant amount of processing power to generate, and the inability to scale applications to meet demand rapidly is inefficient. Further, it is not efficient or effective to house the infrastructure systems within ODE that would be necessary to accomplish these tasks.

The Ohio Department of Administrative Services (DAS) operates the State of Ohio Computer Center (SOCC), which is a data center that provides a highly secure facility for state agencies. ODE currently uses the SOCC for server access, application hosting, and infrastructure services. The majority of ODE's applications are housed and run through the SOCC; however, the Department has begun to move applications to a cloud computing model.[4] Cloud computing provides several advantages over other forms of processing including the ability to have broad network access, pooling of resources, and the ability to rapidly scale to demand.[5]

Methodology and Analysis

We interviewed both ODE and DAS staff to determine the cloud migration history and process specific to ODE. We also interviewed ODE staff in order to identify any strategic plan or existing prioritization of applications for cloud migration. We compared ODE's current practices with the National Institute of Standards and Technology (NIST) standards for cloud migration.

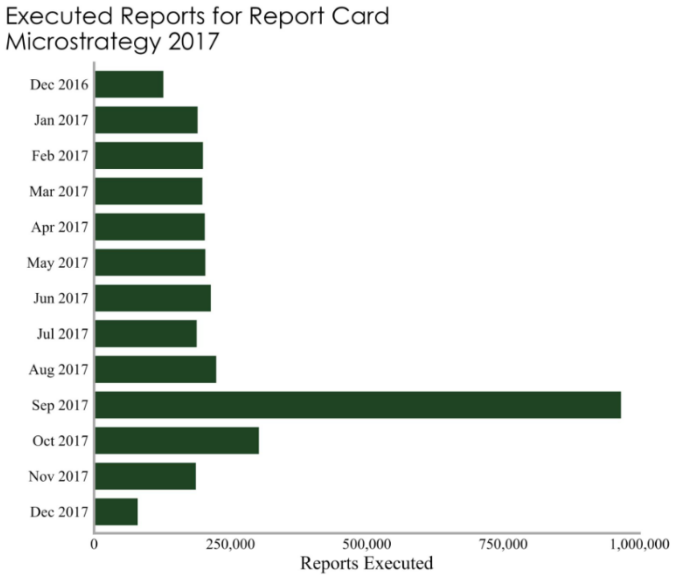
ODE's Application Development group was responsible for developing applications that are currently housed on SOCC servers. Since 2017, ODE and DAS have been working to develop a cloud migration process which requires new application development hosted in a cloud environment.

The strategic movement of applications from the SOCC platform to a cloud based platform should be driven by business use cases that optimize migration of system workloads to cloud-based systems to ensure continuous operation, interoperability between internal IT Systems and cloud based systems, and are most cost-effective.[6] Because ODE does not have a strategic plan prioritizing application cloud migration, a formal process for defining the funding source or

[4] Cloud computing has three service models, see **Appendix F** for additional information.
[5] *The NIST Definition of Cloud Computing*, National Institute of Standards and Technology, (2011).
[6] *NIST Cloud Computing Standards Roadmap*, National Institute of Standards and Technology, (2013).

business case for migration has not been developed. The lack of funding, and migration specific projects, increases the amount of time for application migration overall.

While no formal business use case has been developed, ODE has moved some applications to the cloud in order to address high-demand access issues. For example, as seen in the chart on the right, in 2017 when the Report Card application was located entirely on SOCC servers there was a high-demand spike after new report cards were released in September. This would cause servers to crash or be extremely slow for a period of days after the release. In 2019, after the application had been moved to the cloud, the same demand spike in September occurred, but without users experiencing delays in service. Using the cloud allows ODE to scale access for this application during September in order to address the increase in demand.



Source: ODE

During the course of our fieldwork, ODE identified additional applications which it would like to move to the cloud, but has been unable to do so due to restrictions on funding, restrictions on infrastructure services, and a lack of process for business use case justification. Because of these limitations, ODE estimates a 10 year timeline for the cloud migration process.

Conclusion

ODE should incorporate a plan for cloud migration into the IT strategic plan. Cloud migration of applications should be based on business use case justification and identify specific funding sources. The migration plan should prioritize applications that will increase ODE's efficiency and capacity.

Appendix F: Information Technology

ITO Staffing

We reviewed ITO's staffing compared to benchmarks set by the Office of Budget and Management (OBM). These metrics look at the percent of IT staff dedicated to specific categories. OBM's metric is an average percentage of all state agencies; for example, as seen below, ITO's staffing for IT Administration represents 3.8 percent of all ITO staffing and the state average is 25 percent.

IT Staffing Comparison

Staffing Category	ODE FTEs	ODE %	OBM Metric %
Application Development & Support	56.2	71.9%	40.0%
End User Computing	12.0	15.3%	12.0%
IT Administration	6.0	7.7%	25.0%
Production/Storage Infrastructure & Operations	3.0	3.8%	20.0%
Network	1.0	1.3%	4.0%

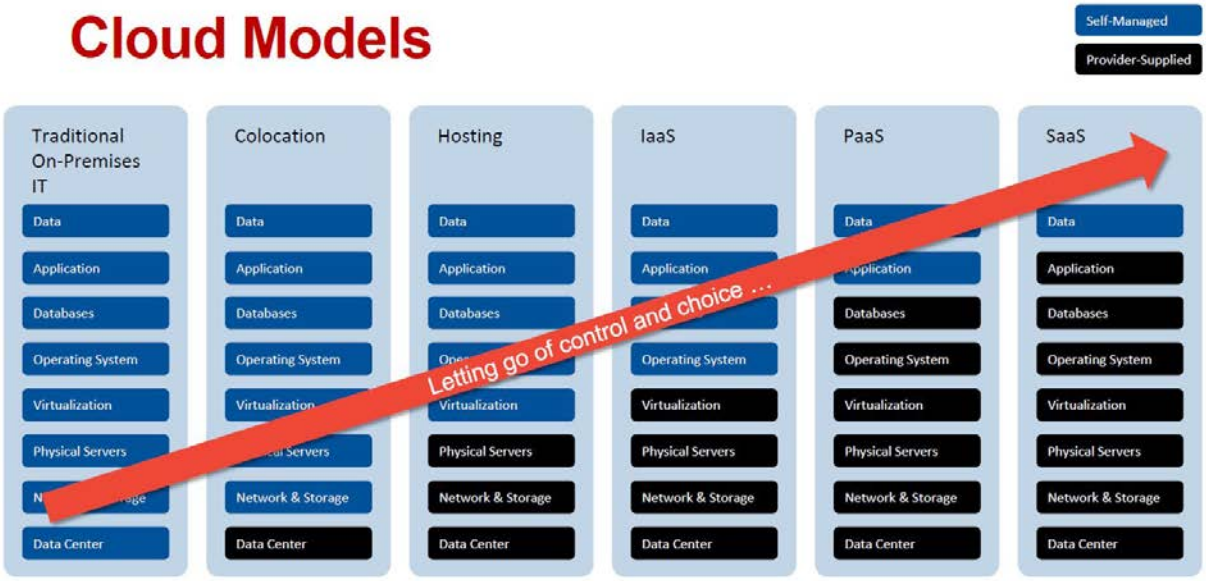
Source: ODE, OBM (Office of Budget & Management) Operating Budget Guidance

Note: Excludes data manager and EMIS FTEs because they do not perform IT functions identified in OBM's metrics.

As seen in the table, ODE is below the OBM metric in all staffing areas except for application development. The additional staff dedicated to application development is an internal decision to maintain that process internally rather than outsourcing to a third party.

Cloud Computing

IT management requires a significant amount of organizational resources. As organizations have increased their reliance on IT for daily operations, the resources needed to effectively manage IT systems has also increased. In order to address the needs of organizations, alternatives to on-site IT management have developed over time.



Source: Gartner

As seen in the graphic above, each IT and data management option has a decreasing level of control for an organization. The final three options in the graphic are related to cloud computing. Cloud computing has three service models, each of which provides advantages to organizations:

- **Software as a Service (SaaS):** The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure.
- **Platform as a Service (PaaS):** The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage.
- **Infrastructure as a Service (IaaS):** The capability to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications.

In general, the level of service provided by cloud computing is determined by the end-user's needs. In addition to the base service provided, users have access to proprietary tools that are adjacent to the purchased service; for example, PaaS will include tools that help enable an

application development team with build, test, and deployment of the application, as well as analytic tools, machine learning capabilities, and AI enabled content.

According to NIST, the cloud model has the following five essential characteristics:

- **On-Demand Self-Service:** A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each server provider.
- **Broad Network Access:** Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms
- **Resource Pooling:** The provider's computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand.
- **Rapid Elasticity:** Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand
- **Measured Service:** Cloud systems automatically control and optimize resource use by leveraging a metering capability at some level of abstraction appropriate to the type of service

Cloud computing offers unique features compared to traditional infrastructure or collocated infrastructure that can enhance ODE’s internal application development. Successful movement of applications should prioritize those applications that take advantage of these characteristics.