ITS Strategic Roadmap – FY20 Planning

Cloud Infrastructure Management

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Background

Digital transformation and modernization of enterprise technology are vital for achieving operational efficiencies. One of the fundamental pillars for driving enterprise technology towards a modern, digital government is evaluating and employing computing capabilities from the broad spectrum of resources in the marketplace.

The rise in data-driven initiatives such as those associated with smart city service delivery projects and initiates such as Open Data compel the business to seek and design innovative and agile system architectures that can withstand unique pressures. Coupled with Metro's emergent Enterprise Data Management strategy and required platform needs, cloud-based solutions offer a vast array of opportunities and advantages to handle the volume, velocity, and variety of data being created and consumed. These cloud models enable convenient, on-demand access to a shared pool of configurable resources. These resources can be rapidly provisioned and released with minimal management effort or service provider interaction.

On August 2018, ITS deployed a full multi-regional geo-replicated Microsoft Azure Government cloud environment replicating our on-premise network and security configurations and expanding our "data center" footprint. Azure Government was selected as our provider due to offering the most extensive compliance certifications of any cloud provider on the market. To hit these high security watermarks, Microsoft states that "Azure Government delivers on the criteria necessary for government agencies and their partners to use cloud services, adding assurance that data will remain in US facilities, datacenter personnel have been screened according to strict guidelines, and continuous monitoring ensures effective incident detection and response." Compliance includes: FedRAMP High, FIPS 140-2, HIPAA, and CJIS (State of Tennessee), to name a few.

By expanding our servicing portfolio to include cloud models, we broaden our ability to provide solutions that are agile, scalable, and resilient. In our adoption, Metro ITS is aligned to maintain pace with technological change and sustain the future needs of supporting agencies and citizens. Employed models within the infrastructure cloud ecosystem include:

- **PaaS (Platform as a Service)**: A category of cloud computing services that provides a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app.

- **IaaS (Infrastructure as a Service)**: A category of cloud computing services that hosts the infrastructure components traditionally present in an on-premises data center, including servers, storage and networking hardware, as well as the virtualization or hypervisor layer.

Stakeholders are all Departments and Agencies of the Metropolitan Government, government vendors and partners, and the citizens of Nashville and Davidson County.

Current Strategic Drivers

1. **Industry Acceptance of Cloud-based Systems** (Game-changing) – The broad industry acceptance and security assurances available with various cloud-based systems offers a functionally attractive, innovative, and cost-effective approach to deliver new or existing services.
2. **Increased Flexibility in Implementation Pathways** (Game-changing) – The widespread public acceptance of cloud for services that employees and citizens use every day, coupled with the potential for positive financial impact and increasingly effective cloud vendor security stance, make a hybrid model a potential direction. Due to these economies of scale, agility, and potential cost savings, a growing number of Metro agencies have either investigated migrating or have migrated certain services to cloud-based systems.
3. **Connected Nashville** (Game-changing) – April 2018, the Connected Nashville community report was delivered to Mayor Briley and the community at-large detailing strategies for implementation of Nashville' smart city vision.
4. **Industry Trend: Smart Cities and "The Internet of Things"** (Game-changing) – An increased number of everyday objects are creating, collecting, sending, and receiving data. Most smart city initiatives are dependent on these IoT devices to generate this data. Cloud infrastructure is versatile in its multiple modes of tooling to consume, store, and interpret enormous amounts of raw data with very little risk to the company.
5. **Secure Government Systems** (High) – With massive data breaches in the news on a regular basis, ITS must strive at all times to protect the security, availability and integrity of all systems and services entrusted to our management.
6. **High Availability of Metro ITS Services** (High) – Customers and the citizens they serve demand extremely high availability of IT services to meet the business-critical and, for some departmental customers, life safety responsibilities they hold.
7. **Limited Market Capacity of Qualified Skillsets** (High) – The increase of services and systems transitioning to the cloud has disrupted the IT labor pool by reimagining and redefining traditional IT roles and skills. The challenge lies in finding qualified staff who hold the necessary skills to support various cloud initiatives.
8. **Increased Storage** (High) – There has been an increase in data storage needs due to unlimited retention for unstructured data, new projects, and data growth.
9. **Data Transparency, Access and Integration** (High) – Expectations are increasing for interfacing data systems and data collaboration between Metro departments, external agencies and even private utilities, allowing combined datasets to be easily available for public use.

10. **Technology Changes** (High) **–** Containers, functions, and other enterprise integration app services reduce overhead by allowing applications to stand alone; therefore, an operating system and compute platform do not need to be configured for each application.
11. **End of Life: Server Hardware and Operating Systems** (High) – As the server hardware platforms and operating systems reach their end of life/end of support, they need to be updated or replaced to ensure availability.

On the Horizon Strategic Drivers

1. **Departmental Applications End of Life** (High) – Customers are reevaluating out-of-date applications no longer compatible with modern technology or security requirements. If unaddressed, this puts their applications at high risk for outages and puts Metro at higher risk for security breaches.
2. **Aging Primary Data Center** (High) – As Metro's primary data center approaches its tenth anniversary in operation, technology equipment, environmental controls, and utilities will need to be replaced or upgraded.
3. **Data Center 2** (High) – Planning on the new Data Center 2 and associated space constraints would suggest that additional Data Center type facilities may be needed to house specialty services should a new facility be built in the future.

Short Term Goals (0-6 months) 7/1/19 – 12/31/19

#	Goal/Objective	Est. Start	Est. Duration
1	Implement critical resource controls, locks, and restrictions to foundational Azure resources (network, gateways, and storage).	7/2019	2 Months
2	Test and implement baseline policy configuration using Azure Policy Management tools. Report findings, recommendations, and plan back to leadership.	7/2019	3-6 Months
3	Research and extend use of Azure Security Center to monitor threats, health, and compliance of resources in the Azure ecosystem. Report findings, recommendations, and plan back to leadership.	7/2019	6 Months
4	Evaluate, test, and implement an AD authentication method for role-based access control (RBAC) in Azure. Report findings, recommendations, and plan back to leadership.	7/2019	6 Months
5	Leverage Azure storage as viable solution for both short and long-term storage needs.	7/2019	3-6 Months
6	Evaluate and devise a plan to address the limited-capacity of cloud-based skillset. Report findings, recommendations, and plan back to leadership.	7/2019	12 Months

#	Goal/Objective	Est. Start	Est. Duration
7	Evaluate, test, and implement ExpressRoute as part of the overall Azure network architecture in order to improve connectivity, and predictability. Report findings, recommendations, and plan back to leadership.	7/2019	12 Months
8	Evaluate impact of cloud services and spend on billing and chargeback. Report findings back to leadership.	7/19	12 Months

Medium Term Goals (6-18 months) 1/1/20 – 12/31/20

#	Goal/Objective	Est. Start	Est. Duration
1	Work with customers to develop and implement projects under the Service-based Architectural Pathway Model	1/2020	12 Months
2	Research and test various Azure infrastructure management tools in managing and reporting in a hybrid environment. Report findings, test results, and recommendations back to leadership.	1/2020	6-9 Months
3	Review and revisit cloud governance groundwork against industry best practices on an annual basis. Report findings and recommendations back to leadership.	1/2020	6 Months
4	Plan and test high availability/disaster recovery tools in Azure as viable solution for both short and long-term resiliency objectives related to application and services deemed most critical. Report findings, test results, and recommendations back to leadership.	1/2020	12 Months
5	Analyze and report ROI of cloud services, whether Azure or other providers, compared to on-premise infrastructure. Provide findings back to leadership.	1/2020	12 Months

Long Term Goals (18-36 months) 1/1/21 – 6/30/22

#	Goal/Objective	Est. Start	Est. Duration
1	Operationalize the Microsoft Azure Portal amongst various divisional teams. Report findings, recommendations, and metrics back to leadership.	7/2021	12 Months
2	Evaluate other cloud providers who demonstrate enterprise grade, best in breed data center capabilities. Report findings and recommendations back to leadership.	7/2021	12 Months

Related Roadmaps

- Enterprise Data Management *(to be released Q1 2019)*
- O365
- Data Center and Environmental
- Server Infrastructure
- Enterprise Server