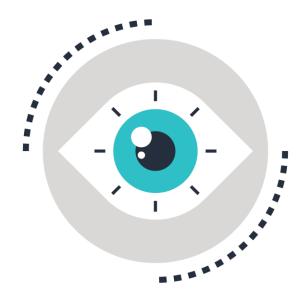


Capital Projects Fiscal 2020 – Fiscal 2025

Frank Johnson, Chief Information Officer/Chief Digital Officer

OUR VISION



Over the next decade engage all City departments, businesses and citizens to design, build and implement technology that creates a safe, thriving and smart city.

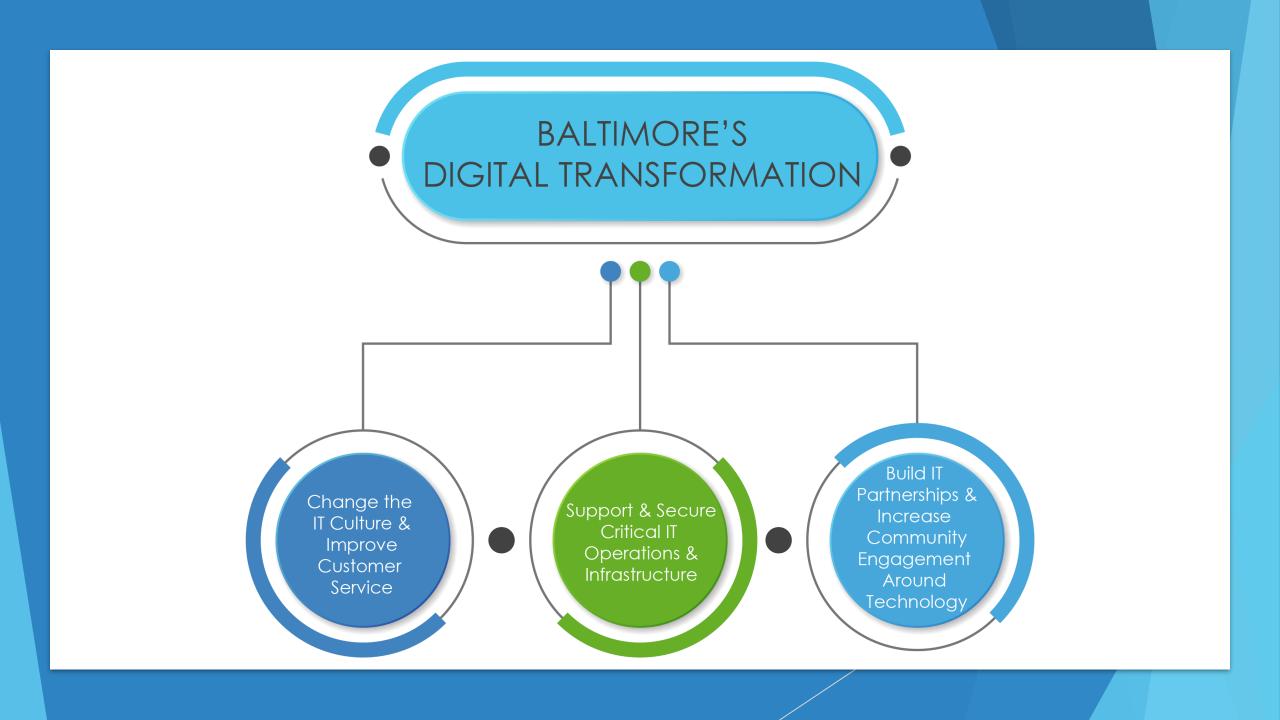
OUR MISSION



The Baltimore City Office of Information & Technology will provide sustainable infrastructure and technology to support and enhance City departments, communities, businesses, and mayoral goals.

Agency Fiscal 2019 Financial Data

Total Operating & Capital Budget	Amount Funded (S)	Full Time Funded Employees (FTE)
Operating (FY19)	\$31,133,000	122
Capital (FY19)	\$3,950,000	0
FY20 (Opex + Capex)	TBD	TBD



Change the IT Culture and Improve Customer Service



One IT Enterprise

Centralize various IT operations and functions to reduce cost, improve efficiency and streamline operations

Human Capital Investment

Improve training and IT professional staffing levels

Governance & Administration

Establish a structure that promotescross-agency collaboration, strategic alignment, and continuous change for IT initiatives

DevOps

Integrate software development to strengthen enterprise IT operations and service delivery

Support and Secure Critical IT Operations and Infrastructure



Cloud Services

Utilize cloud services to rapidly deploy platforms and software without the need to build physical infrastructure

Data Telecommunications

Invest in next-generation network infrastructure to connect the City with high-volume, high-velocity data communications

Enterprise Resource Planning (ERP) modernization

Procure a modern and integrated system to streamline the complexities of the ERP landscape

Build IT Partnerships and Increase Community Engagement Around Technology



Data and Analytics Hub

Expand the City's capacity to combine data residing in different sources and provide users with the ability to access, use, and benefit from the data

IOT-Enabled Smart City

Deploy new technology that improves the quality of life and service delivery for all city residents, businesses and visitors

Baltimore Tech Center

Create a space for people to view and experience immersive technology environments

P3 Partnerships

Partner with external stakeholders to leverage technology resources for the betterment of all city residents and businesses

Alignment with the City Digital Roadmap

Change the IT Culture and Improve
Customer Service



One IT Enterprise

117-038: BCIT E-mail Upgrades
117-020: BCIT Virtual Desktop Installations
117-028: BCIT Virtual Private Network
Upgrades
117-016: BCIT IT Command Setup
117-025: BCIT Storage Hardware Upgrades

117-040: BCIT Disaster Recovery and High Availability Implementations

117-029: BCIT Cyber-Security Upgrades

117-030: BCIT Data Center Internet Upgrades

Support and Secure Critical IT Operations and Infrastructure



Cloud Services

117-042: BCIT hybrid Cloud Upgrades

Data Telecommunications

117-026: Citywide Uninterrupted Power Supply (UPS) Upgrades

117-032: BCIT Fiber Projects

117-019: Citywide Agencies Switch

Replacements

117-041: City-Wide Network Cabling-wiring
Upgrades

117-031: BCIT Network Ports Upgrades 117-046: BCIT Data Center Fiber Divergences

Enterprise Resource Planning (ERP) modernization

Projects: 117-019, 117-026, 117-030, 117-031, 117-041, 117-042, 117-046

Build IT Partnerships and Increase Community Engagement Around Technology



Data and Analytics Hub

17-039: BCIT Data Warehouse Migration

Critical Issues in IT



Aging Infrastructure

40+ year old mainframe

Unsupported email system

Antiquated hardware

New security needs



Storage Capacity

Increased data demands

Increased reliance on email



Connectivity

Degraded access for city users

Lack of access in the community

Slow connectivity

Overview of Capital Needs



BCIT's capital needs are required for supporting the City's IT operations & maintenance, Modernization and enterprise solutions.



BCIT supports City agencies in driving their business outcomes through technology.

- •Supports underlying computer and application services.
 - •Consulting on IT related programs.
- •Providing IT resources for help desk and service desk.

 Managing city technology infrastructure and design supporting applications such as databases, applications, 311, CCTV, Fiber and 911 emergency dispatch.



BCIT's request only covers a small portion of the capital needs to modernize IT across the city government. BCIT estimates **over \$129M** would be needed over the next 5 years to modernize the City's IT environment.

Recent Project Highlights

117-013 Backup and Recovery

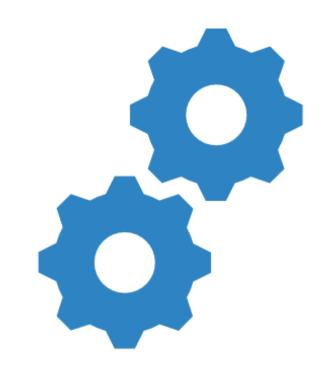
- To backup and capture data systems for City agencies. It was important to mitigate the risk of data loss.
- Status: Completed but post implementation is still in progress
- Fiscal 2017 Funding: \$500,000 (PAYGO)

117-017 Advanced threat detection System - Cyber Security

- To protect the city from cyber-attacks. It's important to protect city systems from hackers, protect the integrity of city data and to maintain compliance.
- Status: Completed but post implementation is still in progress
- Fiscal 2017 Funding: \$500,000 (PAYGO)

CIP	Capital Project	Business outcome 1	Business outcome2	Business outcome3	Business outcome4	Business outcome5
117-013	Backup Data	Capture	Protection	Recovery	Restore	Compliance
117-017	Security Adv.	Detect	Contain	Quarantine	Remediate	Compliance

117-016: BCIT IT Command Setup



This service will improve the City's IT services availability by deploying a 24/7 operation. The IT command center platform will require additional tools and capability to setup, for example, analytics tools that provides analysis of systems near-real time for faster remediation and recovery of IT services.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$300,000	\$300,000	\$300,000	\$300,000	\$0	\$0	\$1,200,000

^{*} Please note the request does not include staffing services

117-019: Citywide Agencies Switch Replacements



- This service will continue to replace city-wide end-oflife switches that support critical services across the City including e-mail, communications and financials.
- Why are switches important?
 - Switches manage the flow of data across a network ensuring data is transmitted only to those devices for which its intended
 - Each networked device connected to a switch can be identified by its network address, allowing the switch to direct the flow of traffic maximizing the security and efficiency of the network.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$650,000	\$650,000	\$200,000	\$200,000	\$250,000	\$200,000	\$2,150,000

117-020: BCIT Virtual Desktop Installations

This service will standardize computers across City agencies using Virtual Desktop Installation (VDI) technology to efficiently manage computer systems to help protect the City from Cyber-attacks.

How it will streamline?



Patch management is currently done on each individual computer. Through VDI, only one universal system needs to be patched making it secure and consistent to support.



VDI technology will take city users computer workspace with them irrespective of their location. The same workspace is presented anywhere the employee chooses to work or login.

► If project is n implemented?



Security threats

Continuing Increased IT spend

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$250,000	\$1,500,000

117-025: BCIT Storage Hardware Upgrades



As the City's data consumption needs grow, the City's network storage has reached its capacity. In the future, there will be an urgent need to scale storage capacities to sustain the current and future data needs.



The current storage capacity is 620 Terabyte (TB) and 100% of that capacity is currently being utilized.



The Fiscal 2020 request will move the City to 1/7-1.8 Petabytes (PB) (1000 TB = 1 PB)



If the City's storage capacity is not upgraded, the result is:

- The percentage uptime for city services will decrease impacting services such as the city intranet, water billing system, property tax, e-mail, library file sharing, etc.
- IT costs for additional city storage will increase if purchased directly through the agencies.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000	\$1,200,000

117-026: Citywide Uninterrupted Power Supply (UPS) Upgrades

- This service will replace or upgrade City-wide Uninterrupted Power Supply (UPS) systems to support critical IT systems in Human Resources, Finance and Public Safety during power related incidents.
 - Some systems that could be impacted include:
 - CAD (Public Safety System)
 - Security and Key Entry Systems
 - Call Centers (DOT, BRC, 311, etc)
 - Mainframe system and its batching process (City financials)
 - Access to water billing system and its portal applications
 - Human Resources portals

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$500,000	\$1,000,000	\$100,000	\$100,000	\$100,000	\$450,000	\$2,250,000

117-028: BCIT Virtual Private Network Upgrades

- This service will extend the City's network presence to remote City of Baltimore agencies that do not have fiber presence. The solution promotes equitable distribution of computing services to underserved city buildings and agencies.
- Sites that will benefit from this funding request include:
 - ▶ DHCD, Fire, Police, DOT or Rec & Parks
- What are the problems that exist now?
 - City fiber is not available at all City remote locations meaning these sites are unable to tap into the city IT enterprise for services.
 - Agencies source 3rd party vendors such as Comcast Business to provide their internet connectivity and 3rd party solutions to connect back to the city enterprise.
 - ▶ This poses a security risk to the City's technology Infrastructure and causes additional engineering overhead to configure multi-vendors connectivity back to the city.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$100,000	\$100,000	\$0	\$0	\$0	\$0	\$200,000

117-029: BCIT Cyber-Security Upgrades

This service will upgrade the City's Cyber-Security technologies, such as the firewall, to support increasing network workloads for email, internet, permits and City billing applications, as well as protect the City from on-going cyber security threats.

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Fiscal 2020	FISCOI ZUZ I	FISCOI ZUZZ	FISCOI 2023	FISCOI 2024	FISCOI ZUZS	TOTAL
\$1,000,000	\$500,000	\$0	\$0	\$0	\$0	\$1,500,000

117-030: BCIT Data Center Internet Upgrades



In alignment with the City's first ever digital transformation strategy, this project would scale the city's broadband internet from 1 GB to 10 GB.



Increasing from 1 GB to 10 GB broadband is needed to enable the city to transact on-line services between native city systems and the cloud.



Why it's important?

The City's new ERP system that will replace legacy Financial and Human Resources systems will be cloud based. Without scaling from 1GB to 10GB, the system will be slow and users will have poor connectivity. Additionally, as the City moves to Office 365 (cloud based) it will put more pressure on the City's existing internet connectivity.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$1,800,000

117-031: BCIT Network Ports Upgrades

This service will improve network ports hardware throughout by moving away from the 1GB to 10GB model. These updates will improve the performance of systems supporting City business systems and public safety.



Why is this important?

These are upgrades are to the internal buildings and data center network hardware that pass traffic between the desktop computers all the way to the internet. These devices act as traffic cops (stop and go). If they are not upgraded, the full internet upgrades potential may not be realized.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$450,000	\$450,000	\$300,000	\$300,000	\$0	\$0	\$1,500,000

117-032: BCIT Fiber Projects



This service will build a fiber program with the hardware and tools required to monetize the fiber in the city based on the ongoing broadband study outcomes.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$200,000	\$200,000	\$450,000	\$450,000	\$750,000	\$500,000	\$2,550,000

117-038: BCIT E-mail Upgrades

- This service will upgrade the City e-mail system deployed 10-15 years ago. The project will enable the city to use a phased approach to migrate all city employees to the modern version of e-mail called M365 while securing the platform.*
- The current mail system MS Exchange 2010 has reached the end of life and is no longer supported by the vendor. The city has no choice but to upgrade.
- What are the benefits of the upgrades to users?

1

The new system will be resilient and less prone to down-time.

2

Reliable and efficient because accounts are managed through the cloud engine as opposed to on-site 3

New features and capabilities such as team collaborations, video and voice collaboration.

4

Offer better security features and functions such as data leak prevention (DLP)

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$1,000,000	\$1,000,000	\$0	\$0	\$0	\$0	\$2,000,000

NOTE: This request is not for licensing.

117-039: BCIT Data Warehouse Migration

This service will upgrade the city data warehouse and migrate its data to the cloud.

What is the benefit of this migration?

Scalability and agility.

As data grows (open data or agencies data sets) the City struggles to scale the data warehouse capabilities processes stored on-site.

It provides the solution for the City's data scalability, agility and integration in alignment with the city IT strategy that calls for data warehousing and management through cloud solutions.

What's the consequence of not doing it?

The city will be locked in siloed state and will be unable to scale its data footprint due to lack of data infrastructure flexibility and scalability.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$300,000	\$300,000	\$400,000	\$400,000	\$450,000	\$600,000	\$2,450,000

117-040: BCIT Disaster Recovery and High Availability Implementations



This service will help the City create a Disaster Recovery (DR) platform to protect the City's IT systems from effects of significant negative event. Disaster Recovery sites allow the City to maintain or quickly resume mission-critical functions following a disaster.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$1,500,000	\$1,500,000	\$0	\$0	\$0	\$500,000	\$3,500,000

117-041: City-Wide Network Cabling-wiring Upgrades

- As the City modernizes its aging infrastructure, this service will enable the City to deploy a phased-out approach of replacing legacy cabling from cat3 to cat6/7 across City agencies to improve throughput and compliance.
- What is the benefit of upgrading from cat3 to cat6/7?
 - Cat5e or higher support higher data throughputs, in perspective they will carry 100-10000Mbps compared to its predecessors that only carry 10-100Mbps
 - ▶ Cat5e or higher can carry data over long distances (up to 300ft) compared to 100ft
 - Cat5e or high reduces crosstalk (electro-magnetic signals) interferences

Compliance: Industry standards such as American National Standard Institute (ANSI)/TIA (Telecommunications Industry Association)/EIA (Electronic Industries Alliance) 568-B general building cabling requirements are required by vendors and compliances before technology solutions are deployed. BCIT digital transformation plan aligns with these requirements.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$300,000	\$300,000	\$200,000	\$200,000	\$400,000	\$200,000	\$1,600,000

117-042: BCIT hybrid Cloud Upgrades

This service will enable the City to extend its data center to the cloud by creating a hybrid model that will enable the City to integrate with cloud solutions such as the financial enterprise resources planning (ERP) system.

Why can't we just use our existing data center setup?

Many business software solutions that the City needs or will need are now cloud based. A hybrid solution enables the city to securely and privately connect to the public cloud to consume these cloud solutions.

A hybrid cloud enables the city to securely and privately consume these services to minimize the threat of using the public internet to consume cloud services

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$2,700,000	\$2,700,000	\$800,000	\$800,000	\$800,000	\$800,000	\$8,600,000

117-046: BCIT Data Center Fiber Divergences



- This service will enable the City to create fiber diversity for 95% of the City agencies that have fiber converged at the secondary data center. The capital will be used to create a phased-out fiber divergence project to the primary data center.
- Why is this project important?
 - 95% of city agencies fiber converge at the secondary data center. Should an event disrupt the fiber connection at the secondary data center, the City government services will be severely impacted. The project will enable the city to create fiber path diversity to the primary data centers for resiliency purposes.

Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
\$250,000	\$250,000	\$500,000	\$500,000	\$500,000	\$0	\$2,000,000

Fiscal 2020 – Fiscal 2025 Capital Request Summary (in millions)

	Fiscal 2020	Fiscal 2021	Fiscal 2022	Fiscal 2023	Fiscal 2024	Fiscal 2025	Total
City Bond Funds	\$10,000	\$10,000	\$2,000	\$2,000	\$2,000	\$2,000	\$28,000
City General Funds	\$ -	\$ -	\$2,000	\$2,000	\$2,000	\$2,000	\$8,000
Total	\$10,000	\$10,000	\$4,000	\$4,000	\$4,000	\$4,000	\$36,000