



2018-2023

**INCLUSIVE DIGITAL
TRANSFORMATION
STRATEGIC PLAN**

City of Baltimore



MESSAGE FROM THE MAYOR



“The development of this inclusive digital transformation strategic plan will create an ecosystem that allows the City of Baltimore to design, implement, and operate the latest technology that Moves Baltimore Forward”

All across the world, information technology is improving lives and bringing together people, communities, and businesses. Baltimore has the resources to be on the cutting edge of this transformation, and my administration is committed to using the latest technology to keep our community safe, educate our citizens, develop our economy, enrich our lives, and keep our government accountable and transparent.

To ensure that our City Government meets these goals while operating at the highest levels of service and quality, I asked my Chief Information Officer, Frank Johnson, to develop the City of Baltimore's first-ever Inclusive Digital Transformation Strategic Plan. This Strategic Plan provides a roadmap to transform the city's digital infrastructure, empower everyone in our community with technology and grow Baltimore's tech industry and workforce.

With enhanced technologies like cloud infrastructure, mobile applications and modern, user-friendly interfaces, the city can improve its analytics, foster collaboration across departments and make more data-driven decisions. We can also leverage local businesses and schools to expand public resources, build our economy and train tomorrow's technology workforce.

In addition, transitioning to a more centralized enterprise and upgrading systems from legacy mainframes to modern and secure platforms will help us to not only become more efficient, but also plan for the future while continuously delivering improved customer services.

The need for better technology is immediate, but the benefits of this Strategic Plan will carry far into the city's bright future.

Sincerely,

A handwritten signature in black ink that reads "Catherine E. Pugh". The signature is fluid and cursive, written over a light blue circular graphic element.

Catherine E. Pugh

Mayor, The City of Baltimore



MOVING BALTIMORE FORWARD TOGETHER

THE HONORABLE BERNARD C. "JACK" YOUNG

City Council President

The City of Baltimore will benefit greatly from the creation of an inclusive digital transformation plan. I am looking forward to supporting this important work. I have long advocated for increased transparency and efficiency in city government.

As the head of the city's Legislative Branch of government, I have been a long-time proponent of the need for Baltimore to properly invest in a 21st-century IT infrastructure. I believe Baltimore is on its way to becoming a truly modern city and an improved technology platform will serve as a major driving force.

For Baltimore to become a technically advanced city, we need to build an infrastructure that allows city agencies to properly connect, communicate and drive positive policy and process changes that help to break down silos, fosters innovation and encourages collaboration enterprise-wide.

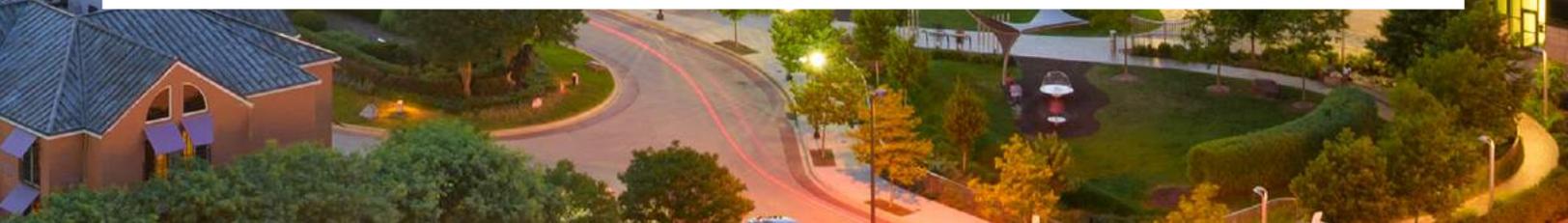
THE HONORABLE JOAN PRATT

Comptroller

My Office is proud to support Mayor Pugh's efforts to prioritize and implement a comprehensive Information Technology strategy that will improve service delivery to the citizens and visitors to Baltimore City.

Our business processes rely on outdated systems that have not kept up with the marketplace. The result is expenditures for supplies, such as paper, which creates expense for reproduction and storage. Just by this example, digital age technology eliminates or materially reduces large paper and ink purchases, warehousing/archiving of records, lease expenses for the warehouse buildings, utility maintenance payments associated with the buildings, etc.

Solid strategy and sound investment decisions will serve the city in the years to come and will provide the needed platform and structure to conduct business in the 21st century.



A Message from the CIO

“

Producing Baltimore City's first IT Strategic Plan is no small feat. It reflects input from a diverse range of stakeholders in the Baltimore community,

”



I am pleased to present the City of Baltimore's first ever strategic plan for Information Technology (IT). This plan represents the city's vision for technology and will guide investment and resource priorities across the departments for the next several years. The goal is to simply build and staff a 21st century IT capability – with a focus on providing maximum support to Mayor Pugh's five pillars to Move Baltimore Forward.

Technology is changing the way governments operate and deliver services to communities, visitors and businesses. Civic Analytics and low-cost sensors allow departments to have greater situational awareness and glean insights that reduce costs, lessen our environmental impact, and improve customer service. Advances in communication and development tools allow us to build applications focused on user experience and not the city's internal administrative structure. An emerging interest in public interest technology provides us with an opportunity to make our community a partner in the solution development and deployment process through our open data, civic technology, smart city and digital equity programs.

It's important to note that this strategic plan is the community's IT plan, not just the IT plan for city government. It outlines the city's plan to connect people to their government, enable an effective and productive workforce, and build a digitally equitable community. We will strive to operate together as “One IT”. We will handle information in a manner that engenders trust, promotes transparency, and protects privacy. For multi-department needs, we will have centrally managed IT solutions & capabilities. For agency specific needs, we will strive for the selection of common platforms and approaches. Like all city investments, our plans for IT solutions will be based on compelling business cases and measurable outcomes, addressing short-term needs and investing for long-term success.

Thank you, Mayor Pugh, City Council President Young, Comptroller Pratt, Finance Director Raymond and the city's department heads for the opportunity to put forth this IT strategic Plan. And thank you to the City staff who put their valuable skills to work in mission-driven service to the Baltimore community. Together we will deliver transformative, inclusive, and innovative technology solutions for the city and the public we serve.

Sincerely,

Frank Johnson

Inclusive Digital Transformation Plan

	PAGE
Welcome Messages	01
Executive Summary	05
Vision and Mission	07
Financial Impact	09
Purpose of the Plan	11
Change the IT Culture and Improve Customer Service	12
Support and Secure Critical IT Operations and Infrastructure	28
Build IT Partnerships and Increase Community Engagement Around Technology	34
Call to Action	49
Acknowledgements	51
Request for Strategic Plan Support	51



This Inclusive Digital Transformation Strategic Plan only highlights the city’s high level IT and data priorities, areas of focus and investment needs for the next five years.

Detailed operational plans, implementation timelines and challenge solutions are not included in this plan, but will be a part of future documents guided by and based on this comprehensive roadmap.

Executive Summary

Founded in 1729, the City of Baltimore, Maryland is the 30th-most populated and largest independent city in the United States. It is home to over a dozen colleges and universities, a thriving inner harbor and a network of over 270 recognized neighborhoods.

Many people know Baltimore City as the birthplace of the Star-Spangled Banner, but few know that technology has played a large part in the city and nation's evolution. Baltimore was the first city to use hydrogen gas to light streets (1816), the first to have an elevator operated by electrical

power (1856) and the first to use 3-1-1 technology for non-emergency call service (1996).

However, decades of decentralized information technology (IT) management and insufficient enterprise investment has led to a system that struggles to support city priorities and deliver service improvements for both residents and businesses. Furthermore, many of the city's IT capabilities are outdated and lack the modern-day range of capabilities offered by comparable cities.

To combat this trend, the City of Baltimore has developed this first ever Inclusive Digital Transformation Strategic Plan which details a five-year plan to build the city's IT enterprise capability.

This document is not meant to detail the exact tasks necessary to implement various tech initiatives and city improvements, but to simply outline the roadmap necessary to establish a tech ecosystem that reduces redundancy and cost, aligns standards, improves the public's experience with city government and dismantle the digital divide.



To ensure this strategic plan aligns with industry best practices and current technology trends, the City of Baltimore consulted with the world's leading IT research and advisory firm, Gartner, Inc. and their Consulting and Executive Partner advisory associates.

Vision

As part of her pledge to Move Baltimore Forward, Mayor Pugh has outlined five pillars aimed at improving the quality of life for city communities.



These pillars not only establish the level of service residents, visitors and businesses should receive from their city government, but also sets the tone for how Mayor Pugh expects her departments to operate, collaborate and respond to Baltimore City needs.

The goals highlighted in this strategic plan will outline how, over the next five years, IT will improve services to the community, provide additional resources to city departments and support Mayor Pugh's goals.

To support Mayor Pugh's pillars and vision of a collaborative and transparent government, the Mayor's Office of Information & Technology (MOIT) has changed their name to The Baltimore City Office of Information & Technology (BCIT) and has adopted a new vision and mission.

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.



BALTIMORE CITY OFFICE OF INFORMATION & TECHNOLOGY

6

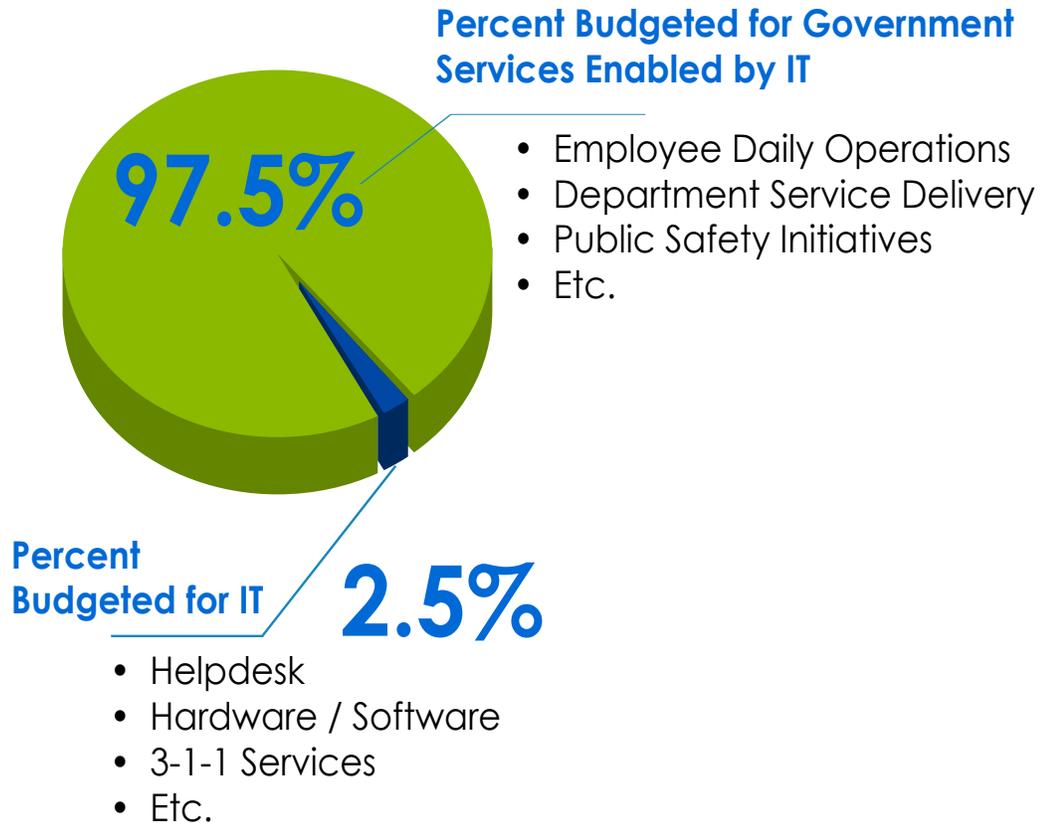
WAYS BALTIMORE CITY INFORMATION & TECHNOLOGY (BCIT) WILL SUPPORT MAYOR CATHERINE E. PUGH'S FIVE PILLARS TO "MOVE BALTIMORE FORWARD"

1	CHANGE THE CULTURE OF				
		Using Band-Aids	Building Silos	Using Outdated Technology	
2	START				
		Connecting Resources	Identifying Opportunities	Measuring Progress	
3	TRY				
		New Ideas	New Strategies	New Tactics	
4	DISRUPT GOVERNANCE TO				
		Eliminate Wasteful Systems	Reorganize Operations		
5	IMPROVE OPERATIONS TO				
		Continuously Communicate	Encourage Leadership	Increase Skills and Staffing Levels	
6	ENGAGE TO				
		Showcase Progress	Build Relationships	Include Everyone	

Financial Impact

The City of Baltimore currently invests 2.5% of its operating budget, or about \$65 million, on information and technology (IT). Yet IT enables and supports services and operations funded by the other 97.5%.

City of Baltimore Operating Budget

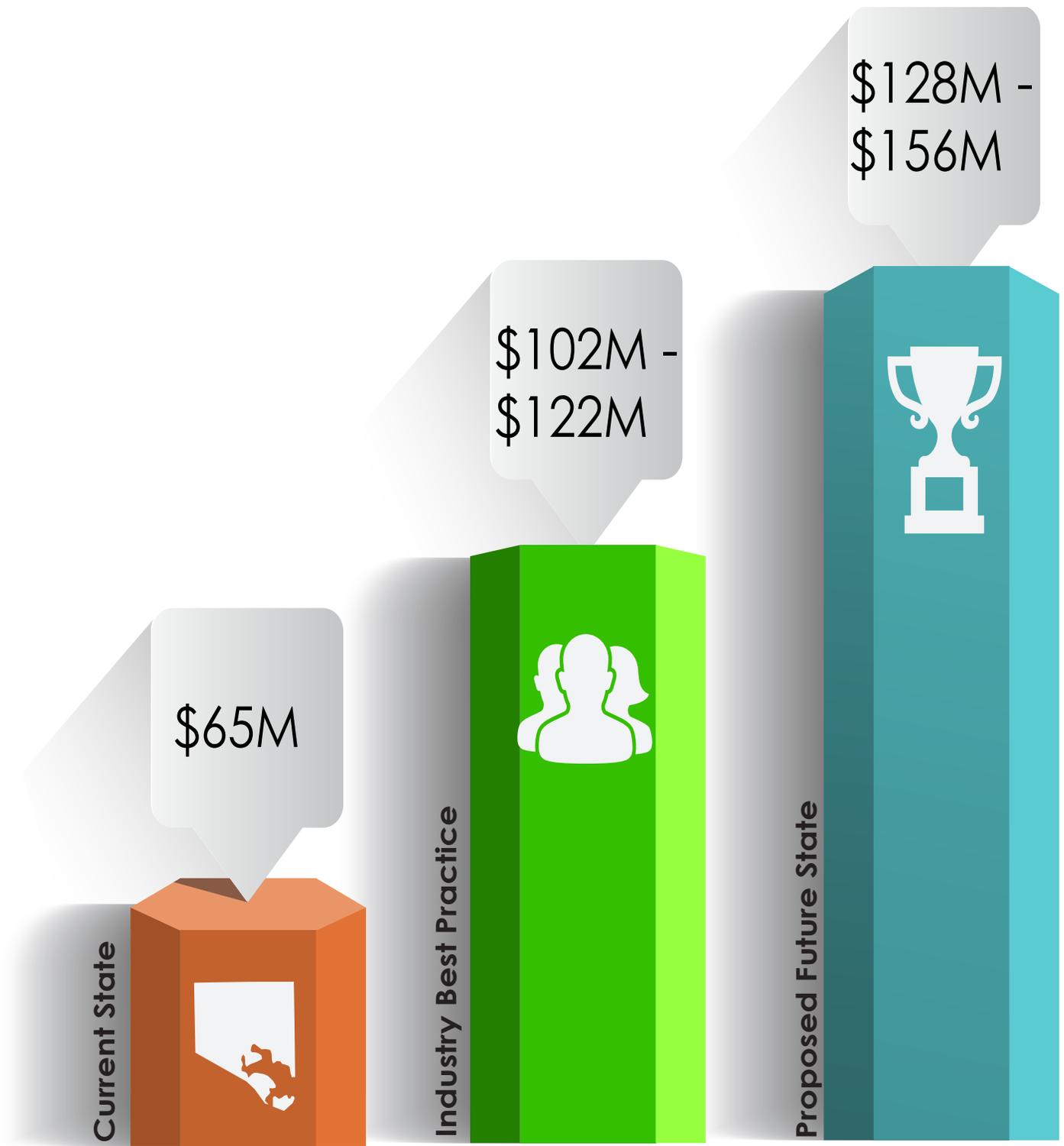


BCIT compared the City of Baltimore's IT budget against industry benchmarks for similar sized State & Local Government (SLG) entities. The results show that the City of Baltimore invests proportionally less on IT than most of its peers.

- **To match average SLG industry benchmarks, the city's annual IT budget would have to increase to the \$102 million - \$122 million range.**

However, increased investment would only raise the city to average spending levels. Given the current state of IT in the city, the risk of not increasing the investment to levels over the industry average is tremendous and necessary to both catch up and expand infrastructure and capabilities outlined in this plan.

- **To match the 75th percentile SLG industry benchmarks, the city's IT budget would have to increase to the \$128 million - \$156 million range.**



As this strategy is implemented, the cost of specific initiatives and investment opportunities will become clearer. Using industry benchmark data for budgetary planning purposes, the city should plan a baseline IT budget in the average benchmark range, with increases over the next five years up to or above the 75th percentile range. This is necessary to implement the reorganization, digital transformation, and modernization outlined in this strategic plan.

Purpose Of The Plan

This Inclusive Digital Transformation Strategic Plan outlines the path BCIT should take over the next five years to further Mayor Catherine E. Pugh's vision to Move Baltimore Forward, ensure better customer service and improve those areas of technology that currently hinder city operations and city quality of life. This plan is separated into three main strategic goals:



Change the IT Culture and Improve Customer Service

- **One IT Enterprise** – Centralize various IT operations and functions, when appropriate, to reduce cost, improve efficiency and streamline operations
- **Human Capital Investment** – Improve training and increase IT staffing levels
- **Governance & Administration** – Establish a structure that promotes cross-agency collaboration, strategic alignment and continuous change for IT initiatives
- **DevOps** – Integrate software development to strengthen enterprise operations, service delivery and customer experience



Support and Secure Critical IT Operations and Infrastructure

- **Cloud Services** – Increase the use of cloud services to rapidly deploy platforms and software without the need to build physical infrastructure
- **Data Telecommunications** – Increase investment in next-generation network infrastructure to connect the city with high-volume, high-velocity data communications that supports demand
- **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 physical and virtual space for people to view and experience immersive technology environments
- **P3 Partnerships** – Encourage stakeholders in the public, private, education and non-profit sectors to partner with the city and leverage their technology resources for the betterment of all city residents and businesses

Each section not only details the current state and roadmap to achieve the various components, but also describes the investments required to transition and transform technology and services for the City of Baltimore.



Change the IT Culture and Improve Customer Service

One IT Enterprise

The City of Baltimore's IT future is one of an integrated enterprise that adapts to the changing needs of its citizens and captures opportunities to apply new and emerging technology to make the city a better place to live and work.

The integrated enterprise goal is to establish a world-class IT operation that supports city departments in their respective missions, and ensures users benefit from and want to use the centralized resources instead of have to.

Today, the city's IT operation is spread among individual departments, which often operate their own internal IT organizations, infrastructures, and applications to meet its own unique needs. The primary benefit of the current model is independence, in that the departments can decide which IT investments best align with their mission and take decisive action without external dependencies and coordination.

However, in addition to obvious redundancy and inefficiencies borne through the current fragmented

environment, there are several drawbacks that hamper the city's ability to modernize and innovate.

First, there simply are not enough resources in the city to support such inefficiency, while maintaining high levels of capability, quality and security. As such, departments often are at risk to make trade-off decisions and tolerate sub-par quality and/or only implement what their budgets can support. Because they are inwardly focused, there is often little to no interoperability with other departments, systems are incompatible and actions that could pose a risk are not pursued due to cost and effort.

Furthermore, city leadership is unable to take a holistic view of IT and see where funds are being spent and how individual investments

line up with Mayoral goals and priorities. With IT divided into department silos, the needs of the enterprise are not considered, and therefore IT is not able to deliver on overarching policy priorities and mission needs that cross agency boundaries.

Finally, opportunities to innovate are also rarely captured due to a department's preference to invest in the operation of existing legacy systems instead of new and more expensive systems that could benefit other departments.



In order to improve operations, eliminate redundancy, reduce cost and achieve mayoral and enterprise-wide IT strategic goals, the city must discontinue its current model of a distributed and decentralized IT operation and infrastructure; and reorganize its IT operations in a way that is more integrated and supports department's independence while building the city's IT capacity and strength. This more inclusive and fundamental shift in structure is also the reason behind the Office's change in name from the Mayor's Office of Information & Technology (MOIT) to the Baltimore City Office of Information & Technology (BCIT).

Before the IT reorganization strategy is developed and centralization of any core function occurs, BCIT will work with department leadership and staff to conduct a comprehensive assessment of their IT assets, operations, service needs and concerns to better determine what functions and operations should be centralized for the benefit of the enterprise. Once the plan is developed, the goals for the transition include:

- Core IT services will be centralized into BCIT and operated at high levels of quality, security, resiliency and performance. We will model enterprise IT infrastructure, services and support using the best examples in city departments as a baseline and industry best practices as a guide.
- Decentralized IT operations and services will only be centralized when BCIT is able to deliver them at levels that meet or exceed the city's needs.
- BCIT will work collaboratively with department leadership and staff to ensure that the transition is smooth and department missions are not harmed in the process.
- Department IT personnel will be integrated into BCIT when it benefits the enterprise. Workforce reduction is not a goal, as the data shows that the city is already understaffed to meet its IT demand. BCIT will collaborate with affected department personnel to plan their BCIT integration and career path prior to any reassignment.
- Transition to a centralized model will be led by the CIO, with certain future actions being governed by the Executive IT Strategy & Investment Board (see page 21).

Decentralization Risk

Although the current decentralized model provides individual departments with some benefits, the continued risk to the city if certain IT functions are not centralized is tremendous. Some of the greatest enterprise risks being:

- Continued overspending on duplicative hardware, software and resources and the inability to realize any potential cost savings.
- Continued inconsistency among IT standards, training, policies and practices.
- Continued inability to provide expertise, quality assurance and quality control at the department level for cyber security, DevOps, data integration and data collection.
- Continued incompatibility between department software and reduced capacity to collaborate on large technology projects and share common resources and challenge solutions.



BCIT recognizes that moving certain functions to a centralized model will require departments to have even more access, communication and support than is currently being provided. Therefore as part of the reorganization, BCIT intends to establish Agency Relationship Managers (ARMs).

ARMs are senior BCIT employees whose main responsibility is to establish and maintain value-driven, strategic relationships with one or more city departments, and proactively manage business demand and customer satisfaction.

The ARMs' role is characterized as follows:

- Serve as the strategic interface between BCIT and the departments.
- Educate departments on BCIT service and product offerings.
- Remain engaged and help manage demand, mitigate risks and clarify processes throughout new BCIT product delivery.
- Establish IT metrics tailored to the departments and track and report on benefits realization and customer satisfaction.
- Advise departments on innovative and technology enablement opportunities.
- Relay unique needs and concerns of the department leaders to BCIT to improve strategic planning, prioritization and evolution of enterprise offerings.

Under a centralized model, departments will no longer maintain certain IT operations. They will however with ARM support, not lose the visibility and influence with which they have become accustomed.

In addition, with the resources of citywide IT available to all departments, leaders will be better able to leverage and share cost and build off of other department's IT success.

Enterprise IT Operations and Service Delivery

In the centralized model, BCIT will deliver an enterprise IT service portfolio organized around business value and backed by industry standards-based operations and processes. This will raise all departments to a higher service standard, improve efficiency and security and allow departments to focus on their missions rather than certain IT operations.

This will require reorganization of existing BCIT operations and enhance current services to:

- Improve enterprise IT to meet or exceed customer expectations.
- Build resiliency into infrastructure and operations.
- Offer new services to support digital government, interoperability and mobility.
- Improve service quality and customer support processes.
- Introduce service portfolio and life-cycle management processes.
- Align service delivery with customer outcomes over local internal efficiency.

The transition to a centralized model will proceed iteratively with BCIT performing assessments of its own IT processes and capabilities as well as other departments. BCIT leaders and ARMs will ensure minimum disruption to agency operations and collaborate with agencies throughout the process. More importantly, BCIT is committed to the city's IT workforce and will work with each IT employee transitioning to BCIT to support employee satisfaction and a smooth integration.

With central enterprise IT services, best of city IT is leveraged for the good of all departments and enhanced by well-resourced, industry-standard technology and processes. City government will operate more securely and efficiently with better customer and employee satisfaction by leveraging consistently high-quality and streamlined IT services and support.

IT Service Portfolio

The BCIT reorganization will offer an IT Service Portfolio focused on customer business value. The portfolio will continually be refined to keep pace with changing enterprise needs. The service portfolio will help shape the internal processes and operations required to deliver business value to customer agencies. Services will be offered in the areas of application and data hosting, workplace and end-user computing, unified communications and collaboration, and others as needed.

A catalogue will be developed that describes the services available to departments, the service level tiers offered, and the performance measurements. In addition to the standard measures, departments with unique needs will work with their Agency Relationship Managers to establish metrics tailored to them and aligned with their mission.

Internal Operations

The key to a high-performing central IT operation is alignment with leadership priorities and department needs. The culture must evolve to always consider the big picture and seek delivery of desired outcomes for citizens as well. As BCIT serves customers that are internal to city government, it can be difficult to understand the impacts of what we do and lead us to focus only on our part. However, highly efficient internal operations that do not work for the departments or are not aligned with leadership priorities, do not represent a wise use of city resources. For that reason, internal operations will be measured on holistic metrics that favor customer satisfaction and results over internal optima.

Internal operations goals are as follows:

- Establish mature internal operations to reliably deliver enterprise IT services according to industry standards, such as ITIL (a set of practices for IT service management).
- Establish an enterprise service help desk to provide a one-stop-shop for any and all IT needs, integrated with department and application-specific support teams.
- Create a modern command center to monitor network and security operations and report status, resolve issues and communicate with stakeholders in real-time.
- Use cross-functional approaches to avoid reverting back to a silo structure. Internal operations staff will work with the Enterprise Project Management Office (EPMO) and others to understand how they affect government services and to collaborate on solutions to enterprise and department challenges.
- Perform a responsible vendor orchestration and coordination function. With multiple vendors involved in delivering end-to-end services, vendors work as partners with the city and work together to deliver desired outcomes in addition to basic service level agreements.
- Design an ongoing process of risk management that will proactively seek out negative impacts of internal operations and potential improvements to better align with enterprise needs.



Investing in Human Capital

A highly skilled and diverse workforce is the critical foundation for executing a digital transformation strategic plan.

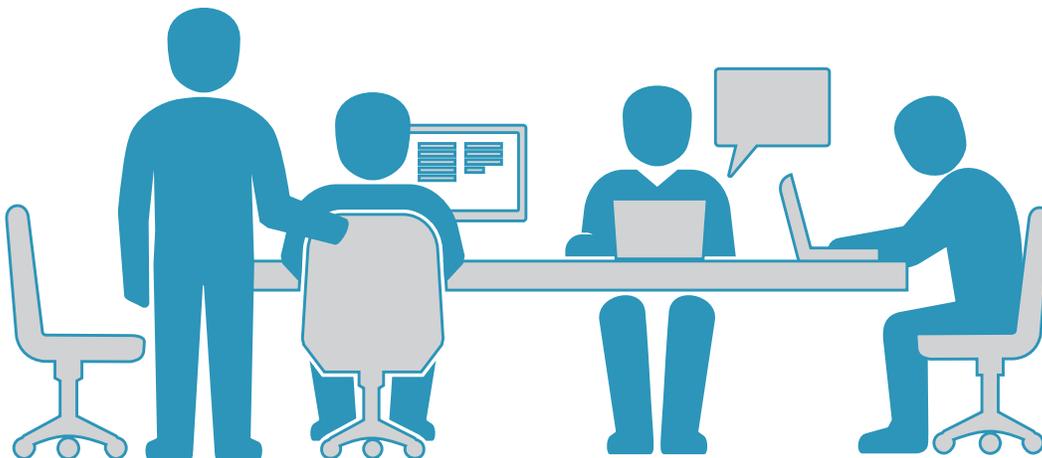
The current IT workforce in the City of Baltimore is not large enough based on industry benchmarks for similar sized State & Local Government (SLG) entities; nor does it have the proper type of staff to provide enterprise-wide support city departments need now and into the future.



City of Baltimore's Current State
Approximately 100 Employees Enterprise Wide



Peer Average
Approximately 200 Employees Enterprise Wide



Top 25 Percentile of Peers
200+ Employees Enterprise Wide

To better align with Mayor Pugh’s economic development and jobs pillar, meet current and future operational demands and move Information Technology forward, BCIT must build a highly skilled and diverse workforce. To achieve this, BCIT will develop a human capital strategy that incorporates three priorities.

01

Develop a Pipeline of Baltimore Based IT Talent

There is a critical need to develop a local pipeline of talent to meet the needs of IT in city government as well as tech needs throughout the city.

There is currently a tech talent shortage in the city and 24% of the city’s central IT authority’s staff can retire immediately. Therefore BCIT will need to partner with stakeholders to create a tech training ecosystem.

BCIT must partner with local foundations and institutions to develop an ecosystem in the city that fosters tech talent development. There are several organizations within the City of Baltimore that provide youth with tech skills such as coding, cybersecurity and data science.

BCIT will develop partnerships with Baltimore City Public Schools and the two and four-year educational institutions to create a tech talent growth initiative and build a tech talent pool which allows city students the opportunity to begin a tech career within city government while still in school.



It is essential that the city ensures its staff is appropriately equipped with the skills needed to remain current with new and evolving technology and that staff is properly aligned to the city's IT business case. Currently only \$150 is allocated per employee for training across the central IT authority and the majority of the IT training options available to staff at a citywide level are limited to basic computer skills and business software (Microsoft Office).



Create Training Programs That Support Professional Development, Encourage Innovation and Fosters a Culture of High Performance

Skills Assessment – To identify training and competency gaps, BCIT will need to conduct an enterprise-wide evaluation of skills and competencies.

Career Ladder Mobility – To facilitate opportunities for professional growth and career mobility, BCIT needs to work with the Department of Human Resources (DHR) to conduct a review of all IT related positions and utilize the findings to adjust job descriptions and salaries that better align with other public-sector IT departments and create new classifications when appropriate.

Create a Citywide IT training program – To ensure staff stays current with changes in the industry and have the ability to move forward in their career, BCIT will need to develop a robust training program. This program should not only support the continued training of front-line IT professionals, but also provide an avenue for all Baltimore City employees to stay up-to-date with changes in IT. An online training platform (enterprise-wide) will provide staff the ability to access a variety of training modules, from recognized certifications to coding skills from any location.

Provide cross-training opportunities – To improve knowledge sharing between teams, provide for continuity of operations and allow the ability to

grow in their career through access to new skills and information, BCIT will need to provide cross-training opportunities across agencies and divisions. Providing cross-training opportunities should help to combat position fatigue among staff and improve retention rates.

Develop a recognition program – To acknowledge and motivate exemplary staff, BCIT will need to build an inclusive and participatory recognition program. Employees at all levels will have the opportunity to recognize each other for innovative and cost-saving ideas that benefit their department and the city as a whole.



Build An Inclusive, Diverse, Resilient and Flexible IT Organization

The city needs a resilient and flexible IT organization that is inclusive and diverse. To achieve this type of organization, significant changes need to be made to existing operations.

Create a diversity and inclusion program – BCIT does not have a documented diversity and inclusion program. Initiatives focused on diverse workplace recruitment should be undertaken in collaboration with the DHR.

Staff Augmentation – In order to appropriately provide resources, BCIT should follow the models of other cities, such as Colorado Springs, and hold contracts with multiple firms capable of providing on-demand contract resources skilled in a variety of technology disciplines. Doing so provides additional resources to meet peak demand but not employ resources needed on rare or sporadic occasions.

Flexible Streamlined Hiring – Bringing staff in to the environment in a timely fashion is critical for operations and execution of a digital transformation. BCIT should partner with the DHR to develop a program that will improve its ability to hire and retain top tech talent. San Francisco found that by moving to a process of continuous eligibility lists in IT engineer classifications and specialty areas, hiring managers were enabled to quickly and efficiently identify highly qualified candidates. During the creation of San Francisco's program, research showed that across all demographics, today's technologists are really looking for meaningful work.

University Project Delivery Collaboration – In order to meet the gap of IT needs in the city, BCIT should partner with local academic institutions to engage students to work on substantive IT research projects for city departments, similar to Los Angeles' Data Science Federation.



Governance & Administration

Improved IT Strategy implementation requires cross-agency collaboration, strategic alignment, and continuous change. This must be balanced with predictable and repeatable operation of enterprise IT services. Multiple stakeholders and groups must form and come together to take a holistic, end-to-end view and approach.



The Chief Information Officer (CIO) is the principle leader responsible for the overall city IT strategy and for aligning enterprise IT to deliver on the Mayor's priorities and department missions.

Although strategy realization begins with the CIO, one leader cannot do it alone. Other city department leaders and their staff, administrative and operational, must lend their expertise so that this strategy will succeed.

Executive IT Strategy & Investment Board

An Executive IT Strategy & Investment Board will be established to set citywide IT strategic objectives that align with the Mayor's policy priorities. The Board will consist of the CIO, the Mayor or her designee(s) and at a minimum representatives from the department of finance, city solicitor's office, procurement and human resources. The Board will:

- Prioritize enterprise IT strategic objectives.
- Plan annual enterprise IT budgets.
- Approve high-level IT investment decisions throughout the year.
- Release metered IT enterprise funding based on outcomes achieved.
- Defund or pivot enterprise IT initiatives that do not effectively deliver on priorities.
- Encourage collaborative enterprise initiatives and shared platforms over single-department projects and seek shared investment opportunities to make the best use of resources.

This board will meet regularly and work collaboratively to support timely decision making, as slow turnarounds have a detrimental effect on outcome realization. This board will seek to establish a framework and culture for decentralization of decisions over time by regularly updating IT policies and authority delegations.

IT Council

The existing City of Baltimore IT Council will continue to provide city departments with visibility and collaboration opportunities through regular meetings, events and the formation of various subcommittees. Departments are expected to actively participate and comment on citywide IT strategic planning, research and other initiatives. By doing so, departments can have a direct impact on enterprise IT as the needs of the city change and technology evolves. Ideas and possible solutions derived from this council will be shared with the Executive IT Strategy & Investment Board and BCIT for possible implementation. IT Council activities will include:

- Discuss possible enterprise IT services and capabilities of interest to departments.
- Propose enterprise initiatives and strategies.
- Provide input on possible investment decisions and funding allocations.
- Identify and recommend opportunities to apply new technology to achieve improved enterprise outcomes.
- Discuss and share technological solutions and share best practices and lessons learned to help each other solve departmental challenges.

Smart City Council

A Smart City Council will be established to focus on Smart City strategy, partnerships, opportunities and coordination. It will leverage city departments and external partners for collaboration and communications and lead Smart City development for the city. It will, in part:

- Prioritize smart city priorities based on social, environmental and economic drivers.
- Form a holistic governance structure to guide the funding, development, and operation of Smart City infrastructure, services and initiatives.
- Design the best practices for enhancing the connectivity, security, and stewardship of Smart City assets and data.
- Work with BCIT to plan for workforce development to gain the next generation capabilities and skills required to execute and manage emerging Smart City technology.
- Work with BCIT to engage citizens to understand their tech needs and priorities.
- Participate in Smart City networks and communities to stay abreast of developments in the market.
- Work with the EPMO Demand Management process as Smart City opportunities arise to coordinate the prioritization, funding, planning and implementation of Smart City technologies.

Enterprise Portfolio Management Office (EPMO) and Demand Management

In order to achieve the strategic objectives of the enterprise's IT Portfolio while ensuring core city operations keep running, BCIT must establish an Enterprise Portfolio Management Office (EPMO) and demand management. The creation of an EPMO will also bring visibility into IT investments and highlight opportunities for innovation and process improvement when, for example, costly existing technology is not aligned with the current strategy.

The Demand Management process will be established to manage the balance between enterprise strategy, department missions and operational requirements. Demand Management should consist of an intake process, where solution requests from all over city government is captured. Requests will be assessed by relevant technical and domain experts and prioritized for funding, planning and execution managed by the EPMO.

One major goal of the EPMO will be to engage experts and managers within BCIT and departments, as well as vendor resources and experts available, on flexible enterprise contracts. Together, they will assess the request and make recommendations related to:

- Prioritization relative to other opportunities
- Enterprise architecture prerequisites required to fulfil the request
- Decomposition of large items into smaller increments
- Identification of existing related platforms and capabilities
- Coordination of dependencies between requests
- Identification of related work streams, platforms, or solutions for inclusion or coordination
- Disposition and proper scoping as an enterprise opportunity or agency-specific initiative
- Implementation approach, procurement strategy, and other planning considerations

Enterprise initiatives will be objectively and economically prioritized based on alignment with overall city strategy and department missions. The initiatives that will deliver the most value in the shortest time should receive highest priority.



The Executive IT Strategy & Investment Board, led by the CIO, will have final approval of enterprise initiatives, priorities and plans informed by the IT Council. The EPMO will then shepherd priority enterprise initiatives through funding, planning and execution.

To support organizational agility, this process must support rapid assessment and decision making and cannot be limited to the annual budget cycle. This is a rolling process and will only support initiatives that can iteratively deliver value in short cycles. Since the portfolio priorities can change at any time, agile methods will be used to capture the value of development frequently. This will minimize risk and support pivots as priorities and capabilities change and lessons are learned.

Multi-year projects will be expected to show value frequently to avoid the risk of late testing and integration and to justify continued investment. The traditional large-project approach was based on the assumption that large, upfront investment would yield a system that could be operated with minimum investment for decades. With the rate of change in today's world leading to rapid obsolescence, this assumption has been disproved.

As a practical matter, funded initiatives may proceed ahead of higher priorities that are not yet funded. The best case is that the request is added to the prioritized backlog of an existing work stream, and funding is added to increase the capacity of the work stream when necessary. This will result in the maximum reuse of technology, capabilities, and processes and support interoperability. Once established the EPMO will:

- Provide access to internal and vendor-provided domain-specific or technology-specific expertise to advise on strategy, approach, evaluation of solution options, etc.
- Engage the budget office to perform financial analysis, plan implementation and long-term maintenance funding, and resolve any issues stemming from the budgetary complexity of multi-agency initiatives.
- Engage the procurement office to leverage flexible enterprise contracts that can scale to meet changing demand and plan a procurement strategy to support enterprise needs.
- Establish contract and vendor management function that can reliably trace work, manage performance and protect the city's interests.



Enterprise Cybersecurity Program

The city's Chief Information Security Officer, or CISO, is the overall leader of the city's cybersecurity strategy and information security posture.

To ensure cybersecurity continues to be current and effective, the City of Baltimore will apply an integrated approach, in which security is a core fabric of the business processes and a key component of the organizational culture. The security team, led by the CISO, will continue to infuse the key components of security (policies, processes, behavior and technology) across all the dimensions of IT: business processes, applications, technology infrastructure and personnel.

The CISO will enhance the security program by establishing a framework of resources and principles through which projects can be managed. The security program will ensure a continuous, iterative regimen of planning, building and running security solutions that are derived from business requirements. As the Cybersecurity program matures, it will increasingly adopt a more collaborative information security philosophy based on flexible policy management, a process-centric approach, realignment of roles and responsibilities, and adaptive security architectures.

Digital Security

With digital transformation comes digital risk. As our government evolves to embrace modern technology and data analytics, so too do our cyber threats. The security of our citizen's data and the resiliency of our government services are vitally important. Moving forward with digital transformation depends on our ability to secure our digital assets, infrastructure, applications and data.

Our future Smart City ecosystem will potentially connect billions of devices and sensors communicating petabytes of data processed by artificial intelligence and automated systems. Thus the complexity of our digital future demands high security standards and a mature, cyber-aware culture.

Digital security is everybody's responsibility. Put simply, we will not move forward with digital transformation opportunities that do not meet the highest standards of digital security. At the same time, we owe it to the citizens of Baltimore City to not allow security immaturity to inhibit our transformation. As our transformation unfolds and from the start, we will build in security, properly and effectively plan for and manage cyber risk, keep it current, and adopt a security-first policy and mindset.



Dev Ops

One of the most impactful shifts in IT management over the last 10-20 years has been the application of lean agile and DevOps principles in all areas of business, operations and management.

DevOps is a software engineering culture and practice that aims at unifying software development (Dev) and software operation (Ops). The practice provides the capability to rapidly develop high-quality software by removing waste in the development and operations processes through automation. It is a mindset and a culture rooted in lean agile principle which takes a systems view and uses cross-functional teams to rapidly deliver value from concept to deployment and beyond.

Currently the city depends on several outdated, legacy systems which is stifling the government processes, and in turn, the services on which our citizens depend. Inflexible contracts and closed software systems have resulted in lock-in to legacy applications that are unable or too costly to evolve and extend. Further limiting the city is a lack of a development environment and capability that can tackle priorities across the enterprise. Most development and operations resources are contractually tied to a specific system or narrow scope and cannot be leveraged across departments or systems.

Currently, most city IT initiatives are planned and delivered independently. Therefore in order to modernize and unify current digital systems, the city requires concerted agile development services to create a cohesive, streamlined and integrated technology ecosystem.

Utilizing agile methodologies such as Scrum, Extreme Programming (XP), and Kanban will allow the city to avoid development problems. By working in fast-paced, iterative cycles, agile teams are able to incorporate user and customer feedback into every build. This flexible approach enables the team to continuously realign their process with evolving customer and user priorities. The holistic, human-centered approach fosters deep empathy with citizens and leverages their experiences in order to better understand, address and anticipate their problems. Adopting such lean agile principles and innovation methods will also allow the city to continuously incorporate lessons learned into each project and to pivot according to shifting priorities and goals.

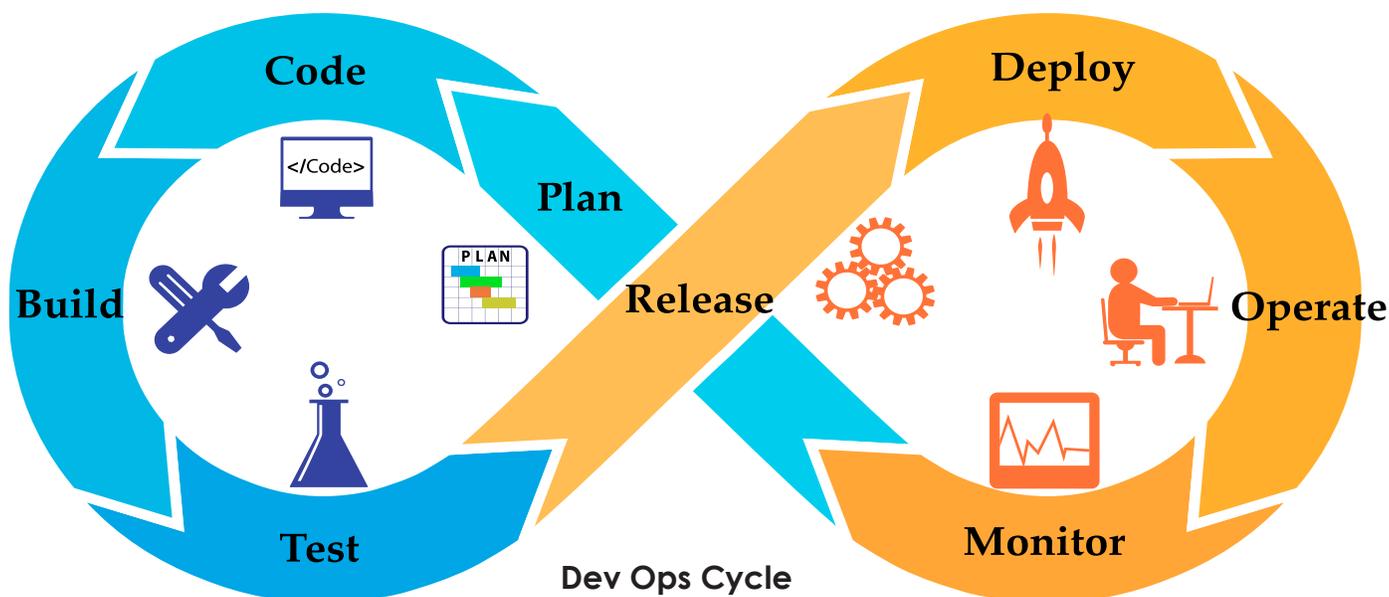
By delivering early and often and constantly testing assumptions, such agile practices will break the pattern of narrowly-scoped system implementations that begin to age on day one. This will allow the city to avoid being locked into business processes that fail to keep up with the changing needs of its citizens.

To avoid the risk associated with inadequate and outdated development practices, BCIT will develop a DevOps strategy to integrate software development with Enterprise IT Operations & Service Delivery,

BCIT will not seek to optimize internally for its own purposes, but rather consider the enterprise and support departments and citizens above all else. The city’s initial approach will be to form a Digital Services team that will establish processes and a DevOps pipeline around one platform that can then be scaled across the city. Formal and informal risk management approaches will be applied favoring hands-on experience and actual proof over speculation. Any enterprise system development efforts (like the planned ERP modernization) will integrate into this DevOps strategy. Solicitations will require vendors to deliver implementation, configuration, customization, development and operation services according to DevOps principles and practices with state and multi-vendor, cross-functional teams.

The DevOps capability will focus on meeting business needs by integrating with the EPMO’s Demand Management process. Opportunities to leverage enterprise platforms to meet citizen and strategic needs will be identified, prioritized and delivered through DevOps. Enterprise Cloud Services will host development environments and shared platforms like data integration and analytics, API management and others that the DevOps teams can leverage to deliver solutions.

DevOps is founded on the principle of building smarter, and the cornerstone processes of Continuous Integration and Continuous Deployment (CI/CD) allow teams to collaboratively, consistently and rapidly offer high-quality deployments. By providing a mechanism to better services through innovation, experimentation and collaboration, the city will be able to improve workflows and streamline processes across City government. BCIT will more quickly meet department needs with a streamlined and integrated development and operations process, through methods such as Infrastructure as Code automation, configuration management, automated testing and ongoing monitoring and support. As this capability matures and services are improved through technology, citizens will benefit from streamlined, end-to-end, integrated digital services and experience less frustration working across city departments.





Support and Secure Critical IT Operations and Infrastructure

Enterprise Cloud Services

The city's physical data center infrastructure prevents it from pursuing digital transformation. Its capacity and capabilities are insufficient and unable to scale to handle enterprise needs such as data integration and analytics, IoT-Enabled Smart City and other strategic objectives.

A large portion of the city's IT infrastructure is purposely built for individual departments, limiting efficient reuse and scalability. As the city reorganizes to deliver a modern digital experience to citizens and leverage digital technology to improve operations and outcomes, a better solution for its computing needs to be established. Computing infrastructure should enable relentless progress towards a better government and a better Baltimore City.

Advancements in cloud computing have far surpassed the city's own capabilities. While the city will continue to operate the IT infrastructure and assets it owns, it needs to seek opportunities that leverage public cloud capabilities.

Public cloud providers offer world-class internal operations and security that are costly and difficult to replicate. They offer a pay-for-use model that allows instant, even automatic scalability to increase computing power at times of peak demand, while reducing capacity when demand is low and is not just for raw computing power. The cloud offers rapid deployment of the most advanced capabilities, platforms and software without the need to build the physical infrastructure or learn how to operate, secure and maintain the underlying technology stack.

Cloud providers offer an ecosystem on which to build, expand and integrate modern digital platforms quickly and securely.

In order for the city to successfully digital transform, it must expand to a hybrid cloud model and make the best use of existing city-managed infrastructure. While taking advantage of scalable, reliable and secure public cloud services that provide the foundation for integrated enterprise applications, platforms and data.

Improvements to current infrastructure and data center operations will continue in tandem with the integration of public cloud services with a priority of improving resiliency, network capacity, and other architectural improvements needed to support digital transformation and Smart City goals.



BCIT will work with agencies throughout the enterprise transition to prioritize cloud computing opportunities and will participate in EPMO demand management and portfolio management activities to maintain alignment with business needs. As new applications are created and modernized, enterprise cloud services experts from the city and its vendor partners will ensure a cohesive integration strategy. The city will adopt an “enterprise-first, leverage or be leveraged” principle that will result in shared platforms rather than narrowly-scoped, full stack, agency-owned silos. Citywide integration and interoperability will be supported by Identity and Access Management (IdAM), data integration and analytics hub, and other enterprise capabilities.

This will require a procurement strategy that enables flexible, scalable, pay-for-use contracts for products, but also professional services to provide architecture, development, operations, training and advisory support. Products and services available to the city via flexible enterprise contracts will greatly reduce the time it takes to plan and implement digital services. Along with the EPMO’s demand and portfolio management processes and a modern DevOps capability, the City will experience unprecedented speed and agility in the delivery of innovative digital services.

Data Telecommunications

As the city embraces new technology and seeks to deliver IoT-Enabled Smart City capabilities and modern digital experiences to improve city life and work, it must plan for the rapidly increasing demands on its data telecommunications infrastructure.

The City of Baltimore must invest in next-generation network infrastructure to connect the city with high-volume, high-velocity data communications that support these demands. Current network infrastructure in the city is insufficient. To enable new and innovative capabilities, an improved fiber backbone and advanced wireless connectivity are needed. This will not only support Baltimore City government operations, but also improve infrastructure and provide opportunities for the people and businesses of the city.

Provision of Wi-Fi and other broadband services to the citizens of Baltimore is a primary focus for the city, particularly to impoverished areas that have not benefited from technology advances that can open doors to employment opportunities, provide easy access to city services, and improve overall quality of life. To this end, the city will investigate early adoption of technologies such as

5G, the first wireless access technology developed for the massive scalability required for IoT applications. By establishing next-generation broadband access, the city can concurrently provide better services to citizens while establishing a growth strategy to survive the global competition and attract businesses to the city.

The city will assess and establish potential investments, partnerships, and policies that may advance broadband availability, affordability, and quality throughout the city. Using a variety of industry accepted evaluation methods, the city will seek to identify current broadband use and needs among the city's Administration and Departments, anchor institutions and businesses. By monetizing city-owned dark fiber and pursuing resource sharing opportunities with the private sector, the city can establish public-private

partnerships that are mutually beneficial and reap myriad benefits for the citizens of Baltimore City.



The first step is to define the future vision for broadband services and compare to current assets and capabilities. After defining needs, the city will determine the likely order of magnitude of investments the city might need to make. A thorough analysis of services and pricing will focus in particular on the business market, given its importance to economic vitality and will include:

- Developing a list of current broadband providers, including the costs for services.
- Identifying providers of high-capacity transport services.
- Distinguishing the difference between facilities based and non-facilities based providers.
- Identifying providers' current offerings.
- Identifying mid-range services tailored to the small and start-up business market.



With this critical information in hand, the city can then evaluate potential infrastructure projects to consider in addition to or instead of a fiber network deployment, and analyze how to leverage existing (and potential future) broadband assets to support Smart City applications. This resulting broadband strategic plan and roadmap will include:

- Connectivity needs among business sectors, residents, anchor institutions, and internal City agencies.
- City policies impacting broadband deployment, from zoning requirements for wireless antennas to conduit access and right-of-way permitting.
- Parameters for effective partnerships with commercial service providers and investors.
- Functional governance structures for managing physical assets and setting policies related to broadband.

BCIT will perform a thorough evaluation of the benefits, risks and implications of the city's options based on the needs assessment and financial analysis. BCIT will prioritize efforts and implement projects that best support the city's needs. Next-generation broadband infrastructure will support IoT-Enabled Smart City initiatives that improve quality of life and enable data integration initiatives to support civic analytics, data-driven decision making and smarter public policy. Working together with partners, Baltimore can provide increased access and opportunities for citizens and attract people and businesses to the city.

Enterprise Resource Planning (ERP) Modernization

The City's core administrative IT systems are cumbersome and difficult to change. The legacy systems do not support reliable integration options and manual integrations regularly fail.

Without a strong, modern and flexible core, the city cannot improve back-office efficiency and advance its data integration and interoperability capabilities. The city must create a strategy to modernize its ERP systems and build a solid technology foundation for core administrative systems on which to support more efficient end-to-end workflows and data integration.

For years, the city has had to deal with cumbersome, "swivel-chair" integration whereby a worker copies data from one legacy system and then (figuratively) "swivels" around to another legacy system to manually enter the data. Where automated integration does exist, it is often based on slow and error-prone overnight batch processing. Modern integration approaches offer superior security, reliability and speed, even between disparate systems from different vendors.

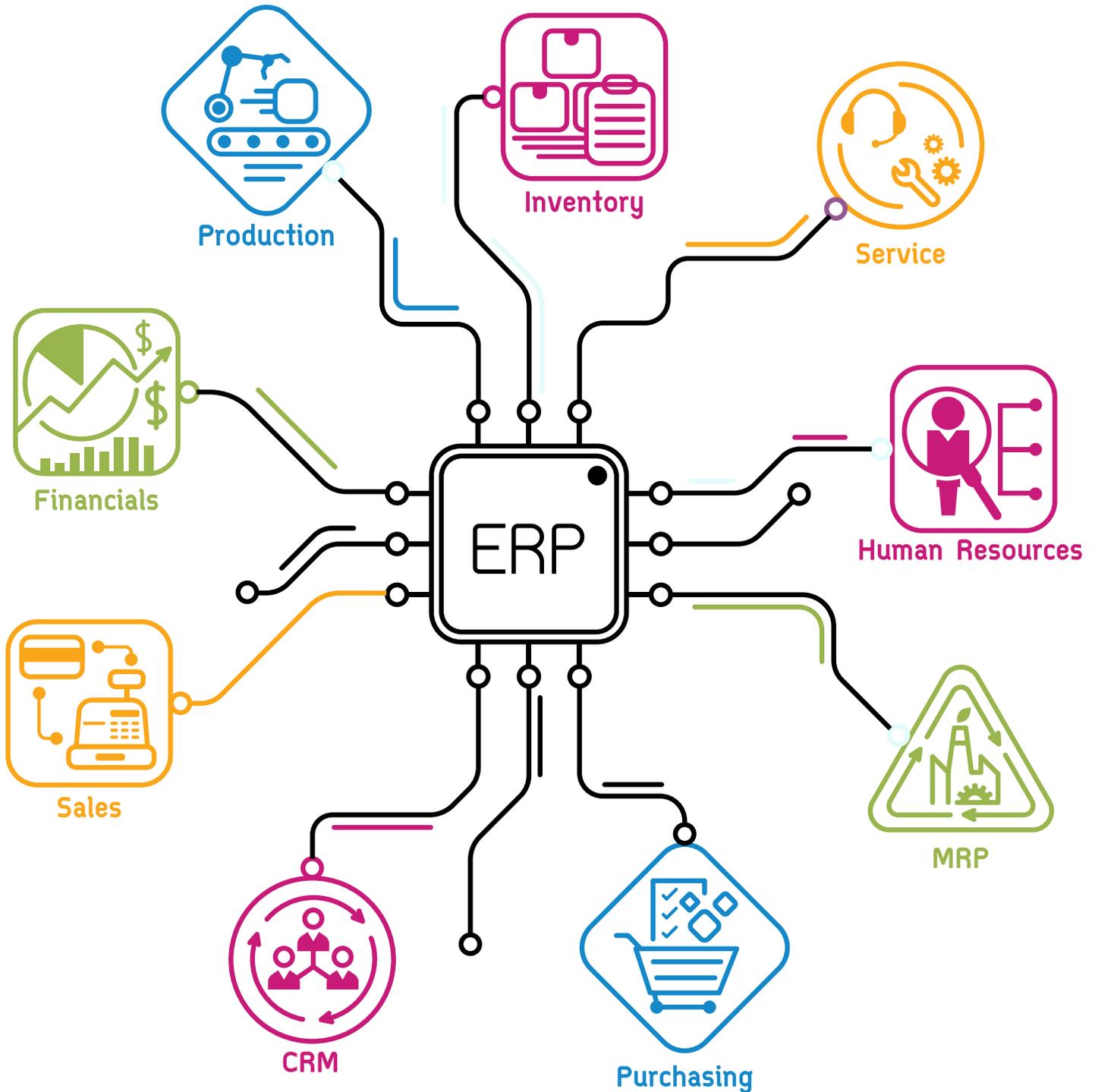
Currently, no single ERP system offers the best solution for all areas and functions ERP supports. Therefore, monolithic strategy will likely result in subpar, maybe unacceptable, capabilities in key enterprise functions. However, a best-in-class approach where each function independently, without appropriate consideration of the whole, can lead to integration issues.

For the City of Baltimore, the right ERP strategy is a balanced one. As the city pursues its ERP modernization, it will do so with a strategic bias towards vendor-supported integrations to minimize risk, especially for core functions.

The first step is to work with stakeholders to develop an ERP integration, data integration and procurement strategy that will reliably connect the ERP and ERP-like systems that support government operations and result in the best agile and flexible outcome.

To develop the ERP modernization strategy, BCIT must:

- Map dependencies and known workflows both internal and external to departments to gain an understanding of the potential integration complexity.
- Coordinate with enterprise IT to understand integration needs with the environment (e.g. identity management, hosting options, data integration environment, API management, etc.).
- Procure in a modular fashion and entertain a multi-vendor solution provided that it meets a high level of modern integration and interoperability standards.
- Deliver in an agile fashion to capture value early and often and reduce risk.
- Plan for DevOps capabilities to leverage the new enterprise platform(s) and extend the value of the platforms to other agencies through APIs, apps, etc.



Enterprise Resource Planning (ERP) Module Construction flow

As a result of a post-modern ERP modernization, city workers will maintain higher productivity due to reliable data processing and easy-to-use systems. Improved master data management in the city’s systems of record will enable enterprise data analytics opportunities to better understand and improve city services and citizen outcomes.

An ERP modernization will also lead to more accurate enterprise data and reliable process integration across city government; which enables citizens to have a better experience interacting with city agencies and programs.



Build IT Partnerships and Increase Community Engagement Around Technology

Civic and Data Analytics

When Baltimore's CitiStat program was launched in 1999, it was a leading, innovative data initiative that paved the way for governments everywhere to improve performance through data transparency and civic analytics.

The program was ahead of its time, but in the almost 20 years since its inception, data analytics technology has far surpassed CitiStat's current capabilities. Many of the city's open data sets must be refreshed manually and are updated infrequently. The city lacks modern platforms for automatic data collection, integration and analysis. This is due to many factors, including limited funding, staffing and technical expertise. As a result, performance measures tracked by CitiStat are not always aligned with strategic priorities. Data is backwards-looking and is not able to be used to actually improve programs in addition to holding them accountable.



To meet the Mayor's goal of accountability and transparency for city government, support the city's growing data integration needs and to improve the current civic and data analytics structure, new data integration techniques must be leveraged to create a modern enterprise Data & Analytics Hub.

The Hub will be a comprehensive end-to-end architecture that will more easily connect disparate data sources such as IoT devices and sensors, structured or unstructured data from internal systems and external cloud-based sources (e.g. external open data sets, geographic, weather, financial, traffic, population, or other data). The Hub is also intended to:

- Serve as a logical data warehouse that organizes enterprise data without a rigid, central, physical architecture. This will require extending the use of existing resources and potentially acquiring new data virtualization platforms.
- Maintain data protections and privacy with a data access and governance layer.
- Offer advanced analytics capabilities that include reporting, visualization, machine learning, predictive analytics and more.
- Integrate and collaborate with the EPMO, Enterprise IT Operations, Enterprise Cloud Services, and DevOps to ensure it evolves to meet the needs of the enterprise. The focus will be to deliver value and achieve strategic outcomes using the EPMO Demand Management process, leveraging enterprise platforms and environments, and delivering valuable integrations and insights via DevOps. And vice versa, these functions will design solutions with data integration and analytics in mind.
- Leverage technology strategy to support collaboration and civic engagement.

The Data & Analytics Hub, paired with other components in this strategic plan, will result in increased transparency and support of civic analytics and more efficient achievement of policy priorities. Achievement of this goal will lead to:

- An improved citizen experience with government due to the increased ability to track and quickly identify and address issues and concerns.
- Increased transparency and accountability for city government.
- City decision makers having the right data and insights to make impactful decisions and enact policies supported by evidence.
- City leaders having a better view of strategic outcomes and the effectiveness of city services, leading to continuous improvement.



Data Integration & Warehousing

The City of Baltimore's data infrastructure is fractured and out of date. Numerous departments have reporting processes which are near 100% manual, must be refreshed manually and there is no consolidated data warehouse to allow analytics and accountability stakeholders to query multiple datasets across multiple departments. Current infrastructure limits the depth, breadth and timeliness of any utilization of city data. The timely, secure and comprehensive availability of data will make the city's operations more efficient and help the city be more responsive to the needs of its citizens.

BCIT's chief data officer (CDO) will collaborate with the Mayor's Office of Sustainable Solutions (MOSS), formally CitiStat, and other partners to create a robust, dynamic enterprise data environment (EDE); which is a major priority for facilitating the City of Baltimore's digital transformation. The EDE is a comprehensive architecture that reliably connects data sources from input-to-analysis. The framework of the EDE will be regularly maintained and constantly improved, keeping internal reporting environments robust and secure for agencies and ensuring their interoperability. Data inputs could be as diverse as manual inputs from caseworkers in the field to automated status reports coming from smart sensors attached to streetlights. The EDE will make sure all inputs and their resulting datasets are clean, well-documented, and accessible in datasets which facilitate maximum interoperability and ease of analysis. Where efficacious the EDE will also consolidate data from external sources to facilitate the operations of Baltimore City.

The data integration plan to be developed will outline the steps necessary to ensure the EDE will:

- Include an enterprise-wide data warehouse of whatever architecture is deemed most efficacious. The data warehouse will ensure the 24/7 availability of all legally permitted data it houses and have industry-standard security built into its architecture. Along with a high degree of granularity built into its permission structures, ability to automate workflows, and extracts and transmit them seamlessly between departments.
- Expand the city's current data portal, Open Baltimore, to increase support for Mayor Pugh's goal of a transparent government. The new portal will have an improved customer interaction, native analytical tools and processes for requesting and adding new datasets.
- Be a vital part of the city's IT infrastructure and will be integral to the EPMO, Enterprise IT Operations, Enterprise Cloud Services, DevOps and analytics/accountability operations, to ensure the city's data infrastructure evolves to meet the needs of the enterprise. The focus will be to deliver value and achieve strategic outcomes using the EPMO Demand Management process, goals and objectives surfaced by analytics and accountability stakeholders.

As the backbone of the city's IT infrastructure, the EDE will facilitate the utilization of industry-leading operational reporting, case management services and robust analytics. When established it will make the City of Baltimore a model of efficiency, transparency and data service access.



Analytics

Baltimore seeks to develop a robust analytics operation which institutes strong, meaningful, operational and predictive analytics at every level of the enterprise to improve operational performance, service to Baltimore's residents and taxpayer value. The digital transformation plan aims to provide the strategy to make Baltimore City's operation the gold standard for civic analytics.

Analytics in Baltimore City will be targeted at every level of the enterprise driving tactical management, strategic management, policy formulation and accountability/transparency. Tactically, Baltimore City will utilize asset tracking and field data collection along with a variety of other datasets to understand how to best allocate the resources of city agencies who have extensive field operations. Data, (as provided through the EDE) will be made available across the chain of command to allow innovations to be communicated and developed at any level of city government.

The City of Baltimore will utilize asset tracking and field data collection, along with a variety of other datasets, to understand how to best allocate the resources of city agencies who have extensive field operations. Data, (as provided through the EDE) will be made available across the chain of command to allow innovations to be communicated and developed at any level of city government.

As infrastructure becomes available, policy formulation in the City of Baltimore will be able to utilize a wealth of timely enterprise-wide data to grow increasingly data driven. This will make the city's policy formulation more sensitive to its operational constraints and the needs of its citizens. The city will also establish robust public-facing data collection tools in order for the citizens of Baltimore to have a direct line to crowdsource their concerns. Possible improvements include a public petitioning site as well as building the infrastructure for regular surveys of public needs.



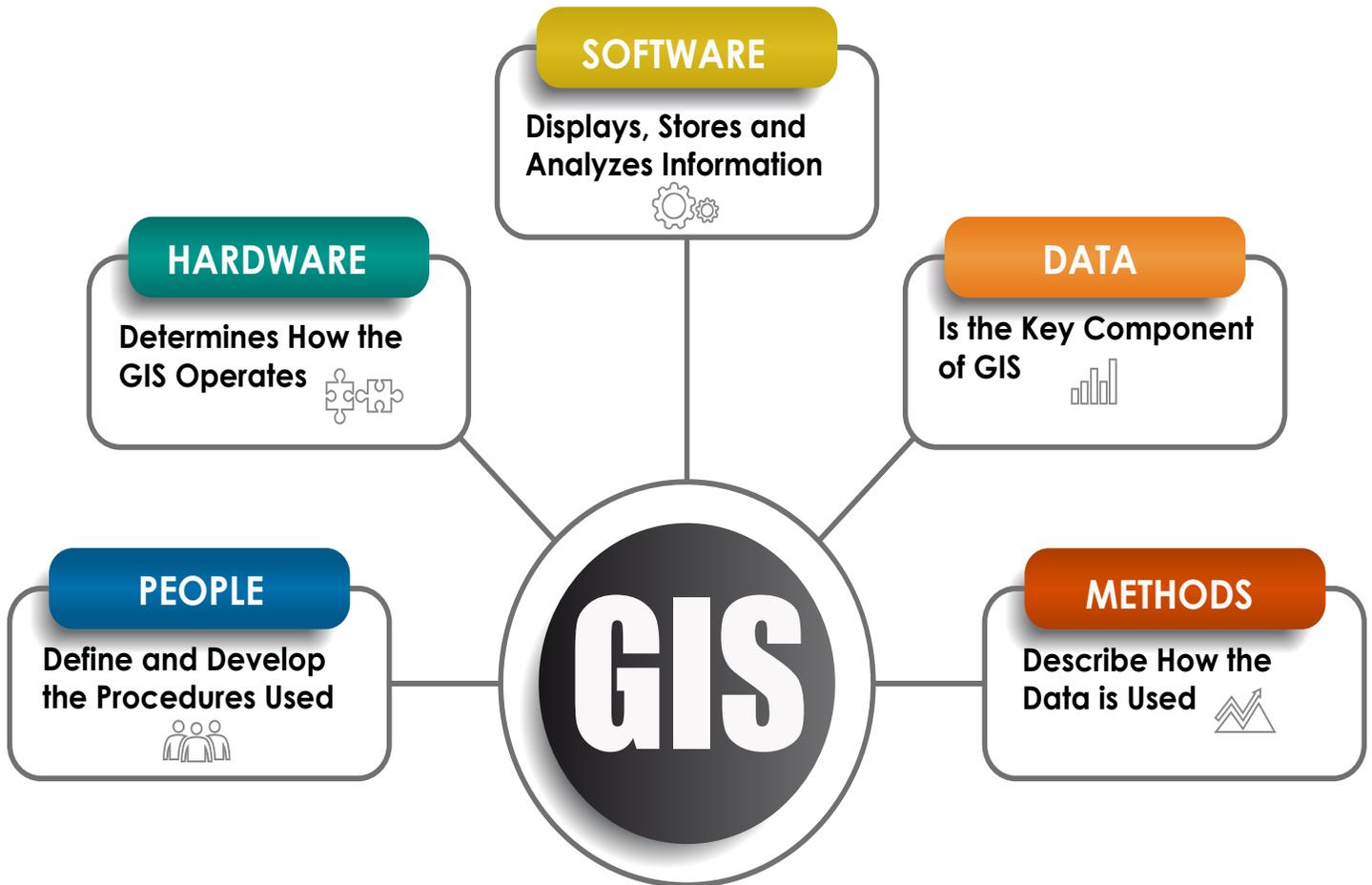
Accountability and transparency needs will be met through utilization of the EDE and the open data portal. The EDE will be available to the city's highest-level accountability and analytics stakeholders in order to assess and engage in performance management of agency operations. The open data portal will have a robust native analytics capability as well as the ability for interested parties to nominate new datasets to be added to the open data portal. Upon nomination, the datasets will proceed through governance processes described in other documents before they are released to the public.

As the requisite infrastructure develops, Baltimore City will continue to expand its utilization of advanced analytical capabilities. It will make better decisions, faster and more effectively while allowing Baltimore's residents to gain greater insights into the operations of government. Over time Baltimore City will develop a reputation as a city where taxpayers know how their money is being spent and city employees at every level know that they are offering peerless value; and their efforts are going into the creation of an efficient, equitable systems which can serve the community of today while preparing it to meet the challenges of tomorrow.

Enterprise GIS (EGIS)

City departments have developed sophisticated uses of Geographic information System (GIS) technology and most of the city's spatial data is well organized in one enterprise system. However, there are still some aspects of spatial data management in the city that could improve and streamline processes. While it is critical to have subject matter experts maintain and manage agency specific spatial data, GIS should evolve towards a true enterprise operation with centralized licensing and migration of core GIS data functions. Taking on responsibility of core GIS datasets will ensure standard location-based attribution across all departments and compliance with NextGen technology.

Five Basic Components of an EGIS



A GIS links locational (spatial) and database (tabular) information and enables a person to visualize patterns, relationships and trends beyond what a table or list can usually depict.

Internet of Things (IoT)-Enabled Smart City

The City of Baltimore is poised to harness the power of the Internet of Things (IoT) and Smart City advancements to solve social, economic, accessibility, mobility, environmental and other city challenges. There is tremendous opportunity for citizens, public organizations and private sector businesses and foundations to collaborate, cooperate and co-create innovative solutions that use smart city data to achieve sustainable outcomes.

SMART CITY



As the City of Baltimore seeks opportunities to improve, BCIT will leverage enterprise capabilities to prepare for the unique demands of the Internet of Things (IoT)

Enterprise IT Operations and Service Delivery

- Use Enterprise Services to manage Smart City assets, including physical security, privacy, and continuity of operations.

Enterprise Cloud Services

- Leverage shared platforms and accessible, scalable, reliable, performance cloud environments to deliver necessary computing power to support IoT.

Data Telecommunications Infrastructure

- Improve high-bandwidth wired and wireless data communications to support an explosion of connected devices.
- Monetize city-owned dark fiber and seek out resource sharing opportunities with the private sector.
- Identify gaps in capability throughout the city in order to provide equal access.

DevOps

- Interface with IoT platforms, infrastructure and data to deliver business solutions and capabilities and extend the value of citywide IoT investments.

Data Integration & Analytics Hub

- Connect IoT devices to the hub, using edge computing and Hub technologies to efficiently process high-volume, high-velocity data.
- Integrate contextual IoT data with other data sources to gain new insights.
- Integrate data streams with business and operational processes to support automated, intelligent, data-driven action.
- Enable real-time analytics and decision making with advanced analytics and machine learning capabilities.
- Make open data available to the public, and encourage citizen engagement.
- Establish appropriate data governance and access controls to protect data privacy and ensure acceptable use.

Baltimore Technology Hub

- Interface with IoT platforms, infrastructure, and data to deliver business solutions and capabilities, and extend the value of citywide IoT investments.

In addition, BCIT will work with the city's Smart City Council to adopt and establish standards to support interoperability and sustainability of IoT assets, infrastructure and services (e.g. NIST's IoT-Enabled Smart City Framework, commercial standards, or partnership agreements). In the selection or acquisition of IoT and Smart City technology, BCIT will favor commercial platforms and technology over custom development. As Smart City is still rapidly evolving, when commercially available or technology is insufficient, BCIT will either partner with the private sector to innovate or utilize our DevOps capability to extend the value of the ecosystem.

The City of Baltimore will benefit in many ways once Smart City technology and initiatives are implemented; and increases the opportunities to be branded as a leading municipality that uses technology to enhance the quality of life for its residents, as well as entice businesses and developers to open in Baltimore.

Baltimore Technology Center

The City of Baltimore is home to numerous technology leaders in the form of educational institutions and private businesses, yet the government's ability to deliver IT infrastructure and solutions lags behind other public sector organizations.

The city has the ability to form partnerships and collaborate with individuals and organizations interested in creating a better city. To capitalize on this opportunity, the city must create a chic, modern space that enables innovative individuals and organizations to collaborate on technical solutions that enhance the city's image as a place to live and work, a Technology Center. This physical and virtual center will showcase the city's technology and provide access to public data, analytics tools, development environments and other assets.

BCIT will support the center by establishing a digital platform to help manage the space and enable 24/7 remote and mobile access to the center's resources. Objective and subjective metrics will be used to track the value of innovative endeavors and hard and soft benefits realized by the city, providing the analytics capability necessary for leaders to make informed decisions. Digital technology can accelerate the delivery of ideas and solutions through unified communications, online workspaces and productivity tools and solutions for task management and project collaboration.

The modern space can also provide a location for talent outside city government to contribute to solutions that benefit the city, improve the quality of government services and increase the speed at which they can be implemented. The existence of a center can also provide individuals with the opportunity to conduct research using public resources, support STEM education and support economic development, training, and jobs; and propel the City of Baltimore as the place to invest and work across a number of technology-related industries.

The Technology Center serves as a space that can not only support government operations but also serve as a location to engage citizens in open data initiatives and improve and expand the city's open data program, self-service integration and analytics tools.

The benefits of the center are endless; however, some specific examples of how it can assist the city's collaborative and innovative goals include:

- Incubating ideas, then transferring them to other organizations.
- Providing deep investigation to solve challenging problems.
- Conducting research by request.
- Hosting and mentoring innovative projects.
- Exchanging knowledge between internal and external participants.
- Creating a showcase for innovation to tout the accomplishments of the city.

The center should also house a command center which will offer a comprehensive view of the status, performance and security of the IT enterprise; and support network and security operations (NOC/SOC). Adding this capability and equipping it with tools, dashboards and communications will provide technical and business leaders with real-time performance, status and major issues analysis.



Public Private Partnerships (P3)

To advance information technology in the City of Baltimore, it is necessary to enable sufficient procurement of the goods and services.

Not only does BCIT, in collaboration with the Department of Finance and Bureau of Procurement, need to create a tech-focused team focused solely on information technology purchases, but needs to also utilize new forms of procurement to close potential funding gaps and assist departments to rapidly and consistency receive vendor provided technology services.

One opportunity for innovation is in the area of Public Private Partnerships (P3s). Although historically used across the country for transportation or infrastructure related procurements and financing, P3s may provide avenues for implementing other resources such as broadband and sensor technology.

BCIT is committed to building the partnerships that will enable connectivity while protecting citizens' privacy. The inclusion of industry partners can also help BCIT identify infrastructure investments that can make the city more attractive to new business opportunities. By asking these partners to lend their knowledge, rather than just their financing, BCIT will be better positioned to create a digital environment that better suits the needs of the community.

In preparation to develop a robust P3 strategy, the city will first conduct a needs assessment of what technological areas could best benefit from a P3 as well as what city and state laws and regulations may need to be changed to accommodate a P3 strategy.





Community Engagement

With the recent advances in technology over the past decade, more and more households and businesses are using technology to aid and improve their daily lives.

People are using technology to electronically pay bills, communicate in real time through smart devices and connect to members of their community. From a government standpoint, cities across the country are better utilizing technology to solve civic problems and improve online services.

However, to ensure the technology initiatives and goals outlined in this strategic plan align with the community's needs, the City of Baltimore must increase its level of engagement with all members of the community, of every age. Venues for engagement should include:

- **Website** – BCIT should create a technology communications plan and interactive website that serves to not only broadcast information and progress on the inclusive digital transformation strategy but also provide a space for the community to provide continuous comments and elicit feedback on the various initiatives and programs the city wants to implement.
- **Social Media** – BCIT should increase the utilization of social media sites such as LinkedIn, Twitter and Facebook to showcase and inform the public on the progress the city is making in the field of Technology.
- **Listening Tours** – BCIT should conduct focus sessions throughout the city to collect insights, ideas and context from communities on how technology can improve city services and their quality of life before making decisions and implementing programs that may impact them.
- **Community Surveys** – BCIT should develop various community surveys to understand the community's technology needs and concerns.





CALL TO ACTION



Implementing the roadmap outlined in this Inclusive Digital Transformation Strategic Plan is going to take considerable time, effort and investment; however, the City of Baltimore cannot make the necessary changes alone. It is going to take other local governments, citizens, businesses and private sector organizations to lean in and collaborate, cooperate and co-create innovative and equitable solutions to achieve sustainable outcomes.

Therefore, in order to reach this plan's implementation goals, the city is making the following calls to action:

- **Communities:** Be vocal when asked how technology can improve city services, improve public safety and quality of life and close the digital divide.
- **Philanthropists:** Engage and partner with the city to strategically address social problems, advance the collective good and identify creative ways and resources to fill the IT funding gap.
- **Universities and Colleges:** Engage and partner with the city to develop programs designed to supplement the city's tech shortage and provide research to solve some of the city's technology and data challenges.
- **Businesses and Non-profits:** Provide knowledge, resources and expertise to help grow the city's tech community and assist city government to better utilize technology and data for the community's benefit.

Only when the above calls to action are met can the city position itself to be a leader in the technology industry, be better equipped to solve its social, economic, accessibility and mobility challenges and support the over 270 neighborhoods to connect, grow and thrive.



ACKNOWLEDGEMENTS

The Baltimore City Office of Information & Technology is very grateful to all that contributed to the city's 2018-2023 Inclusive Digital Transformation Strategic Plan. The time and energy that was given in the planning process as well as the guidance and recommendations submitted during the open comment period were invaluable in drafting this plan and determining the City of Baltimore's technological future.

STRATEGIC PLAN SUPPORT

The City of Baltimore recognizes that it will take support from entities outside of city government to achieve the goals, strategies and initiatives outlined in this plan.

If you are interested in providing IT expertise, resources and/or feedback to assist the City of Baltimore digitally transform, please use one of the below methods to notify us.

Electronic Form:

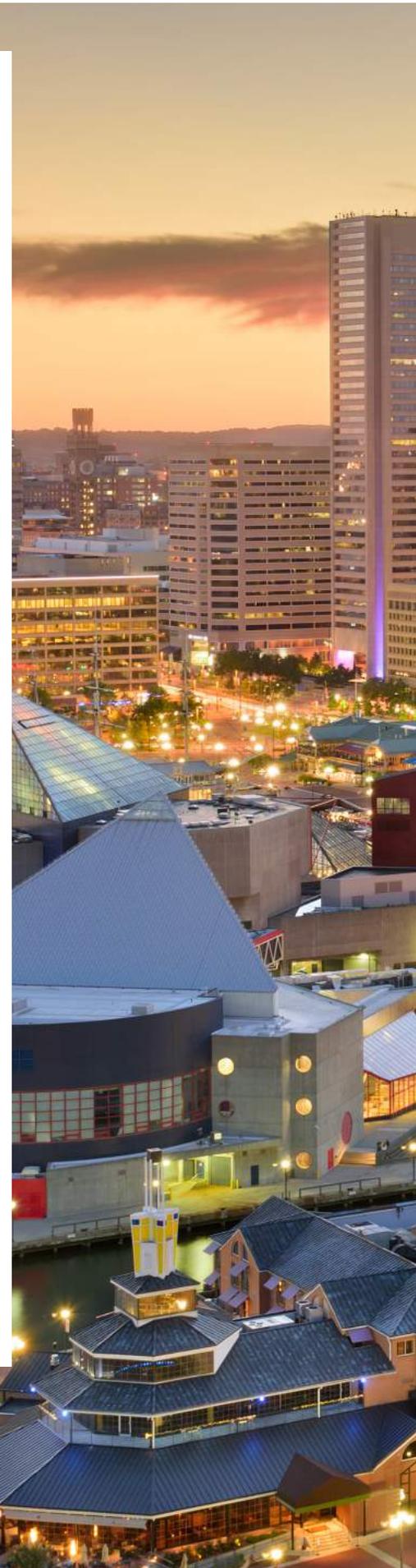
<https://technology.baltimorecity.gov/Plan-Support>

Mail:

Attn: Strategic Plan Support
Baltimore City Office of Information & Technology
401 E. Fayette Street, 3rd Floor
Baltimore, Maryland 21202

The electronic version of the 2018-2023 inclusive Digital Transformation Strategic Plan is available at the following Web address:

[Technology.baltimorecity.gov](https://technology.baltimorecity.gov)







Catherine E. Pugh
Mayor