



2018-2023

**INCLUSIVE DIGITAL
TRANSFORMATION
STRATEGIC PLAN**

City of Baltimore

DRAFT



COPY

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. The Strategic Plan provides a roadmap to transform the City's digital infrastructure, and to empower everyone in our community with technology, while growing Baltimore's tech industry and workforce.

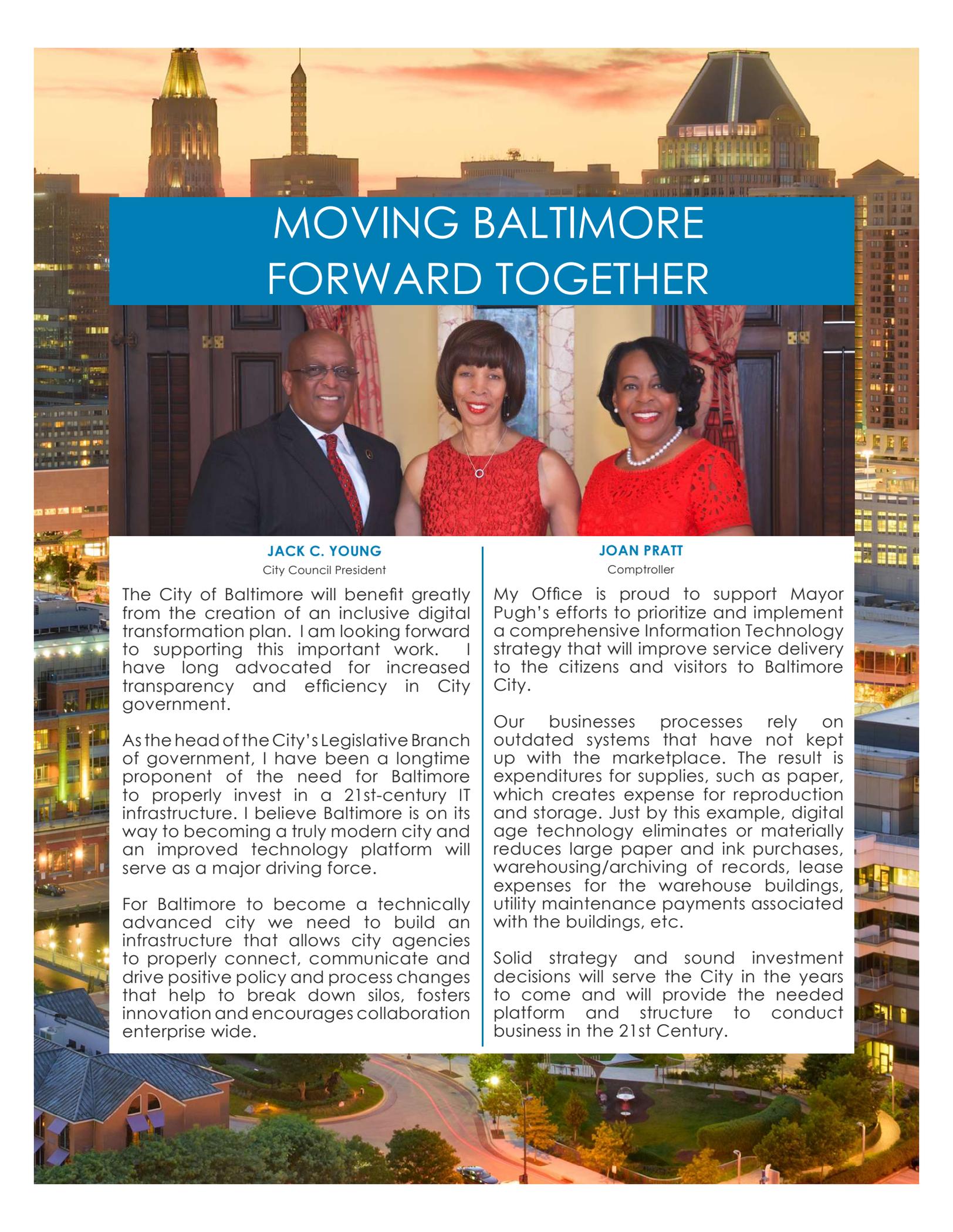
With enhanced technologies like cloud infrastructure, mobile applications, and modern, user-friendly interfaces, the City can improve its analytics, foster collaboration across agencies, and make more data-driven decisions. We can also leverage partnerships with local businesses and schools to expand public resources, while enhancing the local economy and training tomorrow's technology workforce.

In addition, transitioning to a more centralized enterprise and upgrading systems from legacy mainframes to modern, scalable, and secure platforms will help us plan for the future and avoid lock-in to legacy technology, while supporting continuous improvement and agile development projects.

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

Sincerely,

Catherine E. Pugh
Mayor, The City of Baltimore



MOVING BALTIMORE FORWARD TOGETHER

JACK C. 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 longtime 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.

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 businesses 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 Baltimore City's first ever strategic plan for Information Technology. 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

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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 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 spending 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, 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 dismantles the digital divide.



To help ensure this strategic plan aligns with best practices and current technology trends in the market, the City of Baltimore consulted with Gartner, Inc., the world's leading IT research and advisory firm. Working with Gartner Consulting and Executive Partner advisory associates to leverage Gartner research and benchmarking data, the City was able to benefit from Gartner's thought leadership and independent and objective insights.

Vision

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



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

To support Mayor Pugh’s pillars and vision of a collaborative and transparent government, the Mayor’s Office of Information & Technology 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

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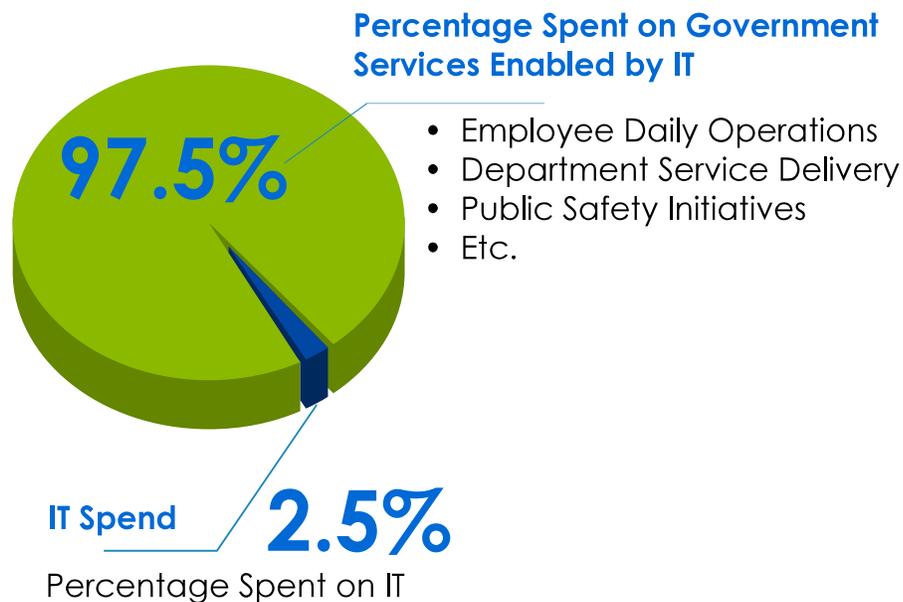
WAYS BALTIMORE CITY INFORMATION & TECHNOLOGY (BCIT) WILL SUPPORT MAYOR CATHERINE E. PUGH'S FIVE PILLARS TO "MOVE BALTIMORE FORWARD"

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				
		Continuous Communication	Encourage Leadership	Increase Skill and Staffing Levels	
6	ENGAGE TO				
		Showcase Progress	Build Relationships	Include Everyone	

Financial Impact

The City of Baltimore currently spends 2.5% of its operating budget, or about \$65 million, on information technology, yet IT contributes to services used daily by citizens and city employees that are funded by the other 97.5%.

City of Baltimore Operating Budget

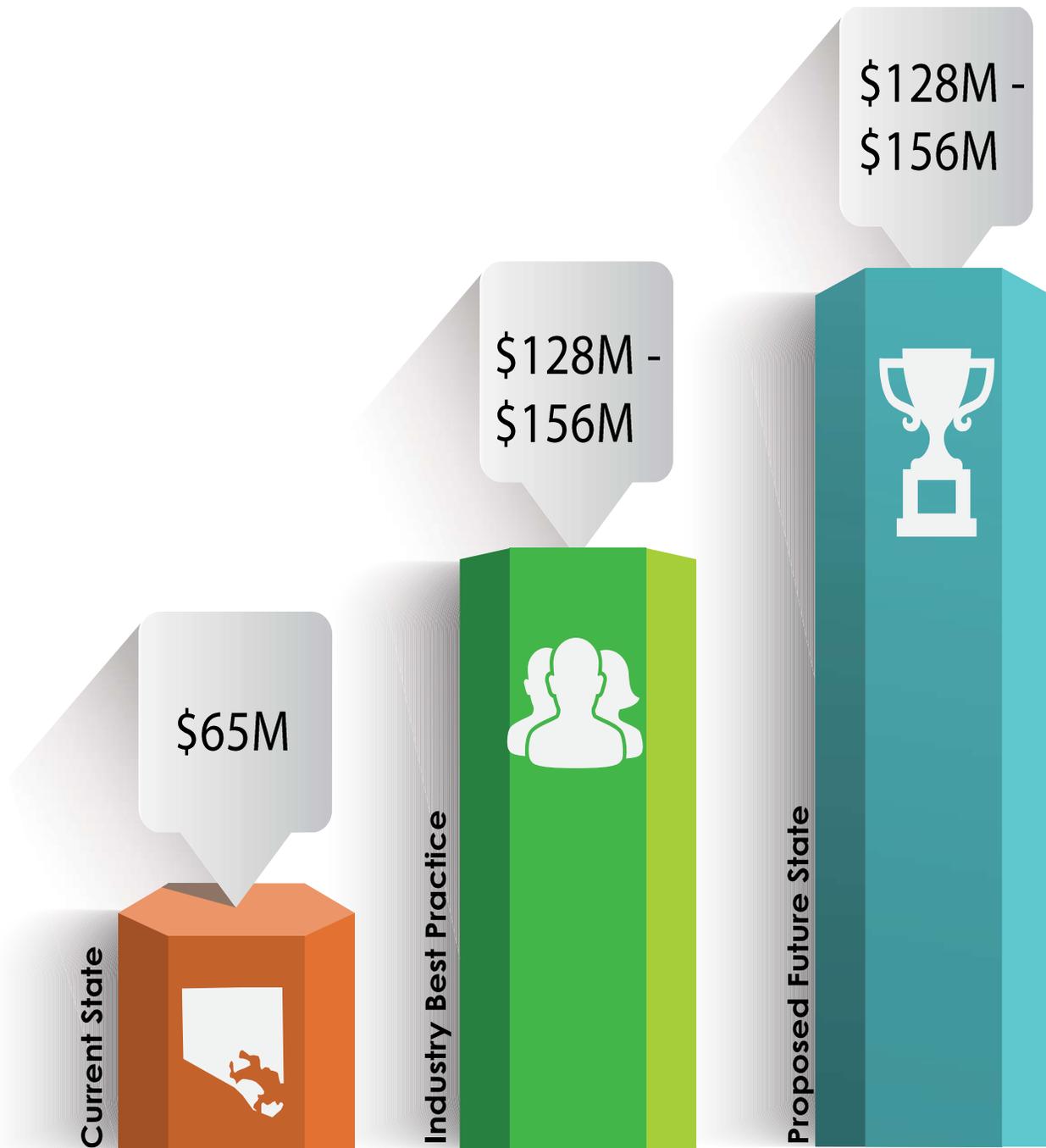


BCIT compared the City of Baltimore's IT expenditures against industry benchmarks for similar sized State & Local Government (SLG) entities. The results show that the City of Baltimore spends proportionally less on IT than most of its peers.

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

However, that would only raise Baltimore to average spending levels. Given the current state of IT in the City, additional investment over the industry average is necessary to both catch up and expand infrastructure and capabilities necessary to deliver on the strategy outlined in this plan.

- **To match 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 5 years up to or above the 75th percentile range. This is necessary to implement the reorganization, digital transformation, and modernization required of this strategic plan.

Purpose Of The Plan

This Inclusive Digital Transformation Strategic Plan will outline the path BCIT will take over the next Five-Years to further Mayor Catherine E. Pugh's vision to Move Baltimore Forward. The 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 IT professional 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 IT operations and service delivery



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 support these demands
- **Enterprise Resource Planning (ERP) modernization** – Develop a modern integrated and procurement 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 compacity 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 in the community that improves the quality of life for all residents no matter where they live
- **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 nonprofit sectors to partner with the City and leverage their technology resources for the betterment of all Baltimore City residents and businesses

Each section will not only detail the current state and roadmap to achieve the various components, but will also describe 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 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 is made possible by a world-class IT operation that supports city agencies in their respective missions.

Today, the City's IT operation is spread among its agencies, which operate their own internal IT organizations, infrastructures, and applications. Each is purposely built to meet its agency's unique needs. The primary benefit of this model is agency independence, in that the agency can decide which IT investments are best aligned with its mission and can take decisive

action without external dependencies and coordination.

However, in addition to obvious redundancy and inefficiencies borne through the current operating model, there are several drawbacks that hamper the City's ability to modernize and innovate. There simply are not enough resources in the City to support such inefficiency while maintaining high levels of capability, quality, and security. As such, agencies make trade-off decisions and tolerate sub-par quality in some areas, only implementing what their budgets can support. Because agencies are inwardly focused, there is little interoperability with other agencies. Systems are incompatible, and there is no coordination or integration mechanism. Any action that adds

risk to an agency's own operations is not pursued, even if it serves a greater good for the City.

City leadership is unable to take a holistic view of IT for the City and see where funds are being spent, or if they are helping achieve desired outcomes. With IT divided into agency silos, the needs of the enterprise – the City itself – are not considered, and therefore IT is not able to deliver on overarching policy priorities and mission needs that cross-agency boundaries. Opportunities to innovate are rarely captured because resources are spent on operation of existing legacy systems.



There is limited accountability to leadership because each agency is only responsible for its own mission. With greater demand for transformational, citywide IT to achieve strategic goals, the City can no longer afford to maintain its distributed IT operations and infrastructure.

The City of Baltimore will reorganize its IT operations in a way that maintains these benefits for agencies (independence) and solves problems inherent in this model (quality, interoperability, innovation, and outcomes). This fundamental shift is also a reason behind the name change from the Mayor's Office of Information & Technology (MOIT) to the Baltimore City Office of Information & Technology (BCIT). The strategy will include an inventory and assessment of enterprise and agency IT, and a process for shifting agency IT to central IT.

- Core IT services will be centralized into BCIT and operated at high levels of quality, security, resiliency, and performance. We will model IT infrastructure, services, and support using the best in the City as a baseline and industry best practices as a guide, but we will always consider the unique needs of the City of Baltimore as we improve.
- Agency IT operations will be centralized only when BCIT is able to deliver service levels that meet or exceed agency needs.
- No agency missions will be harmed, and BCIT will work collaboratively with agency leadership and staff to ensure a smooth transition.
- Agency IT personnel will be integrated into BCIT with the services and systems they support. Workforce reduction is not a goal, and the data shows that, if anything, Baltimore is understaffed to meet its IT demand. BCIT will collaborate with individuals to plan their career transitions prior to any reassignment.
- The transition will be led by the CIO with the support of the Mayor. Any exceptions will be at the discretion of the CIO. The CIO will operate an inclusive governance model where most issues can be raised and adjudicated.

Centralized IT

With centralized IT operations, agencies must be able to rely on BCIT to deliver on their unique mission needs and priorities.

BCIT must focus on delivering business value to its customer agencies, not just operating to meet internal performance metrics.

With this model, agencies can concentrate on their missions and unburden themselves of IT operations. Citywide initiatives can be implemented with cross-functional, cross-agency teams that come together to collaborate to solve city challenges.

BCIT is the enterprise IT services organization that is responsible for the operation and delivery of core enterprise services and cross-agency initiatives.

Each agency continues to serve a product ownership role in the platforms and systems that are important to their missions.

The new BCIT organization will include 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 ARM role is characterized as follows:

- Serve as the strategic interface between BCIT and departments.
- Advise department leaders on BCIT service and product offerings, help manage demand and planning processes, and remain engaged through BCIT product delivery.
- Establish metrics tailored to the departments and track and report on benefits realization and customer satisfaction.
- Advise department leaders on innovation and technology enablement opportunities.
- Relay unique needs of the departments to BCIT for strategic planning, prioritization, and evolution of enterprise offerings.

Under the centralization model, departments will no longer maintain all of their own IT operations, however with ARM support, they will 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 no longer have to build and maintain their own IT capabilities from scratch.

Enterprise IT Operations and Service Delivery

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

This will require reorganization of existing IT operations and enhancement of 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 lifecycle management processes.
- Align service delivery with customer outcomes over local internal efficiency.

The transition to an enterprise model will proceed iteratively with BCIT performing assessments of its own IT processes and capabilities and those of other agencies, planning the centralization of enterprise services, and planning for delivery of agency-specific needs. BCIT leaders and Agency Relationship Managers (ARMs) will ensure minimum disruption to agency operations and collaborate with agencies throughout the process. 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 agencies 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

BCIT 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 catalog will be developed that describes the services available to customer agencies, the service level tiers offered, and the performance measurements. In addition to the standard measures, agencies with unique needs will work with their Agency Relationship Managers to establish metrics tailored to their unique needs and aligned with their mission outcomes.

Internal Operations

The key to a high-performing central IT operation is alignment with leadership priorities and customer needs. The culture must evolve to always consider the big picture and seek delivery of desired outcomes for citizens. 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. But highly efficient internal operations that do not work for our customers 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 will be designed 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 desk to provide a one-stop-shop for any and all IT needs integrated with agency 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 agency 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 SLAs.
- 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 move Information Technology forward in Baltimore City, BCIT must ensure continuity of operations that meets the current and future operational needs of the City and has diverse IT talent. To achieve this, BCIT will develop a human capital plan that incorporates three priorities.



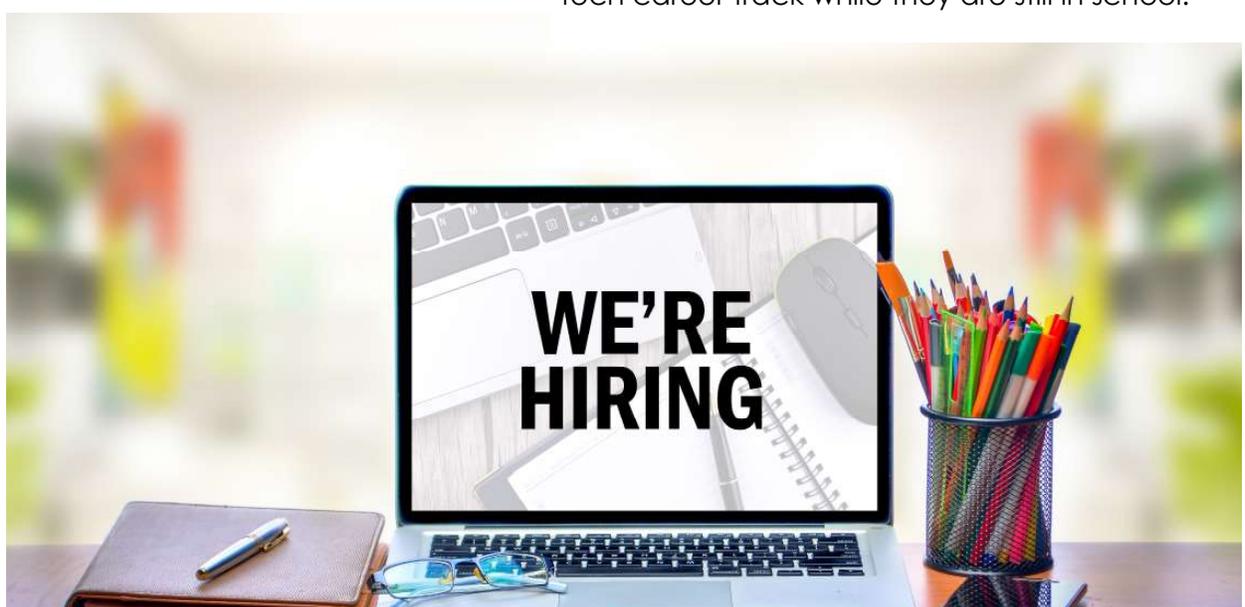
Develop a Pipeline of Baltimore Based IT Talent

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 Baltimore and 24% of the central IT authority's staff can retire immediately. BCIT will need to partner with stakeholders throughout Baltimore in the creation of a tech training ecosystem.

BCIT must partner with local organizations and institutions to develop an ecosystem in Baltimore that fosters tech talent development. There are organizations within Baltimore City that provide youth with tech skills such as coding through partnership with Baltimore City Public Schools (BCPS).

BCIT will partner with BCPS and the two and four-year educational institutions to create a tech talent growth initiative and to build a tech talent pool in Baltimore. The initiative will provide Baltimore City students the opportunity to begin a tech career track while they are 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. 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 conduct an enterprise-wide evaluation of skills and competencies.

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

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 staff the ability to grow in their career through access to new

skills and information, BCIT will 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 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 Department of Human Resources.

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 Department of Human Resources 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 area, 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 will partner with local academic institutions to engage students through working on a substantive project for a City agency. BCIT will work with the Mayor's Office in the development of program modeled on the Los Angeles Data Science Federation.



Governance & Administration

Strategy implementation requires cross-agency collaboration, strategic alignment, and continuous change. This must be balanced with predictable, 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 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 agency missions. The CIO has authority over procurement, policy, and enterprise operations.

Although strategy realization begins with the Chief Information Officer (CIO), one leader cannot do it alone. Other City Department heads, administrative, operational, and mission personnel must lend their expertise so that the 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 representatives from the department of finance, city solicitor's office, procurement and human resources. It will:

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

IT Council

The existing IT Council will continue to provide agencies with visibility and collaboration opportunities through regular meetings and events, and the formation of subcouncils and subcommittees. Agencies are expected to actively participate and lead IT Council strategic planning, research, and other initiatives. By doing so, agencies 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 include:

- Discuss enterprise IT services and capabilities of interest to departments.
- Propose enterprise initiatives and strategies.
- Provide input to investment decision making and funding allocation.
- Identify opportunities to apply new technology to achieve strategic priorities.
- Discuss technology topics, share best practices and lessons learned, and collaborate to help each other solve agency and enterprise challenges.

Smart City Council

A Smart City Council will be established to focus on Smart City strategy, partnerships, opportunities, and coordination. It will be led by the CIO, leverage the IT Council for collaboration and communications, and will lead Smart City development for the City. It will, in part:

- Align priorities on social, environmental, and economic drivers to achieve tangible results with sustainable value across the City's departments and partners.
- Form the 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.
- Plan for workforce development to gain the next generation capabilities and skills required to execute and manage emerging Smart City technology.
- Engage with citizens to understand need, inform priorities, and include the ingenuity and talent of the people of Baltimore.
- Interact with standards, bodies, and frameworks to ensure interoperability and sustainability of solutions.
- 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 leveraging enterprise capabilities (such as Enterprise IT Operations Enterprise Cloud Services, Data Telecommunications, Data Integration & Analytics Hub, DevOps, and others).

Enterprise Portfolio Management Office (EPMO) and Demand Management

The EPMO's primary goal is to balance the IT Portfolio to achieve strategic objectives, while at the same time supporting an implied objective to keep City operations running. A demand management process can bring visibility into IT spending and highlight opportunities for innovation and process improvement when, for example, costly existing technology is not aligned with the current strategy.

The EPMO will establish a Demand Management process to manage this balance between enterprise strategy, agency missions, and operational requirements. Demand Management consists of an intake process, where solution requests from all over city government are captured. All known agency needs, ideas, and opportunities to leverage IT to support strategic and mission goals will be managed by this process as solution requests. Requests will be assessed by relevant technical and domain experts and prioritized for funding, planning, and execution managed by the Enterprise Portfolio Management Office (EPMO). Solution Requests will be identified through multiple channels.

1. ARMs will work with agencies in an advisory capacity and will collect, and/or interpret requests to initiate the process.
2. Agency procurement activity will be reported to BCIT for prior approval, and solicitations that meet the EPMO's criteria will be entered into this process.
3. Service desk issues, trends, and requests may be identified as solution requests.

The EPMO will triage the request to determine if it aligns with an existing service or function. The team will support analysis by relevant technical and domain experts of the opportunity, current enterprise capabilities, industry best practices, and market research. The EPMO will engage experts and managers within BCIT and affected agencies, 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 fulfill 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 agency missions. The initiatives that will deliver the most value in the shortest time 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. 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 part of the 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 people of Baltimore to not allow security immaturity to inhibit our transformation. So, as our transformation unfolds, we will properly and effectively plan for and manage cyber risk, build security into our transformation from the start, keep it current over time, 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 the development and operation of not just IT, but in all areas of business, operations, and management.

DevOps 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 principles - taking a systems view, removing waste, leveraging automation wherever possible, and using cross-functional teams to rapidly deliver value from concept to deployment and beyond.

Currently the City depends on outdated, legacy systems which is stifling the government processes, and in turn, the city 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 agencies or systems.

In order to modernize and unify Baltimore's current digital systems, the City requires concerted agile development services to create a cohesive, streamlined, and integrated technology ecosystem. Currently, every Baltimore IT initiative is planned and delivered independently. This has led to outdated legacy systems holding back our government processes, and in turn, the city services on which our citizens depend.

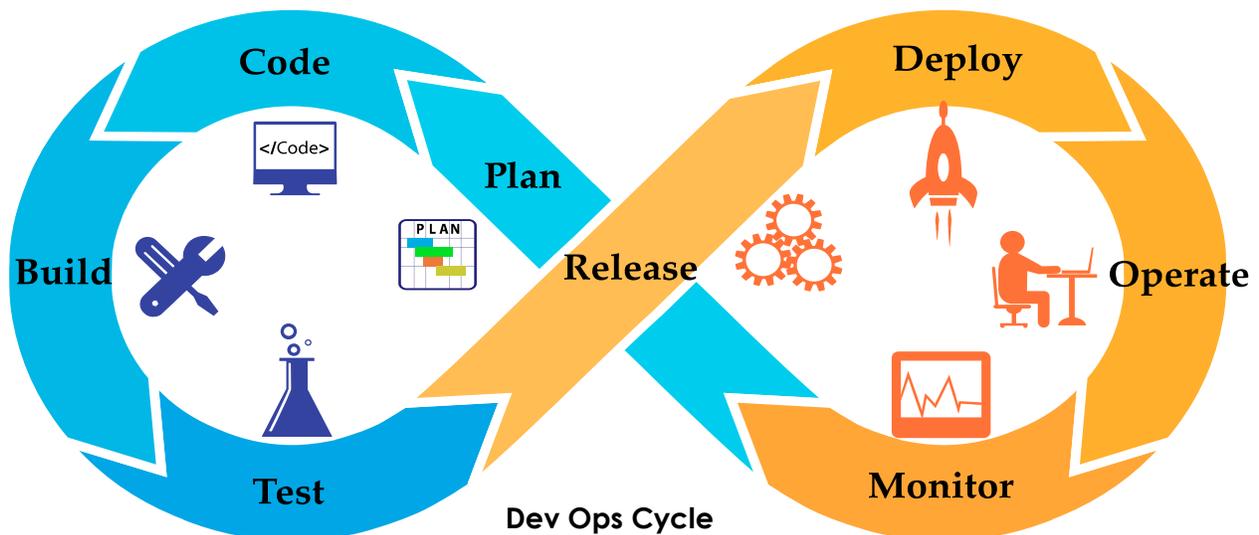
Utilizing agile methodologies such as Scrum, Extreme Programming (XP), and Kanban will allow the city to avoid these problems. By working in fast-paced, iterative cycles, agile teams are able to incorporate user and customer feedback into every build. This flexible approach enables the team to continuously realign their process with evolving customer and user priorities. This 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 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 1. This will allow the City to avoid being locked into business processes that fail to keep up with the changing needs of its citizens.

Baltimore's DevOps will integrate software development with Enterprise IT Operations & Service Delivery, collaborating and working together on environments, automation, configuration, and delivery tools and processes.

BCIT will not seek to optimize internally for our own purposes, but rather consider the whole and support our customers 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 agency 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 agencies.





Support and Secure Critical IT Operations and Infrastructure

Enterprise Cloud Services

The City's physical data center infrastructure prevents the City 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.

Introduction of new technology or more capacity is slow, as it requires procurement, training, or budgetary action. And a large portion of Baltimore's IT infrastructure is purposely built for individual agencies, limiting efficient reuse. As Baltimore gears up to deliver modern digital experiences to citizens and leverage digital technology to improve operations and outcomes, it needs a better solution for its computing needs. Computing infrastructure should enable relentless progress towards a better government, and a better Baltimore. 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 will seek to 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 public cloud 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. Baltimore will begin to expand to a hybrid cloud model to 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 Baltimore's 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.

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.



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 rights-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 in light of the needs assessment and financial analysis. We will prioritize efforts and implement projects that best support the needs of the City. Next-generation broadband infrastructure will support IoT-Enabled Smart City initiatives that improve city life and work, 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 attaching people and businesses to the City

Baltimore's broadband strategy that will launch the City of Baltimore into the vanguard of next-generation, cost-effective, and efficient municipal broadband.

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 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.

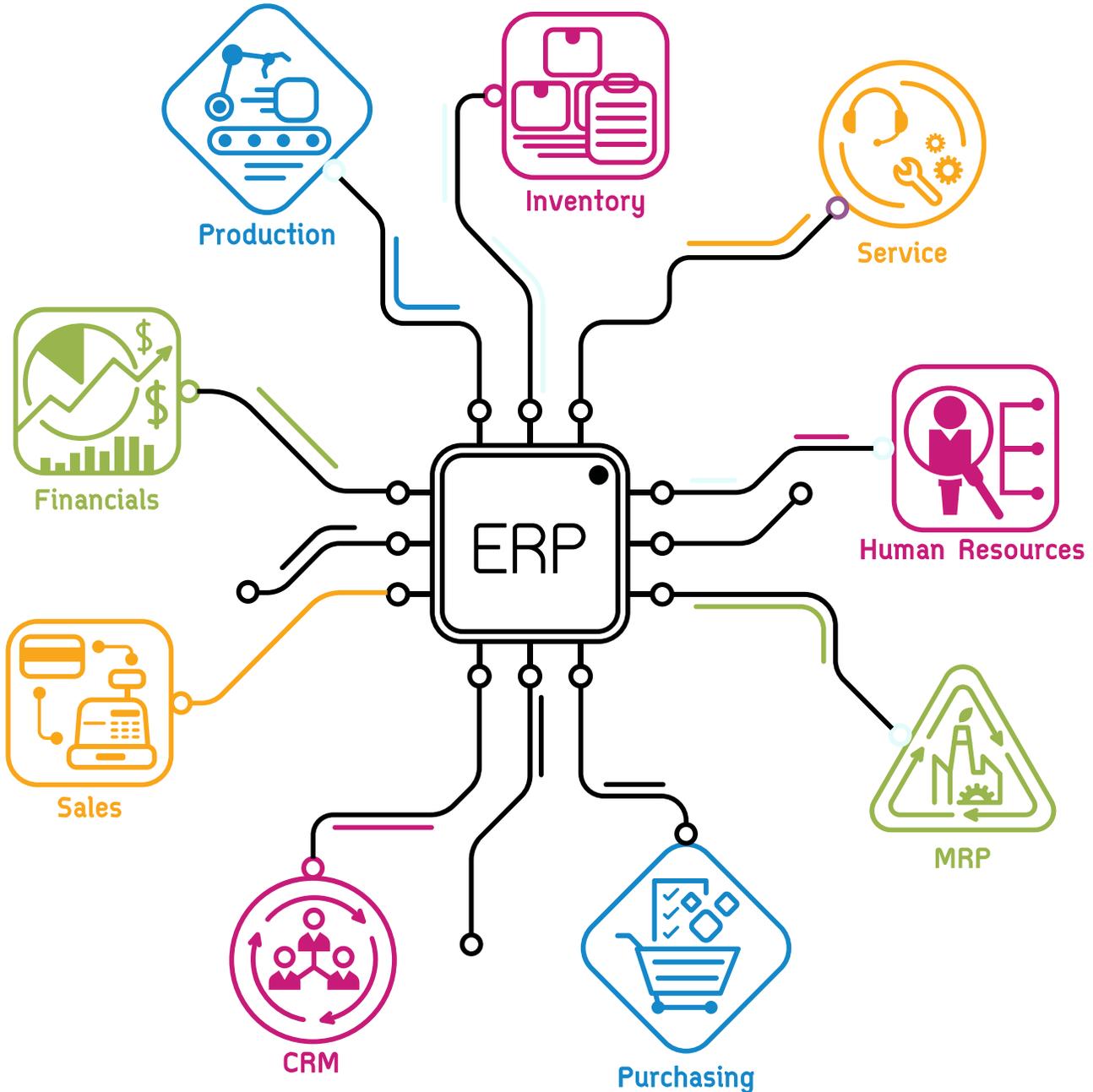
No single ERP system offers the best solution for all areas and functions ERP supports. So, a monolithic ERP strategy will likely result in subpar, maybe unacceptable, capabilities in key enterprise functions. However, a best-in-class approach where each function independently without appropriate consideration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

For 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 develop an ERP integration and procurement strategy that deals with the complexities of the modern ERP landscape. BCIT will work with stakeholders to build a data integration and procurement strategy and 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:

- Work with affected stakeholders to map dependencies and known workflows both internal and external to agencies 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 platform to other agencies through APIs, apps, etc.



Enterprise Resource Planning (ERP) Module Construction flow

As a result of a postmodern 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 Baltimore'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.



Modern data integration techniques will be leveraged to create an enterprise Data & Analytics Hub that will evolve to meet the data integration needs of the City.

The hub is a comprehensive end-to-end architecture that connects disparate data sources like real time data streams (e.g. from IOT devices and sensors) and structured or unstructured data from internal systems (e.g. legacy databases, files, and data lakes) and external cloud-based sources (e.g. external open data sets, geographic, weather, financial, traffic, population, or other data).

- It will 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.
- It will maintain data protections and privacy with a data access and governance layer.
- It will offer advanced analytics capabilities that include reporting, visualization, machine learning, predictive analytics, and more.
- It will 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.
- It will leverage the Baltimore Technology Hub strategy to support collaboration and civic engagement.

The Data & Analytics Hub, paired with other components in this strategy, will result in increased transparency in support of civic analytics, and more efficient achievement of policy priorities.

- Citizens will experience better customer service because outcomes are tracked and issues are immediately identified and acted upon.
- Increased transparency will lead to a more accountable city government.
- City decision makers will have the data and insights to make impactful decisions and enact policies supported by evidence.
- City leaders will better track 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, some open data sets must be refreshed manually, and there is no consolidated data warehouse to allow analytics and accountability stakeholders to query multiple datasets across multiple agencies. 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 will collaborate with the Mayor's Office of Sustainable Solutions to create a robust, dynamic enterprise data environment (EDE), which is a major priority for facilitating Baltimore City'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 EDE will include an enterprise-wide data warehouse of whatever architecture deemed most efficacious. The data warehouse will ensure the 24/7 availability of all data it houses and have industry-standard security built into its architecture along with a high degree of granularity built into its permission structures and the ability to automate workflows and extracts and transmit them seamlessly between agencies.
- The EDE will include a robust open data portal to help make Baltimore a more transparent city. It will have robust interactivity, native analytical tools, and processes for requesting and adding new datasets through a process of careful vetting and community consultation.
- The EDE will 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 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.



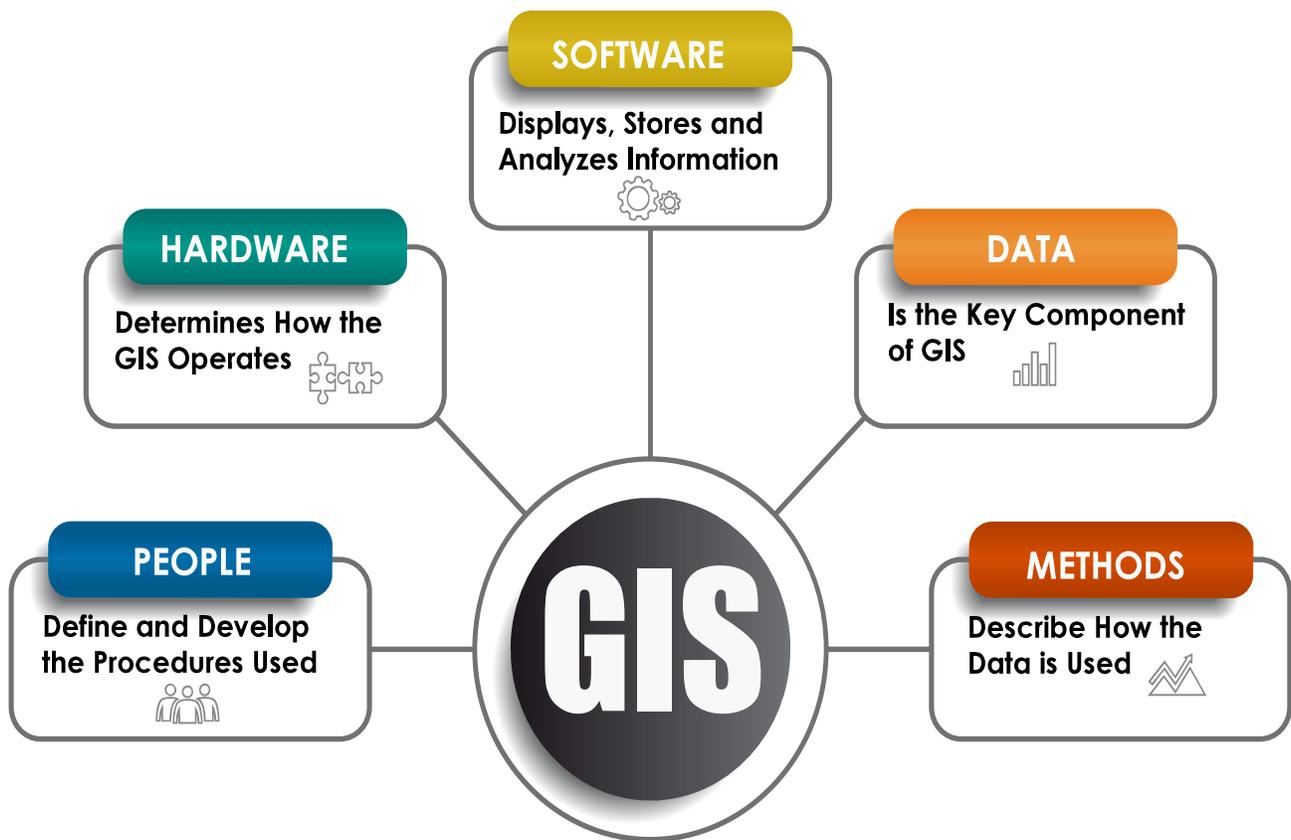
Accountability and transparency needs will be met through utilization of the EDE and the open data portal. The EDE will be available to the City's highest-level accountability and analytics stakeholders in order to assess and engage in performance management of agency operations. The open data portal 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 commons which can serve the community the community of today while preparing it to meet the challenges of tomorrow.

GIS

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 a GIS



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

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, and private sector organizations to collaborate, cooperate, and co-create innovative and 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, performant 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, we will favor commercial platforms and technology over custom development. As Smart City is still rapidly evolving, when commercially available technology is insufficient, we 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 from the implementation of Smart City technology and initiatives. The City will become 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 technology leaders in the form of educational institutions and private businesses, yet Baltimore City government's ability to deliver IT infrastructure and solutions lags behind other public sector organizations.

The City sees great opportunity to form partnerships and collaborate with individuals and organizations interested in creating a better City through the development of physical and virtual spaces to enable collaboration and innovation.

To achieve that goal, Baltimore will create a chic, modern physical space that enables innovative individuals and organizations to collaborate and work together on technical solutions that enhance the City's image as a place to live and work. The Baltimore Technology Center will showcase City technology and provide access to public data, analytics tools, development environments, and other assets.

BCIT will support the Baltimore Technology Center by establishing a digital platform to help manage the space and enable 24/7, remote, mobile, and virtual 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 will 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. It will foster STEM talent and connect people with research opportunities using public resources. The Center will support STEM education through partnerships with schools and universities and support economic development, training, and jobs, improving the attractiveness of Baltimore as a place to work across a number of technology-related industries.

The Center will also serve as a virtual space to engage citizens in open data initiatives, and seek to improve and expand its open data program and self-service integration and analytics tools.

The benefits of the Center can be wide-ranging, but some examples of how they can specifically meet 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 will also house a command center which will offer a comprehensive view of the status, performance, and security of the IT enterprise. BCIT will leverage Center to house a physical command center to support network and security operations (NOC/SOC), and a virtual capability with tools, dashboards, and communications that provide technical and business leaders with real-time performance, status, major issues, and analyses.



Public Private Partnerships (P3)

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

Not only will BCIT, in collaboration with the Department of Finance and Bureau of Procurement, need to create a tech-focused procurement team focused solely on information technology purchases, but will have to utilize new forms of procurement to help close potential funding gaps.

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, P3 may provide avenues for implementing such resources 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 will help the City better identify the infrastructure investments that will improve Baltimore's attractiveness to new business opportunities. By asking these partners to lend their knowledge, rather than just their financing, BCIT will create a digital environment that better suits the need of the community. The City will conduct a needs assessment of what technology 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.





Community Engagement

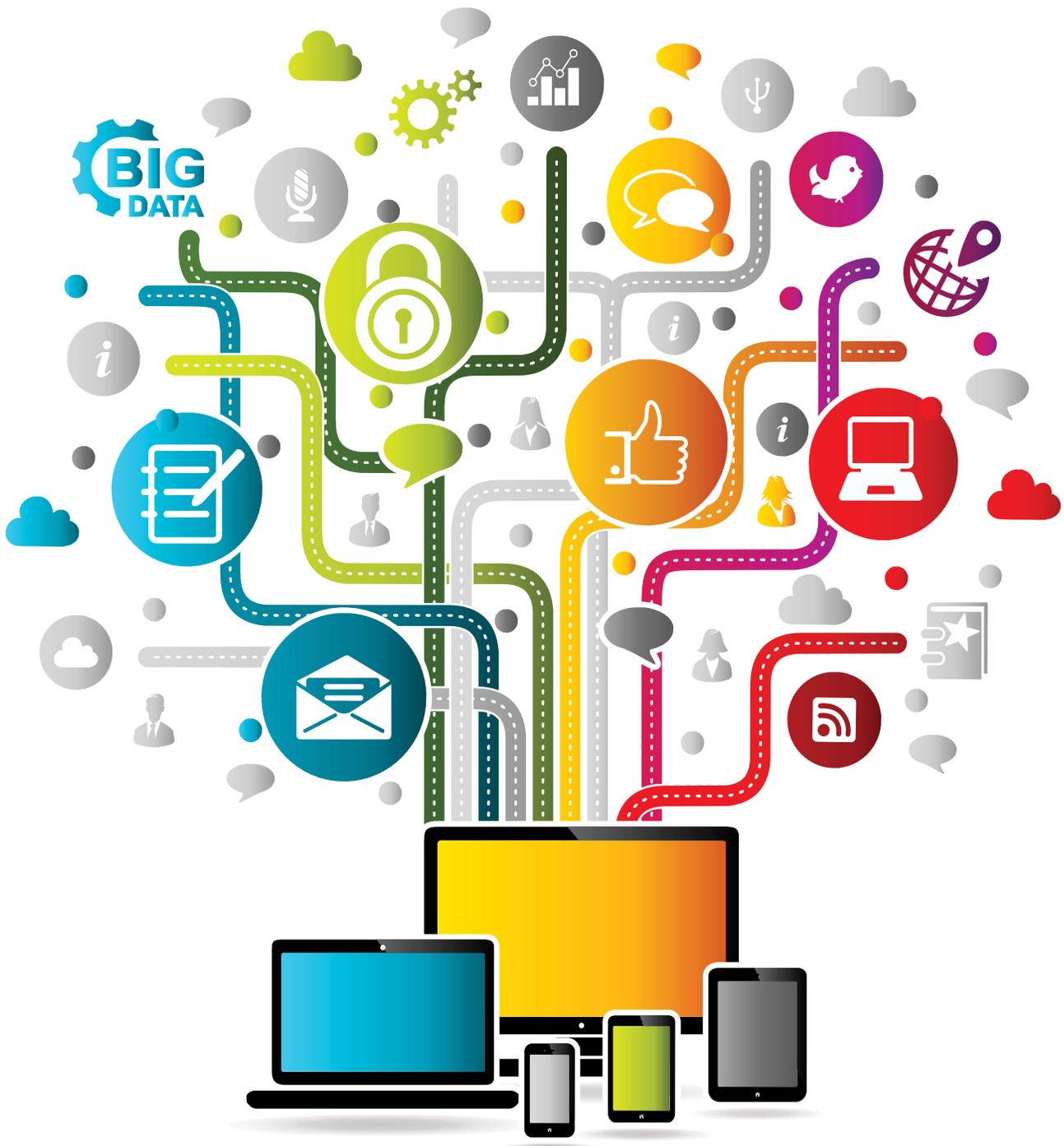
With the recent advances in technology over the past decade, more and more households and businesses are using technology to aid and improve their daily lives.

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

However, to achieve the technology initiatives outlined in this strategic plan, the City of Baltimore will need to increase the level of engagement with all members of the community, of every age. Venues for engagement should include the following:

- **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 continues 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 concerns.





CALL TO ACTION



INNOVATION



GOALS



TEAMWORK



COMMITMENT



INTEGRITY



CUSTOMERS



RESPONSIBILITY

The ultimate goal of the Baltimore City Office of Information & Technology is to better support city government, business and businesses through improved technology.

Implementing the roadmap contained in this Inclusive Digital Transformation Strategic Plan will take time, considerable resources 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, the City is making the below calls to action:

- **Communities:** Be vocal when asked how technology can improve City services and be better utilized to achieve smart city status and close the digital divide.
- **Philanthropists:** Engage with the City to identify creative ways and resources to fill the funding gap.
- **Universities and Colleges:** Engage with the City to develop programs that establish a hiring pipeline 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 and expertise on how the City can help grow the tech community and better utilize technology and data in the community.

When and only when the above calls to action are met, can the City of Baltimore earn its place as a leader in the industry. Once achieved, not only will the City be better able to solve social, economic, accessibility, mobility, environmental, and other City challenges, but the City's over 270 neighborhoods will be better able 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 to the planning process as well as the guidance and recommendations were invaluable in determining the City of Baltimore's technological future.

FEEDBACK AND COMMENTS

The City of Baltimore is making this document available for comment until **March 16, 2018**. It is anticipated the final version will be released to the public in April of 2018.

You may submit feedback and comments by any of the following methods (Please send by one method only).

Electronic Form:

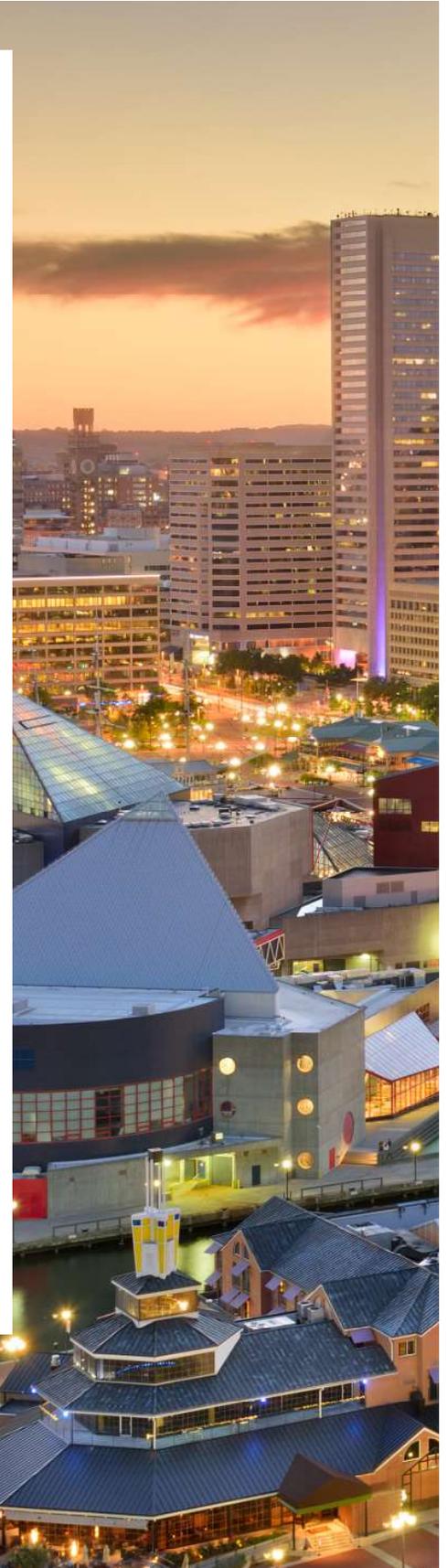
<https://technology.baltimorecity.gov/Plan-Feedback>

Mail:

Attn: Strategic Plan Comments
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