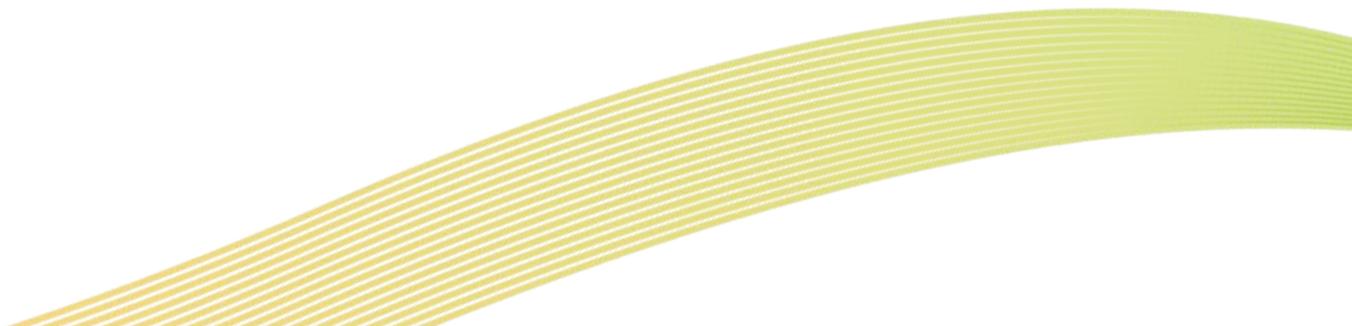


DIGITAL INFRASTRUCTURE STRATEGIC FRAMEWORK

CITY OF TORONTO MARCH 2022



LAND ACKNOWLEDGEMENT



The City of Toronto acknowledges that we are on the traditional territory of many nations including the Mississaugas of the Credit, the Anishnabeg, the Chippewa, the Haudenosaunee and the Wendat peoples and is now home to many diverse First Nations, Inuit and Métis peoples. The City also acknowledges that Toronto is covered by Treaty 13 signed with the Mississaugas of the Credit, and the Williams Treaties signed with multiple Mississaugas and Chippewa bands.



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Photo by mwangi gatheca, February 6, 2018

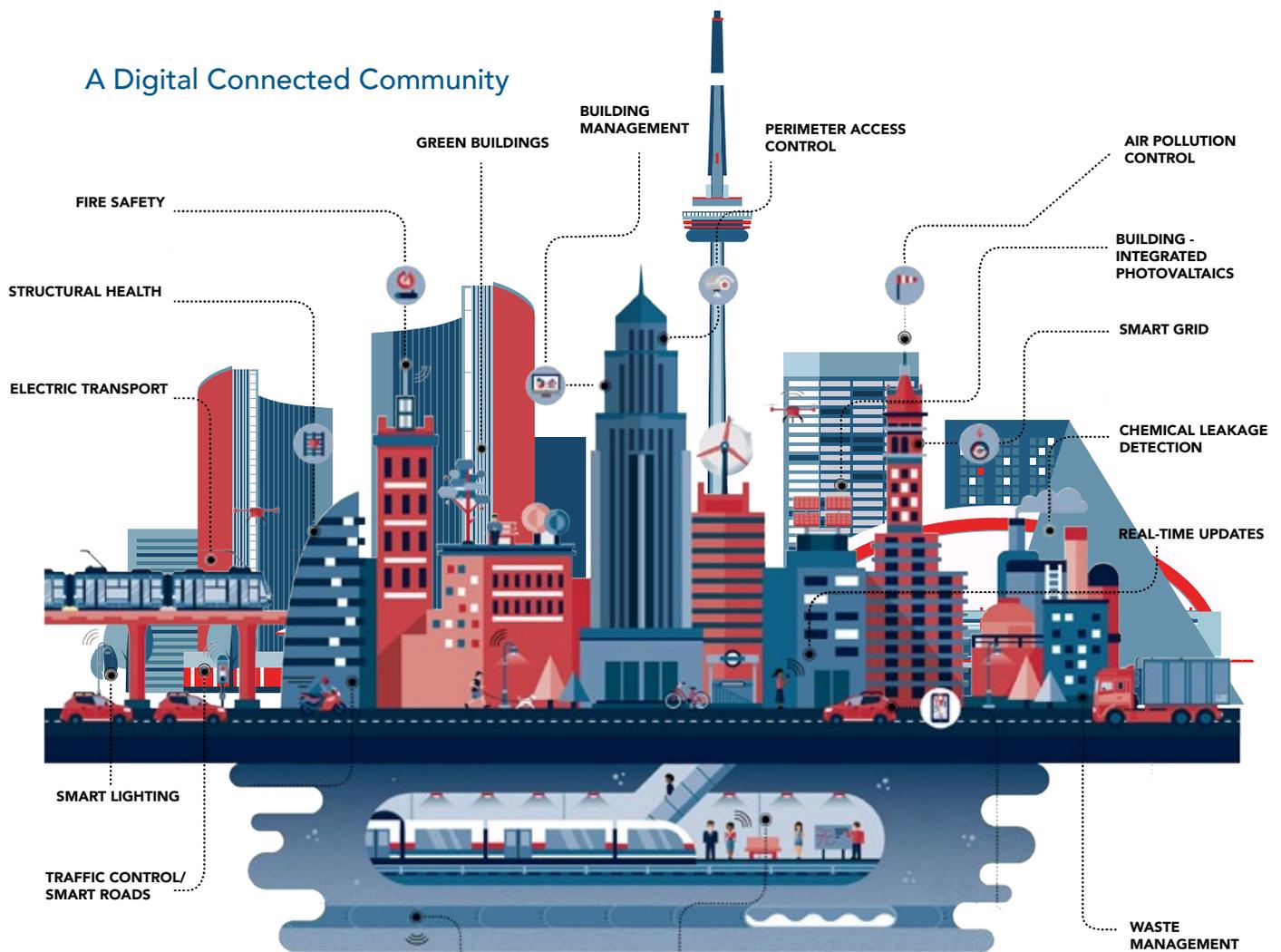
INTRODUCTION: A DIGITAL INFRASTRUCTURE STRATEGIC FRAMEWORK FOR TORONTO

Toronto: A Digital Connected Community

The use of data and technology provides new opportunities to work in different ways, improve City services, inform policy and program decisions, and collaborate across City divisions. Data and technology can shape the way City priorities—such as equity, affordable housing, financial sustainability and accessible transportation—can be achieved. However, data and technology are also transforming expectations of public services, and come with challenges—around privacy, accountability, security, protecting rights, and social exclusion.

A Digital Connected Community is one where Digital Infrastructure - defined as technology assets that create, exchange or use data or information in a digital form as a part of their operation, as well as all data collected or used by the aforementioned technology assets - is increasingly used to deliver services, perform data-driven asset management, help manage public resources efficiently, encourage civic engagement, and inform decision-making. In Toronto's journey to becoming a Digital Connected Community, it is important that people can trust digital public services, and feel comfortable and safe when using public Digital Infrastructure. It is also important that decision making around the use of Digital Infrastructure include consideration of non-technical alternatives and public buy-in.

A Digital Connected Community



The Digital Infrastructure Strategic Framework

The Digital Infrastructure Strategic Framework (DISF) sets out the overarching vision for Toronto as a Digital Connected Community. It is a response to the range of opportunities and challenges associated with the use of Digital Infrastructure. The benefits of Digital Infrastructure will only be realized when Digital Infrastructure is applied to the right problems and deployed and operated in responsible ways.

The DISF aims to clearly define objectives, aspirations and values associated with the use of Digital Infrastructure and guide Toronto in a direction where:

Digital Infrastructure is used to create and sustain equity, inclusion, accessibility, and human rights in its operations and outcomes

Digital Infrastructure enables high quality, resilient and innovative public services, and supports the use of data and evidence in decision-making

Digital Infrastructure is leveraged to create a society that supports equitable and inclusive benefits whether for social, community, health, economic or environmental prosperity

Privacy and security are at the core of our Digital Infrastructure, allowing residents to feel safe and secure online when accessing City services, systems, and products

Decisions about Digital Infrastructure are made democratically, in a way that is ethical, accountable, transparent, and subject to oversight

The City has full control over its ability to develop, select, maintain and use its Digital Infrastructure to deliver public services and advance the public interest.

The DISF has been developed to enhance transparency, accountability and consistency of decision-making, while strengthening the flexibility, safety and efficiency of the City's Digital Infrastructure. In this way, the Framework plays the following key inter-related functions:

Statement of Vision and Aspirations

The DISF is the primary instrument for the expression of Toronto's vision and aspirations for Digital Infrastructure. This vision is expressed through related Principles, Strategic Priorities, and Objectives.

Framework for consistent decision-making

The DISF is a tool to help guide day-to-day as well as long-term decisions related to the City's Digital Infrastructure. A central objective of the DISF is to ensure that decisions related to Digital Infrastructure support corporate objectives and are not made in isolation. The design, development, procurement, implementation, and evaluation of all Digital Infrastructure at the City should align with the Principles and related Strategic Priorities within the DISF, as well as other relevant policies, as appropriate and applicable.

Who is This For

The DISF has been written for three key audiences:

Residents: the DISF provides a clear framework for residents to ask questions about Digital Infrastructure proposed or deployed in Toronto; establishes enhanced transparency and insight into how

their data is used; and sets out a common vision on issues such as equity, inclusion, social and environmental benefit, as it relates to Digital Infrastructure.

City Staff: the design, development, procurement, implementation, and evaluation of all City Digital Infrastructure must be guided by and align with the DISF. The Connected Community team in Technology Services division will work with colleagues across the City to identify and undertake new Digital Infrastructure Initiatives that meet City strategic priorities and align with the DISF. The Technology Services Division is responsible for the oversight and accountability of this framework.

Businesses, Collaborators, & Vendors: the DISF sets common standards and expectations for new Digital Infrastructure Initiatives within the City of Toronto.



Defining “Digital Infrastructure”

For the purposes of the DISF, Digital Infrastructure is defined as: all technology assets that create, exchange or use data or information in a digital form as a part of their operation, as well as all data collected or used by the aforementioned technology assets. Examples of Digital Infrastructure include:

- Physical objects and structures such as cameras, sensors, and broadband networks
- Software systems such as mobile applications, websites, digital payment systems, customer relationship management applications, and legacy technology systems
- Fixed devices such as computers and digital kiosks
- Mobile devices such as robots, vehicles and cellphones
- Data collected or stored digitally by the City, including personally identifiable information and non-personal information (administrative data, geospatial data etc.)
- Systems whose functions may rely on computer generated data such as machine learning systems and artificial intelligence

Additional definitions are included in Appendix 1.

Digital Infrastructure Strategic Framework Scope

For the purposes of the DISF and this report, “Digital Infrastructure Initiatives” are defined as the use of Digital Infrastructure in City operations, including the provision of services to the public, the procurement of Digital Infrastructure by the City, or regulations of

the City which address Digital Infrastructure.

Specifically, the DISF will apply to:

- Digital Infrastructure Initiatives in all City divisions. This includes all new City Digital Infrastructure Initiatives that are developed in-house by the City; operated on behalf of the City; undertaken in collaboration and under contract with third parties; and all policies, plans and strategies related thereto;
- Existing City Digital Infrastructure, in which case the DISF will be applied over time through established cycles of review and renewal;
- All new Digital Infrastructure Initiatives in City-owned portions of the public realm (defined as City-owned streets, sidewalks, parks, open spaces, squares and publicly-accessible portions of City-owned buildings); including those undertaken by City agencies or corporations. Regulatory City control of the City-owned public realm will also be guided by the DISF on a go-forward basis.

“Public Realm” for purposes of the DISF means all locations other than private residences in which members of the public by legal entitlement, or invitation are permitted or invited to attend. The DISF will not apply to any Digital Infrastructure Initiative other than City of Toronto Digital Infrastructure and Digital Infrastructure in the City-owned public realm as described above. For greater clarity, the DISF will not apply to the following circumstances:

- Private property including privately-owned portions of the public realm such as malls, pedestrian walkways (e.g. the PATH network), and Privately-Owned Publicly Accessible Spaces.

Organization of the Framework

The Digital Infrastructure Strategic Framework is founded on the following six Principles, each with their own chapter:

EQUITY & INCLUSION



A WELL RUN CITY



SOCIETY, ECONOMY, & THE ENVIRONMENT



PRIVACY & SECURITY



DEMOCRACY & TRANSPARENCY



DIGITAL AUTONOMY



Each Principle consists of a dedicated chapter that includes a Vision Statement, descriptive text, and themes that are expanded as Strategic Priorities. For each Strategic Priority, an objective, overview, description of emerging issues, and implementation considerations are provided. Consistent with the high-level nature of the DISF, implementation considerations provide guidance on how the Strategic Priorities can be achieved on a case-by-case basis.

Implementing the Framework

The Digital Infrastructure Strategic Framework is a corporate-wide strategy that provides overall direction and guidance for all Digital Infrastructure Initiatives at the City and will be used to facilitate and appropriately balance and reconcile a range of diverse objectives associated with the use of Digital Infrastructure in the City of Toronto. It should be read as a whole to understand its comprehensive and integrative intent as a framework for priority setting and decision making. Objectives within the DISF should not be read in isolation or to the exclusion of other relevant objectives. When more than one objective is relevant, all appropriate objectives should be considered in each situation. To move Toronto closer to the future envisioned in the DISF, all decisions involving Digital Infrastructure should align with the objectives within, regardless of scope or budget.

Implementation of the DISF is intended to complement existing policies and processes (e.g. purchasing, cyber security). The Chief Technology Officer will lead the implementation of the DISF and evaluation of all Digital Infrastructure Initiatives on a case by case

basis, with the objective of maximizing opportunities for alignment with the DISF. Further Monitoring and Performance Measurement details are included in Chapter 7.

The DISF is envisioned as a “living document” that is intended to remain flexible. Updates may be needed from time to time as the use and nature of technology evolves, as changes take place within the City, as community values shift, or as the DISF itself matures. Any substantive changes to the DISF would be addressed in a report to City Council and subject to the Consultation and Participation considerations provided in the DISF itself.







1. PRINCIPLE: EQUITY & INCLUSION

VISION: Digital Infrastructure will be used to create and sustain equity, inclusion, accessibility, and human rights in its operations and outcomes. Digital Infrastructure will be flexible, adaptable and human-centred, responding to the needs of all Torontonians, including Indigenous, Black, equity-deserving groups, and those with accessibility needs.

This principle describes how the City of Toronto will ensure that people can feel safe and secure when accessing digital City services (apps, web pages, bill payments, reservations, online permits, etc.) and have equitable access to digital City services. All residents, businesses and visitors are entitled to respect and fairness online, benefitting from digital services and opportunities without discrimination. This principle reflects the City's motto "Diversity, Our Strength" in the development and use of Digital Infrastructure.

Equity in the context of Digital Infrastructure is vital: access to digital tools and services is directly linked to life opportunities, well-being and freedom. The benefits of digitization have not been equally distributed and particular communities continue to experience disproportionate barriers to access and participation which has led to a digital divide. Digital equity requires an understanding of barriers (such as algorithmic biases) facing Indigenous, Black and equity-deserving groups, including those with accessibility needs, as well as strategies to ensure that those groups are able to trust, participate and fully leverage the benefits of online digital services and technology. Digital Infrastructure is not neutral and has historically had harmful impacts on some communities. Achieving equity in the digital realm requires intentional strategies and investments to reduce and eliminate barriers to access and accessibility of services and technology.

1.1. Strategic Priority: Digital Inclusion and Human Rights

Objective

Digital Infrastructure in the City fosters inclusion, and is free from systemic barriers, bias, and discrimination.

Overview

Identifying and removing systemic barriers to the full participation of diverse communities in the digital realm is key to creating equitable access to services and programs for residents and visitors. This need was emphasized even more so by the COVID-19 pandemic. The City will strive to approach Digital Infrastructure using an equity lens with the goal of fostering inclusion and addressing

and removing systemic barriers, bias, discrimination and existing inequities.

Emerging Issues

The “digital divide” is a term that references the gap between those who can access and make full use of information communication technologies and those who cannot. This divide exists due to barriers such as internet affordability, device access, digital accessibility and digital literacy. Other barriers that disproportionately affect equity-deserving communities must also be considered. For example, some older residents may have low levels of confidence using technology, which can lead to them feeling uncomfortable, distrustful or overwhelmed in the digital realm.

Collecting socio-demographic data can be useful to understanding and addressing systemic discrimination and inequities in program delivery. However, it is important to recognize that some residents may be hesitant or unwilling to provide this information (or to use Digital Infrastructure and digital services), especially if they are required to provide personal information.

Implementation Considerations

1. Design, develop, procure, implement, and evaluate Digital Infrastructure using equity as a lens, emphasizing human dignity, independence, human rights, and ethical digital service standards, with the goal of identifying and removing or mitigating bias and discrimination
2. Identify and address systemic barriers that can restrict the full participation of Toronto’s diverse communities in the digital realm

3. Support digital inclusion by strengthening residents' ability and confidence to utilize digital services through initiatives which improve digital literacy, awareness and skills
4. Engage, educate and train staff—and the broader public—on the value of collecting socio-demographic/personal information in a standardized way

1.2. Strategic Priority: Accessible Digital Infrastructure

Objective

All digital City services, products, and information are accessible to people with disabilities.

Overview

Toronto is committed to ensuring all people can access all City services, products, and information. This includes providing an accessible digital environment where people can access the City's web-based services, information and communications in a way that meets their individual needs (hearing, visual, physical, cognitive, learning, etc.). The City is committed to the identification, removal and prevention of accessibility barriers, and must incorporate accessibility criteria when developing websites, content and applications as well as when procuring goods, services or facilities. Accessibility and usability are achieved through the combination of several factors, and not simply about complying with a policy (for example, user testing, consultation with people with disabilities and lived experience).

DATA FOR EQUITY

The Data for Equity Strategy provides City divisions with guidance to support the collection and use of disaggregated population and place-based data to identify, monitor and address inequities in City services. It is anticipated that the strategy will reduce inequities by helping the City identify gaps, reduce or remove systemic barriers, and improve City service access and impacts for Indigenous, Black, and equity-deserving communities.

Emerging Issues

As more City services are made available in digital formats, it is essential that people's ability to access them is not limited or made more challenging. The COVID-19 pandemic has had disproportionate impacts on and consequences for Indigenous, Black and equity deserving communities including people with disabilities. It is essential to ensure people with disabilities continue to receive equitable service delivery and supports.

Implementation Considerations

1. Ensure that all City digital services and infrastructure, including websites and web applications, digital kiosks and apps are accessible and usable

2. Through training, guidelines and other similar means, ensure that staff are familiar with, and know how to use all available accessibility features that are integrated into enterprise software (closed captioning, keyboard navigations, etc.)
3. Integrate accessibility and usability testing from a diverse range of users (skills and lived experience of disability) in new Digital Infrastructure Initiatives
4. Work with community and external entities to develop and integrate accessibility functions into materials and products where this has historically been challenging (maps, geospatial data, dashboards, etc.)

1.3. Strategic Priority: Human-Centred Digital Infrastructure

Objective

Digital Infrastructure, including digital services, are intuitive and easy to use by everyone.



PROCUREMENT OF ACCESSIBLE GOODS, SERVICES AND FACILITIES

As required by the Accessibility for Ontarians with Disability Act, 2005 (AODA), the City must incorporate accessibility criteria and features when acquiring or procuring goods, services, and facilities. This is done as early as possible in the procurement process to ensure that Digital Infrastructure is compliant with the AODA. Incorporating accessibility requirements into Digital Infrastructure procurements will ensure that all people can use and access City services, products, and information.

Overview

For digital services to be successful, their design and user-experience must be driven by a fundamental understanding of user needs. The Toronto Public Service and businesses are users too, and to succeed, Digital Infrastructure must also respond to their needs. A helpful approach in responding to residents needs is a human-centered approach to design. This approach requires an understanding of people in the full context of their lives, and considers a range of perspectives, including from childhood through to old age. It also helps ensure that Digital Infrastructure is sensitive to the privacy and access rights of people with diverse backgrounds and abilities.

Emerging Issues

To ensure that everyone can navigate Toronto's Digital Infrastructure with confidence and in a self-determined manner, it is necessary to understand people's varied needs and experiences—including historically and systemically marginalized people and those for whom English is a second or third language. This can be achieved by involving representative users in the design of products and services, when developing new digital services through meaningful engagement and iterative design (i.e. during design, development, procurement, implementation, and evaluation). This process should also apply to existing Digital Infrastructure, such as the City's website, to ensure it evolves and remains consistent with community preferences.

Implementation Considerations

1. Pursue a human-centred approach to designing, developing, procuring and implementing Digital Infrastructure and services, based on user needs and preferences identified through research and consultation
2. Ensure that end users are involved at all stages, including design, development, procurement, implementation, and evaluation
3. Ensure that continued access to non-digital public services remains available to people who cannot or choose not to access digital services
4. Ensure people can access digital services in a language and format they understand and that meets their needs
5. Enable users to access digital public services through different channels, devices and platforms, including the ability to switch

CUSTOMER EXPERIENCE TRANSFORMATION

The Customer Experience Transformation program conducts customer experience research to understand people, their context, and their experiences in order to design policies, programs, products and services best suited to their needs. This uses methods such as interviews, workshops, and usability testing of new or improved services. The Inclusive Customer Experience Research Guide provides guidance and resources to ensure that customer experience research is thorough, appropriate and inclusive.

between different channels throughout the user journey

6. Foster a consistent and predictable user-experience for City digital services that is intuitive, simple, trustworthy, and that responds to and evolves with citizens' digital preferences

1.4. Strategic Priority: Connectivity and Digital Equity

Objective

Residents and businesses have access to affordable and reliable high-speed internet and internet-enabled devices.

Overview

Affordable and reliable internet connectivity is essential for

people's ability to perform the basic activities of daily living, to meaningfully participate in economic, educational, and cultural activities, to enjoy a better quality of life, and to access online City services. Internet service options for residents and businesses vary throughout the city, both in terms of quality and pricing. This includes free public Wi-Fi, which is available at most Civic Centres, some recreation centres, all Toronto Public Libraries, TTC subway stations, as well as on some TTC bus routes.

Emerging Issues

As daily life increasingly requires connectivity, Toronto's residents, visitors and businesses must be able to access and use the internet to its full potential. However, infrastructure gaps and other factors related to the digital divide, including the rising costs of living in Toronto, prevent many from fully benefiting from connectivity. The persistence of access and affordability barriers is an indicator of underlying social equity issues. The City is uniquely positioned to leverage public assets for the provision of affordable internet access and doing this will require a commitment to advancing digital equity as a foundation for future prosperity.

Implementation Considerations

1. Consider strategic and operational policies which could coordinate, centralize, and administer the deployment of City owned fibre infrastructure
2. Explore connecting City buildings, facilities, and public spaces through a City owned, high-capacity fibre broadband network
3. Collaborate with private Internet Service Providers (ISPs) and

ConnectTO

ConnectTO is a collaborative program aimed to centralize stewardship of municipal resources and assets to deliver on the City's equity and connectivity goals, This includes expanding free public Wi-Fi and longer-term, creating a City-owned high-speed Municipal Broadband Network to support municipal services; connect City-owned facilities and assets; be accessible for Internet Service Providers; and help ensure equitable access to broadband internet for residents regardless of their financial means or circumstances.

community-led initiatives to provide affordable, high-quality internet services to residences and businesses

4. Consider initiatives that would ensure that Indigenous, Black, equity-deserving groups, and those with accessibility needs have access to affordable high speed internet connectivity and modern and reliable internet-enabled devices
5. Support the expansion of full fibre and 5G, using public assets to stimulate infrastructure investment, with a focus on communities experiencing the digital divide the most



Photo by Aditya Chinchure, January 26, 2021



2. PRINCIPLE: A WELL RUN CITY

VISION: Digital Infrastructure will enable high quality, resilient and innovative public services, and support the use of data and evidence to inform decision-making.

A well-run City depends on evidence-based decisions and new insights to inform recommendations, guide decisions and ultimately enable better outcomes. Introducing more online interaction, paperless services, better access to data, and shared services can help create efficiencies and ensure public resources are better allocated. Resilience can enable the public service - and the City's Digital Infrastructure - to survive, adapt, thrive and ensure business continuity in the face of the chronic stresses and acute shocks that may arise. Tangible outcomes for residents, business and visitors may include faster service delivery, enhanced quality-of-life, and a government that works in deep collaboration with the people it represents to advance an agenda of fairness and prosperity for everyone.

2.1. Strategic Priority: Digital Transformation

Objective

City services, programs, and processes use Digital Infrastructure, when appropriate, to evolve and transform by understanding and anticipating public needs and expectations.

Overview

Technological evolution, cost efficiencies, customer expectations and increased comfort level for digital experiences are key drivers of digital transformation. Digital transformation is an ongoing process in which manual and legacy systems are enhanced or replaced with digital ones in order to enable greater efficiency and sustainability, faster service delivery, new capabilities, and better customer experience.

Emerging Issues

Digital transformation initiatives can be slow, costly, and sometimes fail to achieve the objectives they are intended to accomplish. Importantly, digital transformation does not in and of itself improve existing processes. Without evaluating and refining existing business processes, there is a risk that digital transformation will exacerbate existing issues by adding a digital layer to outdated or inefficient processes.

311 TORONTO MODERNIZATION

311 Toronto provides access for residents, visitors and businesses to create and track a service request, find information about City services or programs, and to search for service requests in their neighbourhoods. The enhanced 311 Toronto service experience, available through multiple platforms including a mobile app, includes online self-serve submissions for approximately 600 service requests, start to finish tracking, real-time status updates, live online chat, and an expanded Knowledge Base.

Implementation Considerations

1. Review and refine existing uses of Digital Infrastructure to improve how needs are met
2. Use agile product management and other iterative methods in order to prototype, test, understand and evaluate the need for Digital Infrastructure Initiatives
3. Clearly define the need for the proposed use of new Digital Infrastructure in relation to a municipal service or public interest objective before scaling up
4. Demonstrate that the proposed use of new Digital Infrastructure is effective at addressing the defined need for transformation
5. Identify and capitalize on opportunities to review, refine, integrate, and align City business processes and policies that relate to digital transformation

6. Work to increase the proportion of services that are available digitally, where appropriate
7. Ensure that any moves towards digital transformation, service improvement, or efficiencies do not compromise public accessibility and privacy
8. Consider the provision and accessibility of alternative, non-digital service channels as part of all digital transformation initiatives

2.2. Strategic Priority: Data Governance

Objective

A data governance framework and clear data management standards ensure that data is protected, accessible, and useable, and facilitates evidence-based decision-making, organizational efficiency, and improved service delivery.

Overview

Data can provide deep insight into how the city functions, and cities have an ever-increasing need for accessing data: for developing new policies, managing traffic, zoning and planning, enforcing regulations and monitoring environmental conditions. Better quality and real-time data can improve urban planning, support local decisions and result in more user-friendly services. Data can also play a transformational role in increasing transparency, supporting communities, identifying gaps and barriers, transforming products and services, and driving innovation. The more data that is collected, the more important it becomes to direct its collection and use in a coordinated and systematic way. To deliver high-quality, integrated

City services, data must often be collected, shared, and integrated across multiple agencies for operational use, analysis,

and evaluation. This is driven by the availability of smart, secure, reliable, up-to-date, and resilient Digital Infrastructure.

Emerging Issues

The increasing use of Digital Infrastructure is leading to more data, of more variety, being collected faster than ever before. In order to protect the security and integrity of this data, maximize its potential value, and embed equity considerations, the City requires a data governance framework, recognizing and supplementing existing information and records management policies, that will control how and why data is collected, used, managed, and shared by the City. This is especially crucial to uphold public trust and confidence in the government's collection and use of data and personal information, and for ensuring the City collects as little sensitive information as possible in order to maximize the benefit to the public.

Implementation Considerations

1. Make better, context-driven use of data across the public service to enable transformation, improve decision-making and improve liveability
2. Develop robust data governance mechanisms for all City data, including appropriate levels of human oversight when necessary, to ensure City data is used in an ethical manner, is managed responsibly through its lifecycle, and prevents the risks of abuse or malicious practices
3. Maintain high quality City data standards with complementary

metadata so it is clear where the data comes from, how it was collected and how it can be searched, shared and retrieved

4. Periodically review and assess data the City collects to ensure it is relevant, required for authorized purposes, and in alignment with the City's policy and equity goals and priorities
5. Identify possibilities for greater data integration, analysis, and performance management at the City as legacy technology systems are upgraded
6. Establish and align City data governance and privacy frameworks with those being established by the federal and provincial governments, as appropriate
7. Invest in City data infrastructure, and improve data sharing and integration capabilities across City divisions and regional jurisdictions in an appropriate manner
8. Provide City service users with assurance and transparency that their data is being used effectively for public benefit, efficiently and securely to deliver high quality public services

2.3. Strategic Priority: Asset Management

Objective

Digital Infrastructure assets used by the City of Toronto are governed by a regulatory framework that protects the public interest.

Overview

The City owns and operates Digital Infrastructure assets, including information technology assets and infrastructure (such as computers, servers, software, and networks) as well as sensors, data analytics, and internet-connected smart infrastructure for a variety of purposes

such as providing services, collecting data, and carrying out essential processes. Deploying smart technology effectively has the potential to further improve the City's understanding of its assets, making it possible to plan more effectively, track variations, reduce energy use and even save money. These assets are governed by corporate and technology asset management policies established in accordance with provincial guidelines and best practices.

Emerging Issues

Existing asset management policies may need to be reviewed and updated to align with emerging types and uses of Digital Infrastructure. There is currently limited City regulation of emerging Digital Infrastructure, which may expose the City and Torontonians to risks. The use of sensor technology requires coordination of deployments, greater attention to interoperability (that is, the ability for systems or devices to communicate or exchange information with each other), and a mature process of data governance.

Implementation Considerations

1. Define a clear purpose for sensor technology to improve asset management, quality of life, and meet environmental targets
2. Centralize the approach to sensing devices, including requirements for review, interoperability, open data, coordination of deployments, and decommissioning of obsolete sensors
3. Institute comprehensive review procedures for sensors that emphasize greater inter-divisional collaboration and sharing of historical and real-time data while ensuring compliance with cybersecurity and privacy policies

4. Review and update information technology and corporate asset management policies to align with emerging information about sensors and other City-owned Digital Infrastructure assets in the public realm.

2.4. Strategic Priority: Toronto Public Service Digital Literacy and Adoption

Objective

The Toronto Public Service has the knowledge, skills, and ability to understand, use, and govern Digital Infrastructure effectively.

Overview

Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information. For most people, a foundational level of digital and media literacy is critical for social, civic, and economic participation. In the workplace, the ability to use technological tools to process work, solve problems, and understand digital content is increasingly essential. Having a workforce with digital and data literacy skills is also an essential component of digital transformation and digital adoption.

Digital adoption is a change and involves a learning process where individuals accept and use new digital resources in the way that they are intended. Digital transformation cannot succeed without digital adoption.

Emerging Issues

The City of Toronto offers a variety of learning and training opportunities for its employees, including content pertaining to digital literacy, cybersecurity and privacy. There is an emerging need for public servants who have specialized knowledge and skills related to Digital Infrastructure. Employees with these skills will assist digital adoption, technology standardization and alignment efforts, improve public engagement and the quality of digital transformation efforts, and build digital autonomy.

Implementation Considerations

1. Identify competencies and develop training resources to inform a data and digital literacy strategy to enable greater digital adoption and transformation within the Toronto Public Service
2. Ensure that new digital transformation initiatives are accompanied by appropriate digital literacy training and upskilling
3. Develop policies to support a workplace culture that promotes a healthy and appropriate use of digital technologies and work-life balance
4. Support media literacy and develop capacity to respond to misuse and misrepresentations of City data
5. Foster the digital capacity of City staff to develop or deploy digital solutions in a secure cloud infrastructure for City services

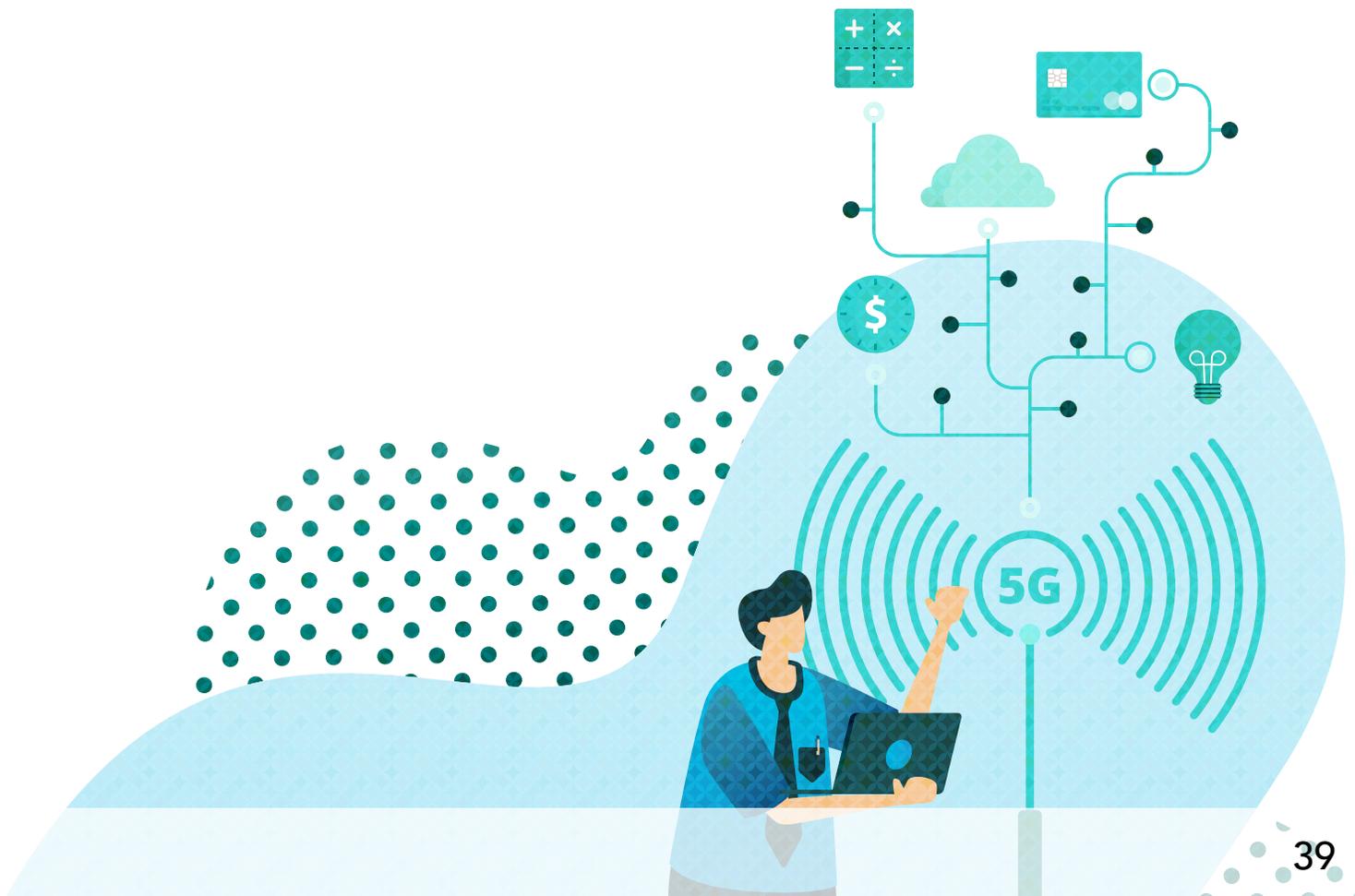
2.5. Strategic Priority: Collaboration

Objective

Digital Infrastructure and transformation is enabled by collaboration between City divisions, City agencies, and City corporations, the private sector and community groups, different levels of government, and municipalities across Canada and around the world.

Overview

In the search for new ways to address complex challenges, there is a growing recognition that the City can help drive solutions by collaborating across divisions, agencies and corporations as well as across sectors and regions. A city with engaged and



informed residents and business sector will attract greater levels of involvement and investment from other levels of government.

The City is a member of several working groups, roundtables, and coalitions engaging with municipal, regional, provincial, and federal government agencies, and regularly engages with the academic, civic, and private sectors.

Emerging Issues

It is important for the City to work across organizational silos and organizations, leverage existing relationships, and develop new arrangements to tackle policy approaches and coordinate cross-boundary matters. The policy and regulatory landscape for Digital Infrastructure is rapidly evolving and requires ongoing engagement with all levels of government.

Implementation Considerations

1. Establish forums to coordinate the refinement and implementation of policies that pertain to Digital Infrastructure, including the Digital Infrastructure Strategic Framework itself
2. Establish and maintain a forum to coordinate technology leadership and strategy and share solutions across City divisions, agencies, and corporations
3. Collaborate with intergovernmental, regional, and cross-sectoral entities, and Higher Education Institutions to align standards, address Digital Infrastructure challenges, and coordinate cross-boundary matters

4. Coordinate with other municipalities to share lessons, expertise, and resources on building and maintaining a common open source Digital Infrastructure
5. Collaborate with provincial and federal governments to interpret how existing or emerging legal frameworks and regulations will apply to Digital Infrastructure Initiatives
6. Support the development of an interconnected strategy with neighbouring municipalities and other levels of government to bolster resilience to shocks and stresses
7. Engage the local civic tech community and domestic innovators to brainstorm, co-develop, pilot or test digital solutions

CITIES COALITION FOR DIGITAL RIGHTS

The Cities Coalition for Digital Rights represents over 50 cities from around the world that promote and defend the digital rights of citizens, residents and visitors in cities and urban environments to ensure fair, inclusive, accessible and affordable non-discriminatory digital environments. Toronto is a core member of the Cities Coalition for Digital Rights, which it joined as a member in 2019.





3. PRINCIPLE: SOCIETY, ECONOMY & THE ENVIRONMENT

VISION: Digital Infrastructure will enhance quality of life for Torontonians, support economic prosperity, and advance environmental sustainability, while also avoiding potential harms that could result from its use.

This principle is focused on leveraging Digital Infrastructure to support equitable and inclusive benefits whether for social, economic or environmental prosperity. In this process, it is essential that potential harms and negative consequences that can arise through the use of technology are avoided. Examples of such harms include: the exclusion of residents who may not be able to afford residential internet connection from digital services; privacy violations; errors, malfunctions or hacks resulting in data leaks or security breaches; and inaccessible digital services resulting in exclusion or discrimination.

3.1. Strategic Priority: Society

Objective

Digital Infrastructure creates positive outcomes for residents as well as society as a whole, including the sustainment of healthy and vibrant connected communities.

Overview

Digital Infrastructure can be an enabler of rights and freedoms, allowing people to reach out beyond geographic regions and social structures, creating new possibilities to learn, have fun, interact, work, and express creativity. It is also an essential component of crisis management when our critical systems are under unprecedented pressure (healthcare, social services, communication etc.). However, Digital Infrastructure also has the potential to reinforce social vulnerabilities and broader inequities. It is therefore essential that Digital Infrastructure does not harm, but rather contributes positively to individuals and society to the greatest extent possible. Some examples include non-discriminatory access to digital City services; the protection of data of minors collected by the City; and the ethical use of algorithms and automated decision-making by the City.

Emerging Issues

Digital Infrastructure is increasingly being integrated into everyday objects, such as wayfinding kiosks, benches, bicycling infrastructure, and playgrounds. These types of digital interactivity have the potential to create newfound interest in everyday interactions, which

at a broader scale, can lead to new types of creative expression, social interaction, and animation of the public realm. However, all uses of Digital Infrastructure must be equitable, secure, resilient, and operate in a way that protects people's privacy.

Implementation Considerations

1. Use City Digital Infrastructure to modernize services, and improve convenience for residents and businesses
2. Support community entities to help protect everyone, especially children, youth, and seniors, from malicious cyber activity such as cyber bullying, cybercrime, online hate, mobbing or grooming that may be enabled through the use of Digital Infrastructure or through digital City services
3. Support a workplace culture in the Toronto Public Service that promotes a healthy and appropriate use of Digital Infrastructure and work-life balance
4. Pursue inclusive and equitable opportunities for Digital Infrastructure Initiatives through community benefits initiatives such as the City's Social Procurement Program, which aims to create jobs, increase supply chain diversity and drive economic growth
5. Broaden the range of vendors tendering to supply digital services, including more small and medium sized enterprises and diverse suppliers from Indigenous, Black and other equity-deserving communities
6. Support social interaction, creativity and artistic expression through the use of Digital Infrastructure, including interactive digital media and free public Wi-Fi
7. Give consideration to possible unintended social consequences of the use of Digital Infrastructure prior to its adoption and deployment, and develop mitigation strategies as needed

3.2. Strategic Priority: The Economy

Objective

Digital Infrastructure helps create opportunities for economic growth and prosperity, and helps address the impacts of potential disruption that could arise.

Overview

Digital Infrastructure has the potential to bring additional prosperity to Toronto's economy, allowing entrepreneurs to innovate, set up and grow their businesses, and create employment opportunities. The continued success of Toronto's technology, creative and innovation sectors is key to sustaining our economy, while safeguarding social and environmental wellbeing.



Emerging Issues

Digital Infrastructure has the capacity to disrupt markets and revolutionise industries. The City has a role to play in considering and proactively addressing the potential impacts of disruption caused by Digital Infrastructure on the local economy. The City also has a direct role in ensuring potential economic benefits of Digital Infrastructure Initiatives do not overshadow the consideration of social or environmental benefits.

Implementation Considerations

1. Support domestic business to adapt and be successful in the digital economy and the City's digital transformation process, including the provision of targeted outreach and education about the City's procurement processes for Digital Infrastructure
2. Identify and develop strategies to address systemic barriers to digital economic initiatives for Indigenous, Black and equity-deserving groups
3. Consider the role that Digital Infrastructure can play in creating local jobs and attracting investment
4. Stimulate innovation through the provision of secure and affordable spaces for testing and experimenting with Digital Infrastructure (i.e. innovation zones)
5. Collaborate with regional entities, businesses, not-for-profit organizations, and Higher Education Institutions to build capacity and skills, secure investment, and establish research relationships and innovation opportunities
6. Set open calls to the tech sector to help solve City challenges in a manner that is transparent, accessible, ethical, and responsible

7. Provide opportunities for domestic companies to showcase their technologies (for example through demonstration days, roundtables, or forums)

3.3. Strategic Priority: The Environment

Objective

Digital Infrastructure helps the City meet climate change targets and avoid harmful environmental impacts, including those associated with Digital Infrastructure themselves.

Overview

Climate change is a defining challenge of our time. Digital Infrastructure has the potential to significantly contribute to reduced emissions, and help in the transition to a climate-neutral, circular and more resilient economy. However, Digital Infrastructure also has the potential to result in harmful environmental impacts. For example, data centres consume substantially more energy than standard office spaces. There is a need to critically examine the impact of greenhouse gas emissions and high intensity use of fossil fuel sourced energy, and the accumulation of obsolete hardware.

Emerging Issues

Decisions related to new Digital Infrastructure Initiatives—including sustainable procurements—need to consider the environmental impact through their lifecycle: will products be repurposed, reused, or recycled, or will they end up in landfill? Will any additional waste be generated? Does the Digital Infrastructure Initiative support the efficient use of City assets and resources?

TRANSPORTATION INNOVATION ZONES

The City supports domestic economic development in Toronto's vibrant start-up sector. As a testbed for domestic innovation, the City has established a Transportation Innovation Zone (TIZ) at Exhibition Place to learn about emerging transportation technologies and approaches and how they could meet some of Toronto's transportation needs. The program facilitates trials by industry and academic actors in the real-world environment of Toronto's streets.

Implementation Considerations

1. Refer to Toronto's climate action strategy, TransformTO, and other initiatives such as the CIO Strategy Council Sustainable IT Pledge for guidance on how to reduce local greenhouse gas emissions and improve our health, grow our economy, and improve social equity
2. Measure, track and report the energy use and environmental impacts of Digital Infrastructure throughout its full lifecycle
3. Pursue Digital Infrastructure that is sustainable, such as including renewable energy and recovery of waste heat from Digital Infrastructure, having a small environmental footprint, and higher energy and material efficiency

4. Extend the service life of devices and equipment through sharing, reusing, repairing, refurbishing and recycling materials and products
5. Identify opportunities to implement circular procurements in Digital Infrastructure Initiatives using the City's Circular Economy Procurement Implementation Plan and Framework
6. Use Digital Infrastructure to raise community awareness of key environmental issues in order to generate greater commitment to climate change targets

CIRCULAR ECONOMY

A circular economy becomes increasingly important as resources become scarce and land degradation persists: extraction of raw materials and use of rare-earth metals are examples of the ecological toll imposed by the short lifespan of digital infrastructure. The City's Circular Economy Procurement Implementation Plan and Framework guides how circular principles can reduce waste, enhance social outcomes, and drive cost savings and the efficient use of City resources.





4. PRINCIPLE: PRIVACY & SECURITY

VISION: Toronto will uphold human dignity, autonomy and safety by limiting the collection of personal information, implementing safeguards that uphold privacy rights, and protecting Digital Infrastructure from misuse, hacks, theft or breaches.

Many public services are now deeply reliant on Digital Infrastructure. The ensuing interconnectedness between City and external systems and data places greater focus on privacy, integrity, safety, security and resilience. This increasing reliance on Digital Infrastructure brings with it an increased potential for vulnerabilities that could lead to cybersecurity attack, privacy breach, data loss, failure, or disruption. Toronto's Digital Infrastructure requires a "by-design" approach (Privacy-, Security-, and Access- by-Design¹) to ensure that the benefits created are not overshadowed by the privacy and security risks that may be created.

¹ See Appendix 2 for additional information about these approaches

- Privacy-by-Design advances the view that the future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance and embedding privacy practices from conception to realization must ideally become an organization’s default mode of operation.
- Security-by-Design advances the view that properly implemented security processes and technology can enable and protect activities and assets of both people and enterprises.

In recognition that legislation is sometimes slow to keep pace with emerging technology trends, a continual process of review is needed to ensure policies and standards remain current. This will ultimately help maintain the integrity of the City’s information, so that it is open, trustworthy, and accessible. Adhering to well-established best practices can also support privacy and security objectives.

4.1. Strategic Priority: Consent & Authorized Collection & Use of Information

Objective

Residents are informed when information about them is collected or used for a municipal purpose.

Overview

The City may collect, use or disclose personal information only when it has confirmed it is necessary for a legally authorized purpose. Often, the City will provide transparency about the collection

of personal information by providing a “Notice of Collection” statement. This statement details the law that authorizes the collection, an explicitly specified and legitimate purpose for which it will be used, and business contact information for City staff who can answer questions about collection, use and disclosure of the information. Collection, Use and Disclosure of personal information and personal health information must comply with the provisions of the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA) and the Personal Health Information Protection Act (PHIPA). In addition, private sector organizations are subject to federal privacy legislation that they are required to be in compliance with.

Emerging Issues

Residents are increasingly subject to data collection by the City, including by City-owned and operated Digital Infrastructure in the public realm. This presents a number of privacy and security risks. Opportunities to solve civic problems through data sharing also present challenges related to consent and use of data.

Implementation Considerations

1. Ensure that residents are informed when data is collected by the City, and of what safeguards are in place to protect their confidentiality and data
2. Ensure that data collection notices explicitly state which City divisions, agencies or corporations will have access to data
3. Establish expectations, standards and processes regarding authorized collection and use of information for the City, including in scenarios which rely on “implied consent”

4. Ensure that vendors doing business with the City are aware of and in compliance with privacy laws applicable to them
5. Carry out education campaigns to enhance awareness of the responsibilities of public sector and private sector entities regarding the collection and use of personal information
6. Ensure that the City's Digital Infrastructure does not knowingly collect youth data without verifiable parental or guardian consent

4.2. Strategic Priority: Privacy

Objective

Privacy risks presented by the use of City Digital Infrastructure are identified, mitigated and clearly communicated.

Overview

Privacy plays a key role in a free, democratic society and is an essential element in maintaining public trust in government. Protecting the information of Toronto's residents, businesses and visitors and maintaining their trust in doing so is key to protecting dignity and autonomy. The City has well-established guidelines to protect personal information it collects, while federal law governs information collected by private entities. The City also has standard contractual provisions as it relates to the City's obligations under MFIPPA and PHIPA in its contracts with vendors for goods and services procured through a competitive process and negotiates for the inclusion of such provisions in its contracts with vendors for goods and services procured through a non-competitive process.

Emerging Issues

New types and forms of Digital Infrastructure implemented by the City can lead to increased concerns about privacy, particularly by members of the public. Privacy policies and procedures must be updated and strengthened to maintain trust and confidence in digital services.

Implementation Considerations

1. Design, develop, procure, implement and evaluate all Digital Infrastructure with Privacy-by-Design principles incorporated
2. Minimize the collection of personal information, and allow individuals to opt-out of automated systems of data collection
3. Review existing privacy policies and procedures to detect, assess, manage, mitigate, and respond to risks presented by Digital Infrastructure
4. Establish and publicly communicate City standards for privacy risk assessment and mitigation
5. Ensure that Torontonians know and understand their privacy rights and data subject rights, and can better control the use of their information
6. Establish and publicly communicate City standards for de-identifying or anonymizing personal data
7. Ensure the City's compliance with MFIPPA and PHIPA when contracting with private sector organizations to carry out activities that involve the collection, use or disclosure of personal information
8. Strengthen the culture of 'privacy awareness' within the Toronto Public Service, ensuring staff are aware of privacy policies, procedures and responsibilities

9. Implement mechanisms to proactively address concerns about the potential misuse of data by fulfilling individuals' rights to access, review and correct their data

4.3. Strategic Priority: Data Residency in Canada

Objective

Data residency requirements are applied on new City Digital Infrastructure Initiatives, where appropriate, to enhance privacy and security.

Overview

As more City services are made available online and information is stored digitally, cloud-based solutions are becoming more frequent. Many cloud-based solutions are located outside of Canadian borders.

Emerging Issues

If data is stored, in transit, or in use outside of Canada, the City may not be able to apply Canadian laws and regulations that protect it from being improperly used. Data residency requirements can help ensure that public data remains subject to Canadian privacy and data protection regulations, and that Canadian regulations will govern any disputes with cloud-based service providers. While cloud service providers are increasingly providing options to store data in Canada, data residency requirements may also limit the ability of the City to engage some vendors and rapidly modernize.

PRIVACY IMPACT ASSESSMENT

One way to operationalize Privacy-by-Design is to carry out a Privacy Impact Assessment (PIA), which is an in-depth review and analysis of a project, program, technology system, and/or process and is intended to identify and resolve privacy risks throughout the design or redesign of a technology, system, program or service. The City of Toronto conducts PIAs regularly when considering new technologies or programs.

Implementation Considerations

1. Establish a clear framework for determining when and how to apply data residency requirements
2. Ensure that the design, development, procurement, and implementation of Digital Infrastructure considers the issue of data residency at the outset
3. Ensure that options for cloud-based solutions consider service providers based in, or with facilities located in, Canada

4.4. Strategic Priority: Cybersecurity

Objective

Cybersecurity risks presented by the use of Digital Infrastructure

are identified and mitigated, building cyber resilience and trust in the protection of data and digital assets.

Overview

Cybersecurity is the ongoing practice of ensuring the City's Digital Infrastructure is adequately protected from threats, vulnerabilities, and risks. The possibility of cyberattack must be anticipated, assessed, and mitigated by the City proactively and on a regularly scheduled basis. This is essential to deliver quality and secure interactions between components within the City's digital realm (people, process and technology).

Cyber resilience is key to operational resilience and business continuity, as well as the City's capacity to grow and flourish



with digital transformation. It ensures that the City can continue delivering services in the event of a cyber incident. Efforts to build cyber resilience are critical to both surviving and even thriving in the face of cyberattacks or physical disasters.

Emerging Issues

The City of Toronto is faced with rising incidences and severity of cybersecurity risks and threats. Data protection and cybersecurity policies and procedures must be continually updated and strengthened to maintain trust, and respond to the rapidly changing nature of technology and associated risks.

Implementation Considerations

1. Ensure security-by-design principles are used to design, develop, procure, implement, and evaluate all Digital Infrastructure
2. Design, develop, procure, implement, and evaluate the City's Digital Infrastructure in alignment with the City's Corporate Cyber Security Policy
3. Embed authentication processes into Digital Infrastructure to limit fraud and cybercrime
4. Continuously detect, assess, manage, and mitigate cybersecurity risks emerging from evolving Digital Infrastructure in order to foster trust in the City's digital services and confidence in local government
5. Protect the integrity and security of all data collected by the City of Toronto

6. Ensure appropriate auditing, logging, monitoring, and access control are built into all aspects of the City's Digital Infrastructure
7. Establish and maintain the secure configuration of internet-connected Digital Infrastructure, including sensors
8. Ensure encryption of any City data that contains personal information whether in transit, at rest (i.e. in storage), or in use
9. Strengthen a culture of cybersecurity awareness within the Toronto Public Service, ensuring staff are aware of appropriate policies, procedures and responsibilities

4.5. Strategic Priority: Digital Identity and Access

Objective

Digital identity solutions enable digital inclusion and improve user experience while ensuring privacy, security, and democratic control.

Overview

Digital identity is a fundamental component of cybersecurity that manages user digital identities (such as accounts) and their access within an organization. A Digital identity program can:

- help identify risks within programs, processes and projects
- validate the secure usage of City services, assets, and business applications, and
- limit unauthorized access and data breaches within the City.

The federal and provincial governments are also in the process of developing digital identity programs.

Emerging Issues

Digital identity solutions may increase the risk of digital exclusion, undue surveillance, and overreliance on vendors or third parties.

Implementation Considerations

1. Promote an understanding of digital identity within the City
2. Carry out public engagement and consultation to understand if and how digital identity solutions meet resident needs and impact accessibility and trust
3. Identify a framework to evaluate and monitor the privacy and security impacts of utilizing digital identity
4. Ensure digital identity requirements, if any are established, address specific business needs to achieve an intuitive, convenient and seamless user experience
5. Implement ongoing compliance and auditing requirements for all digital identity initiatives at the City
6. Ensure any digital identity requirements are compatible with those being developed by other levels of government.

4.6. Strategic Priority: Surveillance

Objective

Residents are protected from undue surveillance and the risks of intrusion and loss of privacy that may be presented by the use of City Digital Infrastructure.

Overview

The City uses traditional surveillance technology, such as closed-circuit television (CCTV) cameras, for a variety of security and safety purposes. CCTV cameras are installed on some building interiors, particularly where large numbers of people assemble; and on some building exteriors. When the City collects personal information in this manner, it must indicate how it intends to use the information and provide people with the contact information of someone who can answer questions they might have. Typically this notice occurs through signage that is posted in a clear and obvious location.

Emerging Issues

The increasing use of sensors and Digital Infrastructure in the public realm by the City, leads to a greater risk of surveillance. It is increasingly possible to track behaviour or movement without the knowledge or consent of individuals.

Implementation Considerations

1. Review the risks of surveillance presented by the emerging use of Digital Infrastructure by the City
2. Examine and update City policies and procedures regarding surveillance
3. If any risks are presented by Digital Infrastructure, consider the development of guardrails that respond to identified risks to ensure lawful authority, public safety and respect for privacy



Photo by Dan Newman, September 17, 2017



5. PRINCIPLE: DEMOCRACY & TRANSPARENCY

VISION: Decisions about Digital Infrastructure will be made democratically, in a way that is ethical, accountable, transparent, and subject to oversight. Torontonians will be provided with understandable, timely, and accurate information about the technologies in their city, and opportunities to shape the digital domain.

As the closest democratic institution to the people, cities have an important role to play in building trust in digital services and infrastructure that supports our community. This can be done in a variety of ways, including by ensuring that human rights principles of privacy, freedom of expression, and democratic engagement, are incorporated “by design” into the City’s Digital Infrastructure. Approaches such as Access-by-Design² and open government advance the view that government-held information should be made available to the public, and that any exemptions should

² See Appendix 2 for additional information about the Access-by-Design approach

be limited and specific. Access to information enables the public to question the actions of their government and participate meaningfully in policy decisions. Transparency also helps to create a culture of accountability, which in turn can build trust and confidence in digital services.

5.1. Strategic Priority: Consultation and Participation

Objective

Residents and stakeholders have opportunities to participate in the design, development and evaluation of the City's Digital Infrastructure Initiatives through open and transparent processes.

Overview

Toronto's continued growth as an ethical connected community is a collective responsibility. For people to feel confident that digital public services are reliable and can be trusted, the City must engage fully with all sectors and the general public to ensure their interests are considered. Just as public consultation is an important step in building out the City's physical infrastructure, so is it necessary for the development of the City's Digital Infrastructure: residents should have the opportunity to help shape the digital realm and share their ideas, and to express their support or opposition for proposed initiatives. This also includes the involvement of persons who feel anxious about using technology, or find it difficult to keep up with the rapid pace of technological development.

DIGITAL CITIZEN ADVISOR

The City of Toronto operates a Digital Citizen Advisor program, where volunteers can provide input into the development of new or changing digital municipal services. Advisors can participate in a variety of ways including through surveys, focus groups, interactive online consultations, accessibility testing, and one-on-one interviews. The Digital Citizen Advisor program is an example of how residents can participate in the development of the City's Digital Infrastructure.

Emerging Issues

The lack of public involvement in decisions regarding Digital Infrastructure reduces public trust. Decisions around the design, development, procurement, implementation and evaluation of new Digital Infrastructure, or sustainment models for existing Digital Infrastructure, must take an increasing number of factors into account: convenience, accessibility, usability, privacy, security, environmental impact, cost etc. Stakeholders and members of the public should also be involved in this process, particularly when decision-making results in new technology directions for the City, or when substantial financial costs can be expected.

Implementation Considerations

1. Promote community awareness of Digital Infrastructure issues and decisions, through the use of clear, understandable language, and innovative processes to inform the public
2. Establish mechanisms, such as program advisory bodies, with diverse representation, to ensure residents and stakeholders are engaged in the decision-making process in development of the City's Digital Infrastructure
3. Create opportunities for residents and stakeholders to provide meaningful input and ongoing feedback to the user experience, design, development, and evaluation of Digital Infrastructure Initiatives
4. Communicate with local communities and other groups who may be affected by City Digital Infrastructure Initiatives
5. Use "plain language" materials to explain what a City proposed Digital Infrastructure Initiative is, what it can do, why it is being considered, and how it will impact people
6. Conduct ongoing engagement and education on Digital Infrastructure and the DISF itself, so that residents and stakeholders become more familiar with how Digital Infrastructure relates to them

5.2. Strategic Priority: Open Government, Transparency & Access to Information

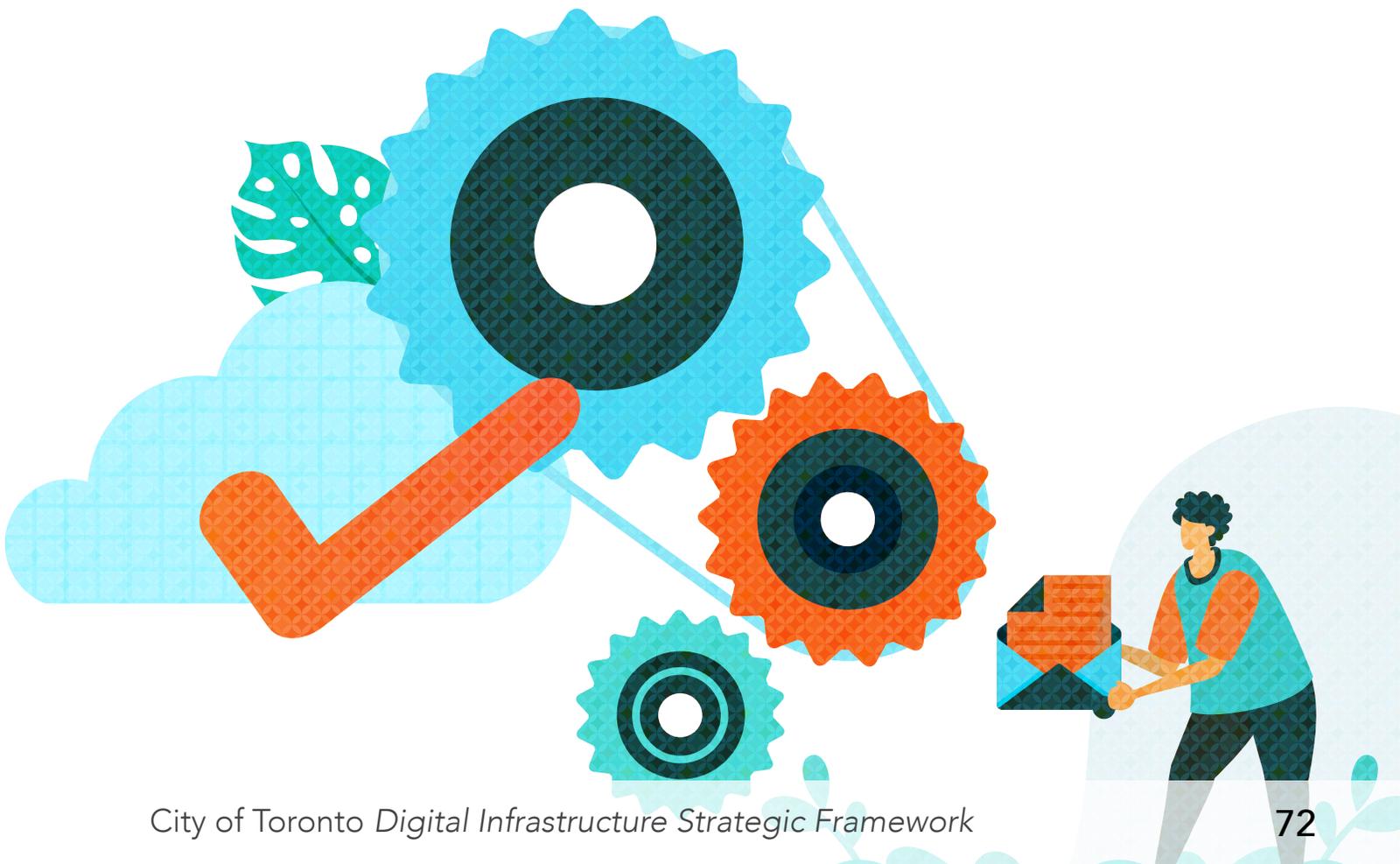
Objective

Residents and stakeholders have access to understandable and accurate information about Digital Infrastructure, and insight into associated decision-making processes.

Overview

Open Government is about improving the delivery of services, making information more accessible and supporting initiatives that build public trust in government. It is guided by principles of transparency, participation, accountability, and accessibility. Ongoing Open Government initiatives include providing open access to all Committee and Council agendas, meetings and decisions and the City's Open Data program.

Open data is data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime and anywhere. When data is made open to the public, new ideas and perspectives can unlock the potential for it to be re-used, analyzed, and correlated to help improve the City's delivery of public services. It can also help with



the engagement of citizens in government decision making, and enable innovation in our approaches to civic problem solving.

City records, including data and information, are shared in multiple ways with the public, including the City's routine disclosure program, the Toronto Archives, the Open Data Catalogue, and through Freedom of Information Requests.

Emerging Issues

In order to build trust in government, the City will continue to pursue open government initiatives. Access to information is not always simple, fast, intuitive, or user-friendly, and information can remain difficult to access. In addition, Toronto's Open Data program requires ongoing support.

As new types of Digital Infrastructure emerge and are deployed, there are more requests for information regarding them. Greater openness and transparency support the goals of public engagement and democratic control over Digital Infrastructure.

Implementation Considerations

1. Ensure that residents can easily access and understand information about the City's Digital Infrastructure: how it operates, and why the decision was made to support its deployment
2. Publish open data about local Digital Infrastructure Initiatives and assets to provide insight and transparency

OPEN DATA

The City of Toronto's award-winning open data program began in 2009 when the City launched its first open data portal to meet growing demand, and was formalized through the Open Data Master Plan in 2018. The Open Data Visualization Portal includes over 400 datasets in spatial, tabular, and other formats and is an example of an initiative to support innovation, and improve transparency, accountability, and open government.

3. Develop tools to make data processing (management methods, risks, guarantees and rights) accessible and understandable to everyone
4. Publish the criteria for, and rationale behind, any decisions that are made to implement a Digital Infrastructure Initiative that has a direct impact on the lives of residents and clients
5. Publish all internal policies and standards related to Digital Infrastructure, except in instances where security, privacy or legal matters would be compromised
6. Develop a public registry of City Digital Infrastructure, in consultation with subject matter experts to reduce City risk

5.3. Strategic Priority: Open Contracting

Objective

City Digital Infrastructure procurement processes and related decisions are open and transparent.

Overview

Open contracting is about the increased disclosure of contracting and procurement processes and decisions related to Digital Infrastructure. This approach will lead to fundamentally better outcomes for the City such as improving competition, driving efficiency, ensuring value for money, and delivering better quality Digital Infrastructure.

Digital Infrastructure is more likely to serve resident needs if they are involved in the process to develop it. Businesses are more likely to bid for tenders if they understand the process. This improves the likelihood of procuring the best Digital Infrastructure products and services, which in turn helps build public trust and confidence, and deliver efficient City services.

Emerging Issues

Open contracting for Digital Infrastructure requires the inclusive and meaningful participation of the public and a wide range of stakeholders. This participation includes building effective mechanisms for engagement, ongoing feedback, and continual process improvement.

Implementation Considerations

1. Ensure the City's Digital Infrastructure procurement processes continue to be fair, open and transparent
2. Continue the disclosure of information related to Digital Infrastructure procurements including the tendering process, awarding of all Digital Infrastructure contracts and review the disclosure of the resulting Digital Infrastructure contracts taking into consideration open data and MFIPPA principles
3. Encourage innovation and data-driven decision making in Digital Infrastructure procurement to drive more effective, expeditious, inclusive and sustainable solutions
4. Develop education and awareness materials for domestic firms on how to navigate the City's procurement process for Digital Infrastructure
5. Conduct ongoing stakeholder engagement to evaluate and refine the City's Digital Infrastructure procurement processes

5.4. Strategic Priority: Algorithmic Transparency and Responsibility

Objective

Algorithms in City Digital Infrastructure are used in a manner that reduces risk, and leads to more efficient, accurate, consistent and interpretable decisions.

Overview

The use of Artificial Intelligence (AI), Automated Decision Making (ADM) and similar technologies to support actions and decisions

are becoming increasingly common. These technologies have the potential to improve efficiency, asset management, and service delivery. However, these technologies are the product of human choices and are therefore prone to human errors, shaped by human biases and directed by human values. This poses concerns for the privacy, rights, dignity and equality of the individuals or communities affected by them. These types of consequences can significantly undermine and damage public trust and confidence in the use of Digital Infrastructure. It is therefore critical that public services which rely on AI or ADM respect the same principles of responsibility, transparency, privacy, and security as all other City services. “Responsible AI” and “Ethical AI” are concepts sometimes used to describe the process of considering issues such as fairness, privacy and security within the design of AI technologies.

Emerging Issues

Algorithms based on historical data can amplify race, class, gender and other inequalities in a negative way. In addition, algorithms trained on datasets with a lack of diversity or representation can impact the accuracy of the systems (e.g. a facial recognition system may be less effective depending on skin colour of the person). Another emerging issue with the use of Artificial Intelligence is that it may not always be possible to easily explain how the system arrived at its predictions or classifications.

Implementation Considerations

1. Establish a process for the responsible, accountable and human-centred development and use of transparent AI and

COVID-19 CHATBOT PILOT

In 2020, the City deployed a 'chat bot' to help process the volume of inquiries related to the COVID-19 pandemic. This chatbot used artificial intelligence to draw answers to over 61,000 questions posed by Torontonians, complementing traditional channels for members of the public to engage with the City, freeing up valuable resources, while integrating human oversight to ensure correct functionality and decision-making. The chatbot was discontinued in October 2021.

ADM, including quality assurance measures for the data, and the AI and ADM technologies, before public use

2. Support transparency by developing a public AI registry, providing understandable and up-to-date information about how AI is used by the City, and how residents may interact with AI
3. Ensure that safeguards are in place to prevent, detect and remedy unlawful discrimination through the use of AI and ADM systems
4. Restrict the use of systems for which potential discrimination cannot be mitigated
5. Establish data governance mechanisms and ensure appropriate oversight over AI and ADM systems used by the City





6. PRINCIPLE: DIGITAL AUTONOMY

VISION: The City will maintain control in the selection, use and design of its Digital Infrastructure, so that it—and its residents—can act with autonomy and in a self-determined manner within the digital realm.

Digital Autonomy refers to the City’s ability to develop, maintain and control the design, development, procurement, implementation and evaluation of its Digital Infrastructure. Examples of digital autonomy include:

- Ensuring Digital Infrastructure is “unlocked” so that the City can repurpose it according to needs. This could include adding new features, or replacing it, without being limited by contractual arrangements (sometimes referred to as “Vendor lock-in”)
- Having the ability to repair, modify and maintain City Digital Infrastructure assets, rather than this work only being permitted by the manufacturer or prescribed vendors
- Enabling interoperability between Digital Infrastructure, including infrastructure developed by different manufacturers
- Being in full control across the life-cycle spectrum of Digital

Infrastructure, whether it be product design and interface (e.g. the 'look and feel' of a product), the product outputs or artifacts (e.g. ownership of data), or product maintenance and management (e.g. having in-house skills to conduct repairs rather than relying on a vendor)

- individuals being able to access and exert some control over the personal information about them that is held by the City

6.1. Strategic Priority: Open Source

Objective

Open source technologies and solutions are considered and integrated into Digital Infrastructure that is developed or procured by the City, where appropriate.

Overview

Open source software refers to all software that can be used, modified and shared (with or without modifications) by any person, and published or distributed under an open licence. Open source itself is a type of licensing agreement that allows users to freely modify a work (i.e. software code), use this work in new ways, integrate the work into a larger project, or derive a new work based on the original. Open source software is integral to digital autonomy as it contributes to interoperability and reusability of solutions; contributes to the avoidance of vendor lock-in (i.e. promotes independence from specific vendors); and promotes collaboration and sharing of solutions across public institutions. Public access to source code is a key component of open source software, which aligns with the Transparency and Democracy principle. Some City

services require the use of specialized proprietary software that is unavailable in open source formats.

Emerging Issues

There is a significant reliance on proprietary digital solutions, which can limit interoperability, digital autonomy, and transparency. Considering open source solutions can expand the range of options available to the City, but also requires in-house staff with specialized expertise.

Implementation Considerations

1. Consider open source solutions in the design and procurement of the City's Digital Infrastructure Initiatives, where appropriate, while promoting free competition in terms of software and hardware purchases
2. Ensure, where appropriate, that all code or technological material developed by or for the City are under open licenses and published
3. Consider using open source licensing to promote the reuse of technological solutions developed by or for the City, including sharing with other public institutions
4. Promote the use of open source file formats for data collection, processing and sharing
5. Encourage, where appropriate, the integration of well-established open source software tools in in-house development

6.2. Strategic Priority: Intellectual Property

Objective

The City and the public benefit when value is generated from the creation of intellectual property made possible through use of City Digital Infrastructure.

Overview

The development and use of Digital Infrastructure can help generate valuable intangible assets such as data and code, which can be captured through intellectual property clauses in contracts and other agreements. The City includes clauses relating to intellectual property in City contracts.

Emerging Issues

While the City directly creates or otherwise enables the creation of a range of intangible assets, it can be challenging to capture this value and ensure that it leads to the creation of public benefit.

Implementation Considerations

1. Seek to ensure that public benefit accrues from Intellectual Property when value is generated by the City or enhanced through arrangements with the City or its residents, when using City Digital Infrastructure

6.3. Strategic Priority: Open Standards and Interoperability

Objective

Open standards and Application Programming Interfaces (APIs) enable interoperability and encourage data sharing and collaboration between City divisions and external innovators.

Overview

Open standards refer to file formats, protocols and application interfaces that can be implemented by everyone (in open source and proprietary software alike): specifications are available at no cost, and their development and standardization is open and transparent.³ The use of open standards promotes interoperability and integration between multiple information systems, and are therefore an integral element of digital autonomy. Interoperability is the capacity of different information systems—which could come from different vendors or providers—to work together and share information without technical or legal boundaries. Interoperability is an important element of digital autonomy as it allows for data to be accessible by different systems (also referred to as portability), as opposed to being limited or restricted by proprietary technology.

Emerging Issues

The use of open standards and APIs can advance interoperability considerably. In the longer term, open standards will also facilitate data sharing and collaboration.

3 Open First Whitepaper: Open Standards - Canada.ca

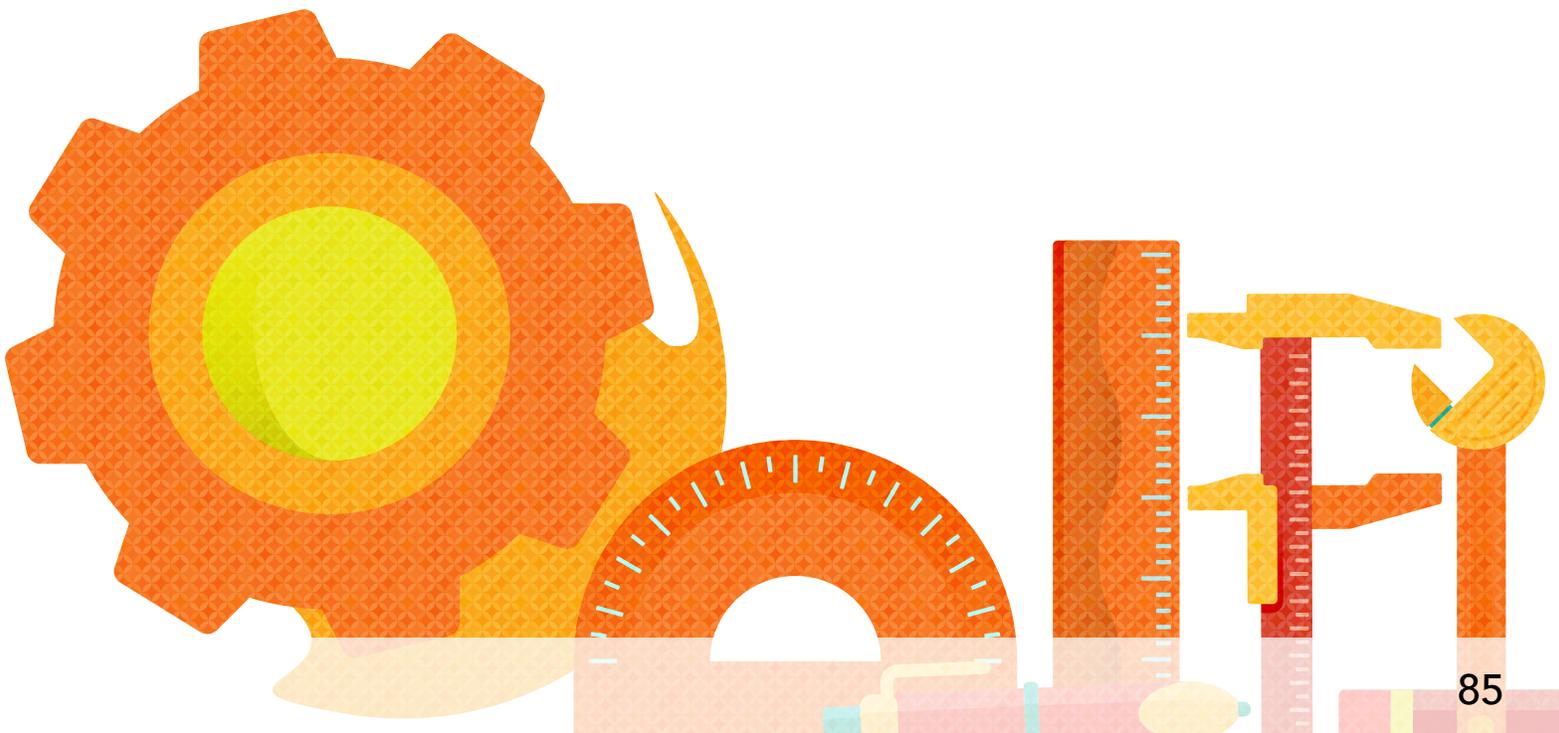
Implementation Considerations

1. Ensure that City Digital Infrastructure work and communicate with other technology and systems, can be easily upgraded, expanded, and that modules can be changed when necessary
2. Establish open standards and publish APIs for Digital Infrastructure owned and operated by, or on behalf of, the City
3. Review and identify widely used standards, including open standards, for Digital Infrastructure to identify ones that are suitable for City use or alignment
4. Encourage the use of interoperable Digital Infrastructure through City policies, data, solutions and services

6.4. Strategic Priority: Maintenance and Repair

Objective

The City holds full control over how its Digital Infrastructure is maintained and repaired, without barriers in the form of proprietary technologies or legal restrictions.



Overview

Maintenance and repair responsibilities and costs are often included in contracts to procure new Digital Infrastructure and solutions. The repair and maintenance of Digital Infrastructure can also be impeded by legal protections, software locks, and end user licence agreements. These challenges can hasten the obsolescence of Digital Infrastructure, leading to increased operational costs and environmental waste.

Maintenance is also linked to building resilience, which is the capacity of individuals, communities, institutions, and systems within a city to survive, adapt, and thrive in the face of the chronic stresses and acute shocks they experience. Stresses and shocks can have both natural (e.g. extreme weather) and human-made causes (e.g. cyber-attack). All of these events can have significant impacts on residents, the economy, and the environment.

Emerging Issues

Digital Infrastructure solutions are becoming harder to fix and maintain, with repairs often requiring specialized skills and tools, difficult-to-obtain parts, or access to proprietary diagnostic software. Integrating the autonomous right to repair and reviewing maintenance terms in Digital Infrastructure solutions and contracts can provide the City with greater control, choice and flexibility around repairs and maintenance, and help meet climate change objectives. Doing so also requires in-house staff with specialized expertise.

Implementation Considerations

1. Integrate, where appropriate, Right to Repair requirements into new Digital Infrastructure solutions
2. In the process of designing, developing, procuring, or implementing Digital Infrastructure, consider what measures are needed within the City to ensure critical support systems can function in the case of stresses and shocks
3. Establish maintenance standards for City Digital Infrastructure
4. Consider a 'State of Good Repair' for Digital Infrastructure
5. Identify and maintain acceptable service levels for City Digital Infrastructure, in the event of a major disruption

6.5. Strategic Priority: Democratic Control

Objective

Digital Infrastructure Initiatives and related initiatives are governed through democratic processes and subject to City oversight.

Overview

To facilitate digital autonomy, and to help achieve the objectives within this Framework, it will be necessary for the City to maintain ownership and control over its Digital Infrastructure. "Control" in this sense is wide-ranging, and will be realized through a variety of channels such as procurement and licensing agreements; individual rights to access and manage personal information about themselves; the right to repair Digital Infrastructure; as well as through the digital capacity of the Toronto Public Service.

Emerging Issues

The increasing growth and reliance on Digital Infrastructure is leading to significant shifts in traditional power structures. In this context, maintaining control of Digital Infrastructure assets at a municipal level will ensure the City is better positioned to protect and advance the public interest.

Implementation Considerations

1. Review City protocols, standards and operating and other agreements to prevent monopolies, barriers to entry, or vendor lock-in
2. Pursue “unlocked” City Digital Infrastructure that can be readily and easily swapped, repurposed, or built upon
3. Establish thresholds to determine when municipal ownership or control of Digital Infrastructure is warranted
4. Provide a clear rationale when obtaining proprietary Digital Infrastructure that is controlled—through contractual or agreement or other means—by third parties or vendors
5. Increase residents’ control over their personal data collected by the City and how it is shared
6. Develop guidelines with regards to the installation of Digital Infrastructure in the public realm by the City
7. Expand and broaden the range of Digital Infrastructure service providers and suppliers



7. MONITORING AND PERFORMANCE MEASUREMENT

The fast pace of innovation in the technology sector brings a requirement to ensure that the Principles, Strategic Priorities and Objectives within the DISF are reviewed regularly. Course correction will be needed over the life of the DISF and policy changes may also be warranted from time to time. New implementation initiatives may be needed and priorities will require adjustment in response to the varied and changing conditions in the City. Periodic assessment of the DISF will look at the objectives, as well as the outcomes that have been driven by it. These assessments may reveal new emerging Strategic Priorities that should be addressed through policy initiatives, investment initiatives, or changes to the DISF itself. Any substantive changes that would result to the DISF would be addressed in a report to City Council.

Monitoring facilitates our ability to respond to these changes and can improve the quality of decision making. Responsiveness, adaptability and continuous improvement will be enhanced through a commitment to tracking key indicators of social, economic, and environmental conditions, and by understanding the real changes to our quality of life and their underlying causes. In order to monitor how the DISF is being used across the City, an evaluation matrix will be developed. This matrix will be in accordance with the City's Results-Based Accountability framework that tracks the extent to which alignment with DISF is achieved. As part of this matrix, performance measures will be established for each Strategic Priority so that it is possible to measure and demonstrate the impact of the

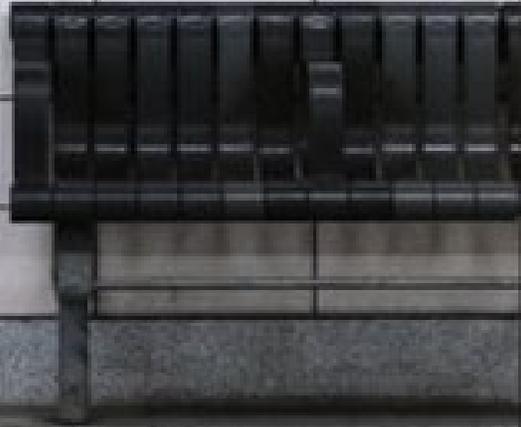
DISF (i.e. how was it used? How well was it done? What were the outcomes and did they achieve the desired goals? Who is better off?).

A fair, open and accessible public process for amending, implementing and reviewing the DISF will be achieved by encouraging participation by all segments of the population. Individuals, organizations or other affected parties are welcome to submit comments on the DISF at any time. The evolution of the DISF is intended to be a transparent process. This includes a version history (including a description of consulted parties), with all prior versions of the DISF remaining available for review.





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8. APPENDIX 1: KEY TERMS AND DEFINITIONS

Accessible: an adjective, which in the context of the Accessibility for Ontarians with Disabilities Act, means “without Barriers “. The Ontario government creates accessibility standards as laws to make Ontario more accessible.

Algorithm: a set of well-defined instructions or rules which produces an output. When we say algorithm, we normally mean an algorithm done by a computer, but the word can also refer to things like bureaucratic rules.

Application Programming Interface: a software connection that allows applications to connect with each other.

Artificial Intelligence: the theory and development of computer systems able to perform tasks that normally require human intelligence. Some examples include visual perception, speech recognition, decision-making, and translation between languages

Barrier: anything that prevents a person with a disability from fully participating in all aspects of society because of his or her disability, including a physical barrier, an architectural barrier, an information or communications barrier, an attitudinal barrier, a technological barrier, a policy or a practice.

Breach, Privacy: the improper or unauthorized creation, collection, use, disclosure, retention or disposition of personal information.

Breach, Security: any incident which results in unauthorized access to a Digital Infrastructure, regardless of intent

City-owned Portions of the Public Realm: City-owned streets, sidewalks, parks, open spaces, squares and publicly-accessible portions of City-owned buildings

Cloud; The Cloud: a set of servers which do what personal computers used to, like run applications and store files. There are many types of clouds, such as “private clouds”, where the servers are under the control of one entity, and “public clouds”, where access is normally sold on a per-usage basis

Consent: the free, explicit and informed expression of will by which an individual agrees voluntarily, without pressure, to the collection and processing of data concerning them

Cyber Resilience: the ability to prepare for, respond to and recover from cyber attacks

Cybersecurity: the practice of security applied to Digital Infrastructure. Includes protection of physical Digital Infrastructure (like literal cables and servers) and non-physical Digital Infrastructure (like access and storage of data, limiting use of technologies, etc.).

De-identification: the general term for the process of removing personal information from a record or data set. De-identification is one tool to protect the privacy of individuals because once de-identified, a data set is considered to no longer contain personal

information.

Digital Adoption: the size and scale of usage or uptake of a digital service, compared to a non-digital counterpart. For example, paying bills online versus paying bills in-person. Can be extended into analogies about people’s “digital adoption” and institution’s “digital adoption”, which typically require further definition

Digital Autonomy: refers to the City’s ability to develop, maintain and control the design, development, procurement, implementation and evaluation of its Digital Infrastructure to deliver public services and advance the public interest, as informed by legislation, community consultation, and the needs of its citizens to adapt to living in the digital realm.

Digital Divide: the disparity within the population regarding access to digital technologies, due either to a lack of equipment and services, or a lack of knowledge and understanding of these technologies.

Digital Equity: equal access and opportunity to digital tools, resources, and services to increase digital knowledge, awareness and skills. This includes the equitable application of digital data, tools, programs and services.

Digital Infrastructure: all technology assets that create, exchange or use data or information in a digital form as a part of their operation, as well as all data collected or used by the aforementioned technology assets. Examples of Digital

Infrastructure include:

- Physical objects and structures such as cameras, sensors, and broadband networks
- Software systems such as mobile applications, websites, digital payment systems, customer relationship management applications, and legacy technology systems
- Fixed devices such as computers and digital kiosks
- Mobile devices such as robots, vehicles and cellphones
- Data collected or stored digitally by the City, including personally identifiable information and non-personal information (administrative data, geospatial data etc.)
- Systems whose functions may rely on computer generated data such as machine learning systems and artificial intelligence

Digital Infrastructure Initiatives: the use of Digital Infrastructure in City operations, including the provision of services to the public, the procurement of Digital Infrastructure by the City, or regulations of the City which address Digital Infrastructure.

Digital Literacy: Ability to understand and use digital communication technologies, including digital data, in everyday life to achieve personal goals and to expand one's knowledge and abilities.

Digital Transformation: the intentional reform of organizations and business practices to achieve more value from digital technology.

Discrimination: Any practice or behaviour, whether intentional or not, which has a negative impact on an individual or group protected in Ontario’s Human Rights Code (e.g., disability, gender identity, sex, race, sexual orientation, etc.) by excluding, denying benefits or imposing burdens on them.

Equity and Inequity: Equity understands, acknowledges and removes barriers that prevent the participation of any individual or group, making fair treatment, access, opportunity, advancement and outcomes possible for all individuals. In the context of City of Toronto services, inequities refer to unfair and avoidable differences in service access, experiences, impacts and outcomes. Socio-demographic data is a critical tool to understand who our service users are and if any sociodemographic groups are disadvantaged or require additional supports.

Equity-deserving Groups: Communities that face significant collective challenges in participating in society because of institutional and societal barriers to equal access, opportunities and resources due to disadvantage and discrimination. These groups are due social justice and reparation.

While Indigenous people and communities in Toronto face inequities, they are not considered to be an equity-deserving group. Indigenous people are the original inhabitants of what is today Toronto, and have unique status and rights recognized under Section 35 of the Constitution. More than equity, Indigenous communities seek prosperity that is characterized by economic and social well-being, inclusion and self-determination,

which were eroded through historical and ongoing colonization.

While Black people in Toronto also face inequities and seek equity, they are recognised as unique and separate from other equity-deserving groups. People of African descent who commonly self-identify as Black people have a unique experience of centuries of enslavement in what is now Canada. The time period of legalized enslavement was longer than the period during which Black people have been legally free. The legacy of socio-economic enslavement continues to significantly impact Black communities in Toronto and across Canada through inequities in social and economic outcomes and well-being. As such, Black communities are more appropriately to be considered as freedom-seeking.

Ethical Digital Service Standards: concerns the questions of how developers, manufacturers, authorities and operators should behave in order to minimize the ethical risks that can arise from the use of Digital Infrastructure in society, either from design, inappropriate application, or misuse.

Hack, Security: refer to Breach, Security

Hardware: refers to the physical parts of a computer and related devices. Internal hardware devices include motherboards, hard drives, and RAM. External hardware devices include monitors, keyboards, mice, printers, and scanners.

Human-Centered Design: an approach to understanding people in the full context of their lives in order to design policies,

programs, products and services that best meet their needs. Through customer experience research and public engagement, we learn about their needs, goals, pains, and mindsets, generate and test ideas with them and keep them engaged through ongoing feedback.

Indigenous Peoples: a term used internationally to collectively represent the original inhabitants or those naturally existing in a particular place. In this context, “Indigenous” is used to refer to the First Nations, Métis and Inuit.

Intellectual Property: a branch of law which extends the concept of property to intangible creations of the mind. Examples include copyrights, patents, trademarks and trade secrets.

Internet-connected Smart Infrastructure (also referred to as Internet of Things): Digital Infrastructure such as sensors, devices and wearables, that are connected to the internet and which generate data

Interoperability: the capacity of different information systems—which could come from different providers—to work together and share information without technical or legal restrictions

Legacy system(s): older technology systems, typically using programming languages and physical technologies which are no longer in common use, are less likely to be interoperable, and which can be hard to continue to support.

Open Data: digitally structured information, in machine readable

and accessible formats, made available to the public under an open data licence

Open Source: computer code that is published freely to the internet for people and organizations to download and use under the terms of a permissive open source license. The key quality of an open source license is that the code is available to be accessed, edited, and used by anyone without having to get permission or pay royalties.

Open Standards: file formats, protocols and application interfaces that can be implemented by everyone (in open source and proprietary software alike): specifications are available at no cost, and their development and standardization is open and transparent

Personal Information: recorded information about an identifiable individual. This definition comes from provincial public-sector law, which puts restrictions on how governments can collect and use this type of information

Privacy by Design: to build privacy and data protection, into the design specifications and architecture of information and communication systems and technologies at the beginning, in order to facilitate compliance with privacy and data protection principles.

Procurement: the acquisition of goods and/or services by any contractual means, including purchase, rental, lease or conditional sale

Public Realm: for purposes of this report and the DISF, means all locations other than private residences in which members of the public by legal entitlement, or invitation are permitted or invited to attend.

Sensor: an electronic device which collects data about the physical world, such as light (e.g. cameras), sound, heat, motion, etc., and transmits it to a computer

Software: programs and other operating information used by a computer

Socio-demographic Data: socio-demographic data describes personal characteristics and social identity. Characteristics such as age, language, race, First Nations, Inuit, Métis identity, Canadian-born or immigrant, disability, gender, sexual orientation, income and place of residence are all examples of socio-demographic data.

Standard: a document which provides a set of agreed-upon rules, guidelines or characteristics for activities or their results. Technical standards are typically established by governments, by standards development organizations and industry associations

Systemic Barrier: a barrier embedded in the social or administrative structures of an organization, including the physical accessibility of an organization, organizational policies, practices and decision-making processes, or the culture of an organization

9. APPENDIX 2: “BY-DESIGN” APPROACHES TO PRIVACY, SECURITY, & ACCESS

A “By-design” approach for Privacy, Security, and Access will be taken for all Digital Infrastructure Initiatives. “By design” is an approach where certain objectives or desired outcomes are considered and integrated into all phases of a project, starting with design but including the entire lifecycle. This approach ensures that these objectives are proactively integrated directly into the design of Digital Infrastructure systems, processes and services by default. This also includes the business processes and practices which support that infrastructure. Other “by-design” approaches may be integrated into Digital Infrastructure Initiatives, as guided by objectives and desired outcomes.

Privacy by Design advances the view that the future of privacy cannot be assured solely by compliance with regulatory frameworks; rather, privacy assurance must ideally become an organization’s default mode of operation.

The Principles of Privacy-by-Design are:

1. Proactive not Reactive; Preventative not Remedial - Anticipate and prevent privacy invasive events before they occur
2. Privacy as the Default - Automatically apply privacy as a default feature
3. Privacy Embedded into Design - Incorporate privacy as a key feature of the design of Digital Infrastructure

4. Full-Functionality - Make an effort to accommodate all reasonable and legitimate privacy and security features and functions
5. Full Data Lifecycle Protection - Map the entire lifecycle of data, and protect it from breach at all stages
6. Visibility and Transparency - Allow full access to and independent verification of all technology and business practices which use personal information
7. Respect for User Privacy - Offer users measures such as privacy defaults, consent, and appropriate notice of collection

Security by Design advances the view that properly implemented security processes and technology can enable and protect activities and assets of both people and enterprises.

The principles of Security-by-Design⁴ are :

1. Begin with the end in mind. Leverage enterprise architecture methods to guide the proactive implementation of security
2. Implement “Secure by Default” policies, including least privilege, need-to-know, least trust, mandatory access control and separation of duties.
3. Apply Software Security Assurance practices. Use hardware solutions such as Trusted Platform Module.
4. Accommodate all stakeholders. Resolve conflicts to seek win-win.
5. Ensure confidentiality, integrity and availability of all information for all stakeholders.
6. Strengthen security through open standards, well-known processes and external validation.

4 <https://www.ipc.on.ca/wp-content/uploads/Resources/pbd-privacy-and-security-by-design-oracle.pdf>

7. Respect and protect the interests of all information owners. Security must accommodate both individual and enterprise interests.

Access by Design advances the view that government-held information should be made available to the public, and that any exceptions should be limited and specific.

The Principles of Access-by-Design are:

1. Proactive not reactive - a proactive approach to promote full transparency
2. Access embedded into design - making proactive disclosure the default
3. Openness and Transparency - support the democratic process by ensuring that citizens have the information required to hold government accountable
4. Fosters Collaboration - make data readily available so that it can be used to advance society as a whole
5. Enhances Efficient Government - improve information management practices by providing more streamlined access to public information
6. Makes Access Truly Accessible - requires that public information be easily found, indexed and presented in user-friendly formats
7. Increases Quality of Information - implement quality control and assurance protocols to ensure that information is accurate, reliable, and up-to-date

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MIDLAND

DO NOT CHARGE
OR HOLD DOORS



Line 3 to McCowan



LET PATRONS
EXIT FIRST



