Technology Framework (Document 1)

Contents

A. Introduction:

The intent of the Ottawa Public Library (OPL) Technology Framework is to inform decision-making regarding technology investments, to look ahead and determine which forms of hardware, software, and support will be required to meet future needs.

In short, a technology framework will provide strategic direction to:

- give OPL the opportunity to relate technology to the Library's vision, mission, values and strategic priorities, i.e. creates a mechanism for identifying the systems (hardware and software) required to support OPL priorities;
- acknowledge and support operational requirements;
- recognize changes in staffing patterns and capital budget allocations necessary to implement new technologies;
- be flexible enough to acknowledge that opportunities may arise or that some needs might change and therefore priorities within the plan should also change;
- help to manage risks and costs to renew existing technology; and,
- provide for periodic review of needs and plans.

The Framework, as described in the sections that follow, covers two broad areas:

B. Background material (i.e. *why* the Framework is needed), including the rationale, strategic context, key challenges, and technology trends that underlie and inform the framework.
C. An approach to developing and prioritizing OPL technology investments, including key assumptions /guiding principles, inputs/drivers for identifying potential initiatives, and a set of criteria to be used for prioritizing technology initiatives for selection and implementation.

B. Background and context

Public libraries are key entry points to the digital world for many customers. They provide a mechanism for citizens to embrace technology and avoid digital exclusion. Indeed, through technology libraries can lead the way to digital citizenship. It follows that to improve the technological literacy of local communities, libraries must be equipped with relevant technologies.

Technology continues to develop at a staggering rate, and is critical in ensuring the future of public libraries. Every service that modern public libraries offer, and every work process they use, are dependent on technology.

However, like most institutions, public libraries have finite resources, and therefore need to make sound decisions about technology investments that considers the strategic context in which OPL operates, the key challenges it faces, and the wider technology trends that are affecting society as a whole.

A framework is therefore needed to assist OPL with making decisions about technology, while taking into account the strategic context, key challenges, and trends as follows:

1. Strategic Context

By way of OPL's mission, vision and values, the Board has confirmed its belief that public libraries are:

- Integral players in community transformations through their role in supporting community priorities and their physical presence in the communities they serve;
- Committed to ensuring access and equity;
- Trusted guides in the digital world;
- Custodians and curators of the overwhelming amount of information available in today's world;
- Places that connect people to each other to collaborate and share ideas physically and virtually; and,
- Neutral sites that operate without political agendas or biases.

Further, technology has made it possible for libraries to:

- Connect with people in the community who never walk into a physical branch;
- Provide 24/7 access to library resources anytime, anywhere;
- Offer e-books and other downloadable and streamed media to OPL customers;
- Incubate new technologies and provide hands-on experience for customers and employees;
- Broaden and deepen educational opportunities for people of all ages; and,
- Provide opportunities to create and publish content, invent, and collaborate in new ways.

Technology plays a key role in fulfilling the vision, mission, values, and current strategic priorities of the OPL.

Technology services in public libraries further advance public policy goals at the municipal, provincial, federal and global levels. For example:

- Globally, the International Federation of Library Associations (IFLA) emphasizes that "libraries around the world can contribute to the United Nations Sustainable Development Goals";
- In Canada, the new service objectives of the Canadian Radio-Television and Telecommunications Commission (CRTC) recognize high-speed broadband internet as a basic telecommunications service, and one that all Canadians are entitled to receive;
- The Government of Ontario is currently focused on enhancing digital delivery of government services, making digital inclusion critical to civic participation and access to public resources and services; and,
- At the municipal level, the need for connectivity is likely to increase as cities transform themselves into 'smart cities.' The Library is seen as a key player in helping to bridge the digital divide, as referenced in the recent "Smart City 2.0, Ottawa's Smart City Strategy", approved by City Council on November 22, 2017.

2. Key Challenges

The axiom that public libraries are many things to many people is especially true in the realm of technology. In today's world, social and economic participation are dependent on the ability to navigate the digital world and interact with digital information and networks. Without access to technology and the skills required to use it, citizens are at risk of exclusion from activities that are critical to their well-being success.

a. Digital inclusion

One key technological challenge for public libraries relates to digital inclusion, a broad term used to encompass:

- The digital divide (which is about opportunity and equitable access);
- Digital literacy (which is about knowledge and skills, i.e. adoption), and;
- The application of knowledge and skills to workforce development, education, wellbeing and civic engagement.

The progression from the term "digital divide" to "digital inclusion" represents a shift in focus from issues of access exclusively toward contexts and quality of participation and usage. In this way, the language of digital inclusion reframes the issue by making it clear that simply focusing on the manner of access can obscure the fact that there remain significant divides associated with quality and effectiveness.

Public libraries are extremely well positioned to contribute to digital inclusion and digital literacy by providing customers with the opportunity to connect to the Internet and use equipment ranging from desktop computers to 3D printers. As welcoming community hubs for both self-directed discovery and structured learning, libraries also support the development of digital comfort and skills.

b. Financial challenges

In many ways, strategic technology planning is just another name for long-term financial planning, which underscores the central role of funding issues in technology planning. Traditionally, strategic funding requests and allocations involve many layers of authority and a substantial amount of justification; the amount of time it takes to analyze funding needs, gain approvals, and locate or create resources, is often out of sync with the windows of opportunity for technological innovation.

One way to address this problem is to formalize a yearly budget allocation percentage for technology and innovation (e.g. research, pilots). While it may not be possible to justify future technology needs in detail, good planning should permit an organization to estimate the level of financial resources that it can and should devote to technology for a period of several years.

Total Cost of Ownership (TCO) considers the hidden costs of a new technology. TCO helps to make decisions about technology and prioritize among competing projects and services and to make more accurate budget projections. Libraries ignore TCO at their

peril - the indirect costs of technology can affect an organization for years to come. However, it is also important to consider the Total Value of Ownership (TVO), especially in a publicly funded and focused institution such as the public library. TVO is the other side of TCO and considers hidden benefits such as customer service, library visibility, employee productivity, etc.

c. Other challenges

Some other technology-related challenges in public libraries include:

- Being proactive in defining how technology supports the library's role in the community, including reaching out to new partners in the community whose missions are aligned with the library but who may not be aware of that alignment;
- Securing and maintaining technology competence in employees in order to meet changing needs (including recruitment and hiring);
- Being able to take risks in a public environment which is often risk averse;
- Keeping up with the rapid rate of change and having the capacity to deal with change, new opportunities, and new needs;
- Maintaining support for legacy systems;
- Balancing the need for security and customer privacy, including online trust, information literacy and privacy awareness;
- Implementing technologies that may not have been created with diverse/accessible needs in mind;
- Telling the library's story more effectively, including providing data and outcomes to verify the story, is critical in countering the perception some have that libraries are becoming less relevant in the digital age when, in fact, they are more essential and relevant; and,
- Prioritization of initiatives and dependency on shared services (e.g. City Information Technology Services) resource allocation.

3. Technology Trends

Each year brings an accelerating pace of change in technology. While public libraries tend to operate at a safe distance from the cutting edge of technology, it is important to look forward in order to be aware of the movement underway and to plan for future initiatives.

The technology trend categories below are intended to provide a way to illustrate and organize emerging technologies into conceptual pathways that are or may be relevant to public libraries. Collectively, the categories serve as lenses for thinking further about innovation; each is defined below. (adapted from *NMC Horizons report 2017*)

a. Consumer technologies are tools created for recreational and professional purposes and were not designed, at least initially, for library use — though they may be quite adaptable for use in libraries. These technologies find their ways into institutions because people are using them at home or in other settings. Examples

include drones (e.g. holds delivery), real-time communications (e.g. chat), robotics (e.g. performing repetitive tasks), and wearable technology.

b. **Enabling technologies** are those technologies that have the potential to transform what we expect of our devices and tools. This group of technologies is where substantive technological innovation begins to be visible. Enabling technologies expand the reach of our tools, making them more capable and useful. Examples include Artificial Intelligence (e.g. Apple Siri, Amazon Echo), mobile broadband, virtual assistants, wireless power, and TV White Space.

c. **Internet technologies** include techniques and essential infrastructure that help to make the technologies underlying how we interact with the network more transparent, less obtrusive, and easier to use. Examples include blockchain (open, distributed ledger – e.g. Bitcoin), The Internet of Things (e.g. Smart LED, traffic sensors), and Library Services Platforms (LSPs).

d. **Learning technologies** include both tools and resources that are changing the landscape of learning, whether formal or informal, by making it more accessible and personalized. Examples include adaptive learning technologies, mobile learning, next-generation Learning Management Systems (LMS), and virtual & remote labs.

e. **Social media technologies** could have been subsumed under the consumer technology category, but they have become so ever-present and so widely used in every part of society that they have been elevated to their own category. As well-established as social media is, it continues to evolve at a rapid pace, with new ideas, tools, and developments coming online constantly. Examples include crowdsourcing, online identity (e.g. privacy and authentication), social networks (e.g. social inclusion and access), and virtual worlds

f. **Visualization technologies** run the gamut from simple infographics to complex forms of visual data analysis. What they have in common is that they tap the brain's inherent ability to rapidly process visual information, identify patterns, and sense order in complex situations. These technologies are a growing cluster of tools and processes for mining large data sets, exploring dynamic processes, and generally making the complex simple. Examples include 3D printing, information visualization, and virtual reality.

The ALA Center for the Future of Libraries also has some good write-ups on trends, including key technology trends affecting libraries such as the following:

g. **Connected Toys** - A new crop of toys take advantage of trends in wireless connectivity, the internet of things, artificial intelligence, and machine learning to create highly personalized exchanges between object and child.

h. **Data Everywhere** - New technologies have greatly improved the opportunities to collect, store, and analyze customer data and personal information. The explosion of mobile devices, internet-connected devices, and applications has drastically increased opportunities for data collection. As data is collected, companies and organizations can use the information to develop products and services, improve marketing and communications, or monetize information.

i. **Drones** - Drones or 'Unmanned Aerial Vehicles' (UAVs) will become a regular part of life, used in research, transportation and delivery, artistic production, news coverage and reporting, law enforcement and surveillance, and entertainment.

j. **Haptic Technology** - Haptic technology, haptic feedback, or simply haptics, is technology that incorporates tactile experience or feedback as part of its user interface, creating a sense of touch through vibrations, motion, or other forces.

k. **Internet of Things** - Smaller computing and radio devices, often unseen or built into objects, will sense and transmit data offering greater control of and connectivity between objects.

l. **Robots** - Robots will move from industrial and factory settings, where they were first introduced in the early 1960s, to more everyday work, educational, research, and living spaces. These collaborative robots will increasingly perform repetitive tasks and work alongside humans.

m. **Unplugged** - In a world where information and technology are everywhere and ever-present, opportunities to unplug may become more essential, benefiting both professional and personal experiences.

Also, according to the current issue of Gartner 'Top 10 Strategic Technology Trends' (published March 21, 2017):

n. **Artificial intelligence (AI) and advanced machine-learning techniques** are opening up a new frontier for digital business, as virtually every application, service and digitalized thing incorporates an intelligent aspect.
o. The merging of, and interaction between, the **physical and digital worlds** provides a digital business revenue opportunity and sets the stage for digital business ecosystem development.
p. An **expanding mesh of rich connections** between devices, things, services, people and businesses demands systems that are more adaptable and responsive to changing needs.

C. Developing and Prioritizing OPL Technology Investments

Section B above demonstrates why OPL needs a technology framework; to assist with making decisions about technology while considering various factors, including strategic context, challenges and trends.

What follows is the proposed approach to developing and prioritizing objectives. It incorporates key assumptions, inputs for identifying potential initiatives, and the criteria that OPL staff will use to prioritize these initiatives, as a means of developing a 4-year roadmap and annual work plans.

1. Key assumptions / guiding principles

a. Customer centrality - OPL will give preference to customer-centric technology services and design, and ensure that identified public-facing solutions are bilingual and are compliant with the Accessibility for Ontarians with Disabilities Act (AODA).

b. Project management - OPL will continue to employ project management discipline in implementing new technology, including project proposals, business cases, charters, and other planning documents. OPL will also ensure that sound change management practices are built into all project plans.

c. Pilots / innovation - OPL will undertake pilot projects (where applicable) as a means of enabling innovation, and ensuring agility and responsiveness to changes in the industry. In these cases, project rigour will be scaled to the size and scope of the pilot until a decision is made regarding program adoption or expansion. OPL will also prioritize the practice of evaluating open source software as part of new technology projects (where applicable).

d. Resource alignment - OPL will ensure that training and hiring practices support increases and changes in technology, so that OPL has the right skills available to deliver on technology priorities.

e. Shared Services - OPL will continue to use City of Ottawa Information Technology Services (ITS) shared services for support (enterprise application, systems in City data centres, desktop / printer), internal hardware/software ordering, network infrastructure/connectivity and data support (including backups), network account management, technology security controls, standards and policies, threat and risk assessments, and security incident response.

f. Library technology system reviews - OPL will undertake a review of major library automated systems (e.g. integrated library system, public networking) on a four-year cycle, in order to evaluate the changing market, determine whether the system reviewed continues to meet OPL's needs, and whether OPL needs to explore options to ensure best value for money. OPL will continue its practice of reviewing public desktop PCs on an annual basis, reducing and consolidating devices where possible, and in

light of wireless upgrades and ongoing use of portable mobile devices (e.g. Chromebooks).

g. **Lifecycle** - OPL will continue to take an “evergreening” approach (i.e. replacing technology on a scheduled plan) to lifecycle activities for any equipment/systems that are still deemed relevant.

h. **Collaboration & partnerships** - OPL will continue to foster collaboration with external partners where applicable, especially when seeking to address common problems, costs and lessons learned across similarly positioned library systems.

i. **Fiscal responsibility** - OPL will continue to consider total cost of ownership (i.e. upfront capital and operating impact) as part of technology evaluation. OPL will seek to negotiate contracts in Canadian dollars wherever possible, regardless of vendors’ country of provenance, as a means of reducing financial risk.

2. Inputs/drivers for identifying potential technology objectives / initiatives

Potential objectives / initiatives are based on problems, unmet needs, lifecycle requirements and future goals that can be directly enhanced through the application of existing or new technologies.

In developing a list of potential initiatives, the following sources of information (i.e. inputs) will be considered:

a. **Lifecycle requirements –** technology that requires replacement due to end-of-life status.

b. **Recommendations from technology audits / assessments –** previous technology assessments have identified areas for future technology investment.

c. **Benchmarks –** there are various library technology benchmarking tools, including Library Edge, which highlights best practices in library technology.

d. **OPL Risk Register –** this includes technology items that may require investment due to a specific risk that has been identified.

e. **Previously approved strategic initiatives –** technology requirements for approved projects (e.g. Central Library Development project).

f. **New system-wide strategies –** potential technology investments related to system-wide initiatives.

g. **Feedback from employees –** identification of potential technology investments based on staff knowledge and feedback.

h. **Survey data –** Surveys often include technology recommendations or help to identify potential technology investments, whether directly or indirectly.

i. **Other feedback –** from the public, partners and other community contacts.

3. Prioritization criteria

OPL will use selection criteria to prioritize the initiatives that are identified via the inputs in the previous section. Criteria are based on best practices (tailored to the OPL environment) and fall into two broad categories: organizational value and implementation complexity.

a. **Organizational Value:** includes the rating of value to OPL customers, in addition to the value to OPL as an organization.

    1. Customer benefit
       How important is it to customers, and what is the expected impact? Will it increase customer satisfaction? What is the level of urgency?

    2. Partnership potential
       Are there potential partnerships available to help offset costs, drive innovation and deepen our connection to the community?

    3. Positioning
       How well does it position OPL in terms of best practices, trends, other libraries? Is it innovative, or will it promote innovation?

    4. Strategic alignment
       How aligned is the project/initiative to OPL goals? What is the relative importance to, and impact on, the organization?

b. **Implementation Complexity:** includes the difficulty of deploying, maintaining, and supporting the initiative.

    1. Planning and development
       Resources – Is the resource need low, or is it easily outsourced?
       Confidence – How confident are we in our estimates and technical ability? Any useful information from a pilot project? Change readiness?
       Risk – Are risks clearly defined and well understood, and what is the probability of overcoming them? Is there a plan for mitigating risk?
       Leverage – Does it leverage our existing technology and resources? To what extent are we already doing it, and will this extend our reach?

2. Deployment and implementation
   Resources / sustainability - Does OPL have the skills, bandwidth, and change readiness to execute and sustain the initiative?
   Ease of implementation – Is it relatively easy to implement (i.e. low hanging fruit)? Has a successful pilot been undertaken? Is a migration effort required?
   Costs – What are capital costs, and the operating impacts? Are existing funds available to execute and sustain?
   Support impact – Are there significant impacts on ongoing/future support?

Table 1: Summary of prioritization criteria

Organizational Value	Customer Benefit ✓ Importance to customers ✓ Customer satisfaction ✓ % of customers impacted ✓ Level of urgency
	Partnership Potential ✓ Availability of partners ✓ Cost offset
	Positioning ✓ Best practices ✓ Trends / Innovation
	Strategic Alignment ✓ Alignment to OPL Directions/Priorities ✓ Importance ✓ Impact
Implementation Complexity	Planning & Development ✓ Resources (including City ITS) ✓ Confidence ✓ Risk ✓ Leverage
	Deployment and Implementation ✓ Resources/Sustainability (including City ITS) ✓ Ease of implementation ✓ Costs ✓ Support impact

4. Process Flow

The CEO has delegated authority to implement the Framework as per Board policy OPLB-002 Delegation of Authority item #21, and will approve weightings for each criterion in concert with OPL senior management. This will be done on a four-year cycle to reflect Board strategic directions and priorities, or as required to reflect changes in the environment.

OPL staff will use the prioritization criteria and associated weightings to finalize the development of a tool and process for technology selection and implementation. A staff committee will use the tool to assign scores to potential initiatives.

The scores of Implementation Complexity will be subtracted from the Organizational Value scores, as there is an inverse relationship between them. That is, a high score on Organizational Value with a low score on Implementation Complexity would yield the highest total score. Conversely, a low score on Organizational Value with high score on Implementation Complexity would yield the lowest total score.

The scored list of initiatives will be used to prioritize budget requests and to develop a roadmap and annual work plans.

The chart below provides a schematic of the overall process for technology selection and implementation at OPL.