

# Towards the Digital University

IT Strategic Plan, York University

2019-2024

Version 1.0

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## Introduction

### A Case for Change

Over the years, technology at York University (York) has grown organically according to immediate and local needs, resulting in a fragmentation of services, data, systems and infrastructure. The slow pace of technology refresh—endemic to the post-secondary sector in general<sup>1</sup>—is reflected at York and has impacted the institution’s ability to take advantage of innovative practices. Thus, the current situation is rife with opportunity. The modernization of key systems can transform York and differentiate it among its competitors. It can make York a university of choice thanks to a rich campus experience based on student and user centricity, streamlined and automated processes and data-driven and evidence-derived insights. With the right plan and commitment to its execution, we can advance York as a true digital institution.

As we move forward, it is vital that our modernization objectives ensure our system designs and developments are student-centered and consider how our users interface with our systems. Our future architecture (Appendix 3) will inform the automation of our processes, the transformation of our teaching and learning spaces, the provision of technologies and the flow of information to those who need it. How will we accomplish this? Collectively, we have created a five-year technology strategy that will be followed by a rolling three-year technology execution roadmap, which will include: project prioritization according to relevant criteria, resourcing and costing, timelines aligned with partners’ Integrated Resource Plans, the collection of data on metrics and key performance indicators, etc.

The plan highlights the replacement of our core systems, the establishment of centres of innovation, the modernization of our infrastructure and the creation of data warehouses accessible to all stakeholders. Information security, a shared responsibility, will enable this vast access and protect the University from malicious intruders. A series of applications available from York’s app store will make it simple for the entire York community to navigate the institution and its services. All these initiatives will bring about connectedness at a new level, both for the individual and community.

York’s journey of digital transformation will be effected at three levels:

1. Corrective, which aims to remove irritants and fix issues
2. Ameliorative, which aims to improve processes and solutions while implementing a best practice approach
3. Transformative, which aims to innovate and will take us to a higher state of operation. This is the state—in keeping with its tradition of being forward-looking and trailblazing—that will allow York to shine. *Tentanda Via*.

### Supporting the University Academic Plan

This document is a “nested” strategic plan, that is, a subset of the University Academic Plan (UAP), which it supports and advances. York’s vision, as stated in the UAP 2015-2020, is to “[foster] creativity, innovation and global citizenship through its open-minded and engaged approach to teaching, scholarship and research, and community outreach.” The UAP also establishes York’s guiding values:

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<sup>1</sup> Howard, C. (2018). 2018 CIO Agenda: A Canadian Perspective. Gartner.

excellence, progressiveness, inclusivity and diversity, social justice and equity, and sustainability. This IT Strategic Plan will enable the UAP's vision and support these values.

The UAP lists seven priority areas for the University. To ensure alignment with the UAP, the 2019-2024 IT Strategic Plan will be structured around these seven priorities:

1. Innovative, quality programs for academic excellence
2. Advancing exploration, innovation and achievement in scholarship, research and related creative activities
3. Enhanced quality in teaching and student learning
4. A student-centred approach
5. Enhanced campus experience
6. Enhanced community engagement
7. Enabling the plan

## Vision

In its broadest aspirational form and in keeping with a humanistic view of technology, York University's IT vision sets the goal of:

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Enriching the community's experience and capacity to act  
through technology

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In this sense, technology is in service of human fulfillment, and is focused on the community, i.e. people. This vision recognizes the importance of the users' global experience, as opposed to intermittent and unconnected transactional activities, as well as the role IT plays in enhancing our community's capacity to direct actions.

This vision will guide York IT in advancing our president's four pillars for institutional success, i.e. access, connectedness, excellence and impact.<sup>2</sup> Accordingly, York University strives toward enabling the community to seek excellence through technology and systems that allow instant access to data and knowledge, innovative teaching and research environments and fruitful collaboration across communities and disciplines.<sup>3</sup> This vision culminates in the empowerment of the community to have a greater impact on Canadian society and the global community.

## Mission

The mission describes what is being done or should be done to achieve our vision.

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York IT provides inclusive technology-based service  
experience to the York community in support of the  
University's goals

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Here, the focus is on service. Both organizational units (including Faculties) and individual users are key service foci, as both contribute to an enhanced experience for our entire community. As a clear indication that York IT's mission is subsumed under the University's aspiration, the mission statement refers to IT's role in support of the institution's goals, as stated in the UAP.

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<sup>2</sup> See President Lenton's installation address, [http://president.yorku.ca/files/2017/10/Installation-Address-Rhonda-L.-Lenton\\_October-18-2017.pdf](http://president.yorku.ca/files/2017/10/Installation-Address-Rhonda-L.-Lenton_October-18-2017.pdf).

<sup>3</sup> This view aligns surprisingly well with Harvard University's IT vision statement: "Empower the community through technology that enables effortless access to data information and knowledge; rapid and profound innovation in teaching, learning and research; and seamless collaboration across communities and disciplines."

## Principles

York IT will be guided by several principles that will give meaning to and further its vision:

### People

The purpose of all technology-driven action is people, i.e. the end users. The idea of user-centred service, as well as integrated approaches, is based on this principle.

### Community

Technology is also a means of bringing people together and facilitating collaboration. This starts with the institution's IT community and grows to encompass the university community and beyond.

### Value

Our goal is to create value for our community by providing services that meet their wants and needs. Value also implies operational cost effectiveness. In a context of scarcity, this is as much an ethical as it is a business principle.

### Innovation

Given the growing expectations of the sophisticated users we serve, it becomes imperative to constantly devise new ways of creating value for them. Innovation is a principle that supports a value-oriented service philosophy in the face of ever-present change and systemic entropy. We believe that innovation must be a driving force of York IT, from daily activities to strategic goals.

### Agility

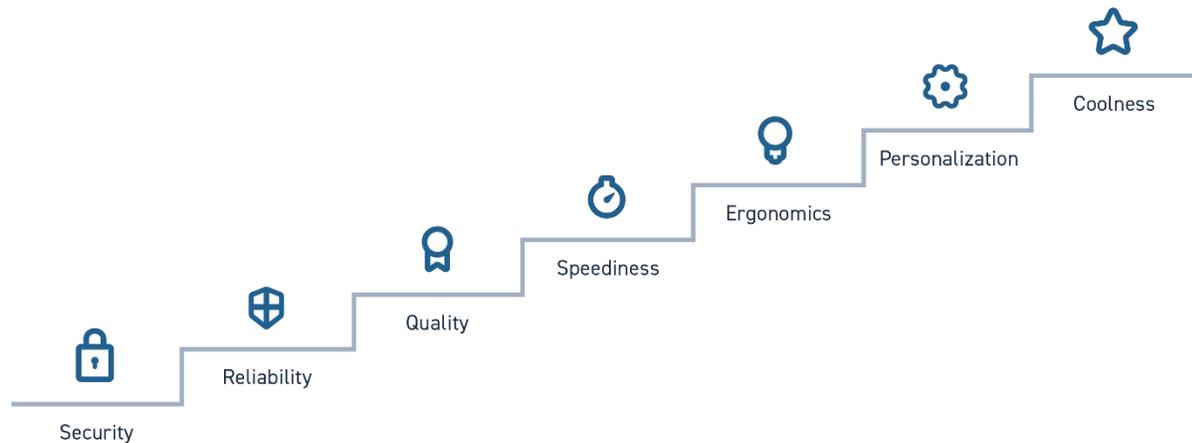
Innovation is not possible if the institution cannot act promptly and adapt to a rapidly changing and unpredictable environment. The term "agile" was chosen specifically for its linkage to a valuable project management methodology York IT can draw on to innovate.

## Defining Success

The vision, mission and principles of York IT all orbit the goal of providing exceptional service that creates a rich experience for our community. But what do services that enhance a student-centred campus experience look like? Another way to pose this question is to ask what experience or services are people—students in particular—expecting from the University?

Arguably, these expectations are formed via interactions with "next-generation" IT services. These services are defined by their cloud-based, user-centered, ergonomic and typically AI-driven, characteristics and are most often associated with major technology innovators like Facebook, Apple, Amazon, Netflix and Google. This leading-edge user experience (UX) has become the new standard against which technology-based service (and perhaps service in general) is now being measured. This level of sophistication is what York IT must strive towards in order to succeed in its mission.

The idea of exceptional digital user experience can be unpacked and mapped to a hierarchical scale of attributes.



**Figure 1: Digital Experience Scale**

The lower levels are usually taken for granted and are not sufficient in themselves to meet the full expectations of today’s users. One can postulate that the more higher-level attributes that are met, assuming the preceding attributes have already been met, the more positive the overall experience. For instance, an unreliable and insecure yet speedy service will not result in a positive experience. Similarly, a “cool” feature is pointless if all other attributes are not met.

- ❖ *Security* is the most basic attribute that ensures a positive digital user experience. Users increasingly expect data privacy and integrity to be safeguarded,<sup>4</sup> and security has been considered as the number one issue for teaching and learning since 2016.<sup>5</sup>
- ❖ *Reliability* and stability are other basic attributes essential to a positive user experience. A consistent lack of reliability inevitably equates to frustrated users (e.g. service outages)
- ❖ By *quality*, we mean that the services actually create the value the user expects, including the growing expectation that value will continue to be created through additional or improved features.
- ❖ In a connected world, users have also come to expect *speedy* responses from systems, whether they are interacting with these systems transactionally via machines or in real time via human communications.<sup>6</sup>
- ❖ Users also expect a seamless, intuitive and user-friendly experience, which we encapsulate in the concept of digital *ergonomics*.
- ❖ Increasingly, users come to expect rich and personal interactivity. They expect to be “known” personally in their interactions with systems. At a basic level, this means being recognized without having to re-enter personal information (e.g. single sign-on). At a mid-level, this means having interactions customized to one’s needs. At a higher level, being known means the system can predict one’s needs (e.g. predictive analytics).

<sup>4</sup> <https://www.salesforce.com/research/customer-expectations/>

<sup>5</sup> <https://library.educause.edu/-/media/interactive-content/it-issues-trends/index.html>

<sup>6</sup> <https://www.salesforce.com/research/customer-expectations/>

- ❖ The final attribute is *coolness*. The lure of novelty is deeply engrained in people and can be a strong motivator. Fashionable, exciting and “cool” features will enhance user experience. However, cool features are quickly disregarded if they are not founded on the more solid attributes described above.

## Strategic Actions

To advance the IT strategic priorities defined in the section below, the following strategic actions will be promoted:

### Simplify and Automate

In many instances, concrete benefits will be achieved by simplifying, orchestrating and possibly automating a process. Automation alone is often insufficient for stable and enduring change if processes they build upon are flawed. Note that orchestration is the enablement of efficient process with technological support, while automation requires no intervention or input.

### Data and Analytics

Organized institutional data is required to improve student success and administrative processes. Every system must provide data and analytics that are accessible to the greatest number of users authorized through a governance framework.

### Learn and Train

Innovation cannot be accomplished without constantly learning from successes and failures, and leveraging and disseminating that learning to all with the final goal of upgrading people’s skills. Accordingly—in the spirit of continuous improvement—training and opportunities to learn must be provided on a larger scale.<sup>7</sup>

### Communicate, communicate, communicate

Communication, though often neglected, is key to successful organizational change management. It will become a focus of our activities, whether in the form of sharing information about incidents as they occur or keeping the community abreast of new initiatives.

## Strategic Priorities

IT will play a role in all priorities set in the York University Academic Plan. The core activities defined below draw from various industry reports, university documents and the consultation process described in the “Background Research” section (Appendix 2). The enterprise architecture target, which was developed through pan-university consultations, has served as a key reference in selecting the high-priority activities.

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<sup>7</sup> Change leadership and the awareness of a skills gap made it in EDUCAUSE’s Top 10 Issues 2018.

## 1. Innovative, Quality Programs for Academic Excellence

Academic excellence is the purview of the academy. However, innovative programs must often be built on a flexible digital infrastructure that enables institutional implementation. For example, skills and competence “badges”, micro-credentials and non-conventional course structures and curricula must be anchored in appropriate systems and architectures.

Activities:

- ❖ Re-architect foundational student information
- ❖ Develop curriculum management
- ❖ Improve program review and accreditation support
- ❖ Support experiential education opportunities

## 2. Advancing Exploration, Innovation and Achievement in Scholarship, Research and Related Creative Activities

Academic research is often burdened with administrative tasks (grant writing, CV formatting, ethics approval, contract preparation, periodic reporting, etc.) and research management activities (data repository, asset management, etc.). To improve research outcomes, researchers must be relieved of this burden. Thus, a full suite of research services will include proper IT solutions for these tasks and activities.

Activities:

- ❖ Facilitate the use of an integrated research CV
- ❖ Improve research ethics management
- ❖ Design and implement a new data architecture
- ❖ Improve pre- and post-award management
- ❖ Support graduate student services—admissions, funding, awards

## 3. Enhanced Quality in Teaching and Student Learning

Teaching and learning (T&L) is the core of the university mission. While support for pedagogical innovation is the responsibility of York’s Teaching Commons, which falls under the leadership of the AVP Teaching & Learning, support and innovation in learning technologies traditionally falls under the purview of York IT. As such, much effort will be allocated to T&L support and innovation in the coming years.

Activities:

- ❖ Improve classroom technologies
- ❖ Formalize teaching innovation in an eCampus innovation space
- ❖ Explore and implement new learning technologies and new web-enhanced instructional design
- ❖ Improve data access for teaching and learning
- ❖ Enhance online/blended learning
- ❖ Automate grade reporting

- ❖ Provide IT foundation for competencies management

#### 4. Take a Student-Centred Approach

The UAP defines a student-centred approach in terms of “facilitating the success of our students” and “viewing everything we do from a student lens including decisions about our academic plans, the learning environment, the campus experience, and academic support strategies.” These goals also apply to IT solutions.

As early as 2013, EDUCAUSE began identifying student success as a key issue that technology could help address. While the granular focus has shifted over time, the general message has remained true: technology has a role in improving student success and degree completion. With the application of data and analytics, earlier identification of at-risk students could result in increased student success and on-time completion rates. To achieve this, data accessibility and availability will be a necessity.

##### Activities:

- ❖ Contribute to student success through the implementation of early alert mechanisms
- ❖ Create a seamless student experience throughout the student lifecycle
- ❖ Implement student-centred designs
- ❖ Implement more mobile solutions
- ❖ Improve student advising with the help of artificial intelligence
- ❖ Simplify and accelerate grade reporting

#### 5. Enhanced Campus Experience

York IT will provide expertise in creating an “intelligent” space at Markham Campus, which will enhance the conventional student experience. In addition, York IT will work ceaselessly to establish and enhance a virtual campus experience. This priority is especially important given the large number of commuter students at York (close to 95% of its students).

##### Activities:

- ❖ Support the creation of Markham Campus as a state-of-the-art environment
- ❖ Connect people by improving faculty, staff and student communication, collaboration and ability to perform with the help of appropriate tools
- ❖ Improve user centredness and clarity of services
- ❖ Improve communication technology on and off campus

#### 6. Enhanced Community Engagement

Systems fragmentation affects not only York’s data, applications and services, but also its community. Efforts will be put into creating a sense of community within York IT (UIT, Faculties and units) and making sure the whole York community is engaged in institutional technology enhancements and innovation.

##### Activities:

- ❖ Build a pan-university IT community

- ❖ Develop an IT and Data Governance structure that involves all stakeholders

## 7. Enabling the Plan

IT is commonly—and rightfully—presented as a “business enabler”. York IT will look at all business functions with a view to cost-effectively improving them in a coordinated fashion, whether through the systematic use of data, process improvement, delivery method, etc.

### Activities:

- ❖ Improve data-informed decision making
- ❖ Implement a governance structure based on a holistic view of the institution’s IT landscape
- ❖ Advance the idea of a paperless office
- ❖ Improve capacity to deliver IT projects
- ❖ Optimize processes through simplification, standardization, automation and streamlining
- ❖ Pursue a robust open-source and open-access strategy
- ❖ Improve SHARP readiness

## Information Security

Information Security is integral to enabling the plan. Given its significance in information technology, it is given its own section in this strategic plan.

As outlined in this strategic plan, the University is adapting to and leveraging a rapidly evolving digital landscape that includes increased opportunities that come naturally with increased threats and risks. The growing global spotlight on cyber security, as well as recent noteworthy incidents at other higher education institutions, demonstrates that it is more important than ever to ensure that the institution is well prepared to appropriately manage and mitigate such risks. The goal of the information security strategy is to develop a sustainable and proactive cyber security program that balances the effective protection of user privacy and the University’s systems and data with the need to support academic innovation and agility.

Since 2007 (excepting 2012), information security has consistently been in EDUCAUSE’s Top 10 IT issues, and since 2016, it has been the top IT issue. Much like student success, the granular focus of information security has changed over the years, but it remains a topic of great significance. It is key to understand that there is no notion of completeness in information security as it is built upon layers of adaptation to the local environment and global ecosystem, and the continuously evolving nature of threats. As a result, it is vital to develop an all-encompassing, flexible approach for reducing institutional risk to information security threats and developing a strategy that is designed to keep pace with the myriad of challenges that surface due to an ever-shifting landscape.

### Activities:

- ❖ Build an institutional culture of risk-awareness and cyber-security competency
- ❖ Deploy a sustainable and extensible next-generation identity and access management system (to replace Passport York)
- ❖ Widely deploy two-factor authentication for access to university data and systems
- ❖ Improve identification and management of cyber risk
- ❖ Develop a next-generation security architecture and infrastructure

- ❖ Implement advanced threat protection for email and devices
- ❖ Introduce mobile device security management and encryption
- ❖ Ensure increased participation and leadership with regional and international partnerships to develop and utilize shared-security solutions

## Major Foundational Initiatives

From the list of strategic activities enumerated above, some are considered foundational and essential to future innovation. They are major projects that will be the primary focus in the next few years.

- ❖ Enterprise architecture framework
- ❖ Next-generation student information system
- ❖ Integration of the student lifecycle through customer relationship management
- ❖ Identity and access management
- ❖ Cognitive Student Assistant (IBM Watson)—with AVP T&L and VP Students
- ❖ Data architecture and business intelligence
- ❖ IT and data governance

## In Five Years...

Looking five years ahead, York IT and its partners will work collectively to meet the needs of the community across the full range of activities, including teaching, research, community engagement and other priority areas. It is our aspiration that, as the mission of the University is advanced, York will become an institution with seamless people-centric experiences for students, faculty and staff.

This will be achieved through the following:

1. Institutional data becoming better integrated, reliable and accessible
2. Data informing intuition and decision making
3. Technology becoming a steppingstone for academic innovation

In turn, innovation will become a key driver of institutional transformation, with technology allowing the community to re-focus their attention on more meaningful activities and interactions with others, augmenting its ability to address the complex needs of the University. Technology will become an amplifier of our collective growth, and the investments made will continue to pave the roads towards becoming a digital university.

## Appendix 1: IT Strategic Plan Steering Committee

The steering committee was responsible for managing the strategic planning process (including the consultations and the survey questions) and writing the IT Strategic Plan 2019.

<b>Name</b>	<b>Title</b>	<b>Unit</b>
Markus Biehl	Professor	Schulich School of Business
Sarah Cantrell	AVP Inst. Planning & Analysis	Office of Institutional Planning & Analysis
Lucy Fromowitz / Mario Verrilli	AVP Students Executive Director, Resources & Strategic Planning	Student Services
Will Gage	Professor and AVP Teaching & Learning	Teaching and Learning
Donald Ipperciel	Professor and Chief Information Officer	University IT
Lyndon Martin	Professor and Dean of the Faculty of Education	Faculty of Education
Richard Ooi	Senior Executive Officer	Office of the Provost
Leslie Quintanilla	Student	Political Science Department
Dominique Scheffel-Dunand	Associate Professor and Co-Principal of Glendon College	Glendon College

## Appendix 2: Background Research

The IT Strategy Plan Steering Committee (Appendix 1) surveyed trends in higher education and information technology, research papers on successful governance models and previous internal analyses, including the 2009 IT Strategic Plan, the PWC PRASE report, the Academic and Administrative Program Review (AAPR), the Institutional Integrated Resource Plan (IIRP) reports and Cubane's UniForum benchmarking documents. Research on higher education was done using reports from Gartner, EDUCAUSE, the Canadian University Council of Chief Information Officers (CUCCIO) and other sources judged to be reliable. The steering committee conducted broad consultations and strategy sessions with stakeholders and reviewed the current technology landscape at York.

### Past University Reports

A review of prior reports and assessments regarding York's information technology services reveals several common themes. These reports frequently recommend using student-centric technology for advising and for reserving academic spaces. They also recommend that classroom technology meet a minimum measurable standard, and that York increase sustainable investment in technology under the guidance of enhanced IT governance structures.

The IIRP Working Group: Student Advising report states that "[e]ffective governance, enhanced technology and a student-centred approach will support colleagues who deliver advising services, and leverage York's significant, collective institutional capacity to meet our students' needs and expectations." The IIRP Working Group: Campus Experience report notes that there are no University standards for academic spaces and recommends that York ensure that classes and labs are sustainable with a "commitment to infrastructure, governance, innovation, accessibility, and the student experience."

Several of the reports recommend that the University pilot new technologies with the intention of university-wide adoption, streamline functions to eliminate redundancy and exceptions, and address the large technology deficit to build a solid foundation supporting future growth.

### Consultations and Feedback: An Overview

The IT Strategy team also consulted with York faculty members, staff, researchers, and students on the current state of technology at the University and their desired future state. The first round of consultations, conducted from September to November 2017, included individual strategy meetings with members of the University Executive Council and focus groups with students and researchers.

The second round, conducted from January to May 2018, included a series of detailed enterprise architecture workshops facilitated by a team of consultants from KPMG with experience in higher education and technology strategy. The sessions delivered an analysis of the current state of technology, and the key business and technical requirements for central units and Faculties to meet their stated goals. The enterprise architecture exercise provides a framework for the creation of an execution roadmap, which will set out of a portfolio of programs and projects to accomplish the goals established in the IT Strategic Plan.

The third round, conducted between January and April 2019, included townhalls and meetings with a broad range of stakeholders to validate and refine a draft of the IT Strategic Plan prepared by the IT

Strategic Plan Steering Committee (Appendix 1). The draft incorporated the major themes gathered from community feedback as well as the background research described above.

### Strategy Sessions with York Leadership

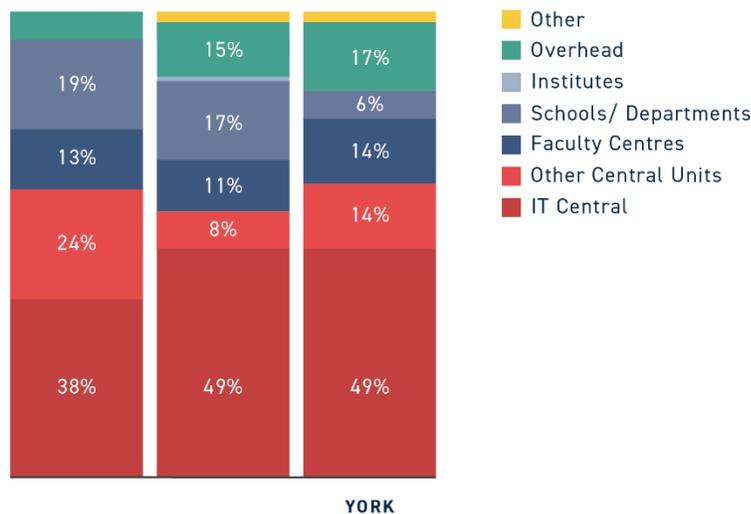
During their introductory strategy sessions, leaders from York's Faculties and administrative divisions identified their short and long-term objectives, as well as significant technology gaps and issues. Overall, they expressed a need for a more seamless, integrated student experience and for greater access to information. They also expressed the desire for a more streamlined delivery of technology services and for the simplification of some administrative processes.

Faculties, in particular, desire a strategic plan that would create an integrated, secure environment, yet allow for a range of experimentation and innovation within individual units. Many of York's Faculties have great interest in expanding online offerings and exploring ways to enhance teaching and learning through the use of technology.

Researchers, on the other hand, are requesting more customized support and increased communication about the technological solutions available, especially regarding data storage and servers.

### Technology Landscape at York

York's technology services are generally decentralized, but in line with the level of decentralization found in other Canadian universities. Figure 2 shows the proportion of Central IT services at York compared to two Canadian universities participating in Cubane's UniForum benchmarking exercise, one from the West, the other from Ontario. At York, 49% of technology is managed by Central IT, 34% by other academic units.<sup>8</sup>

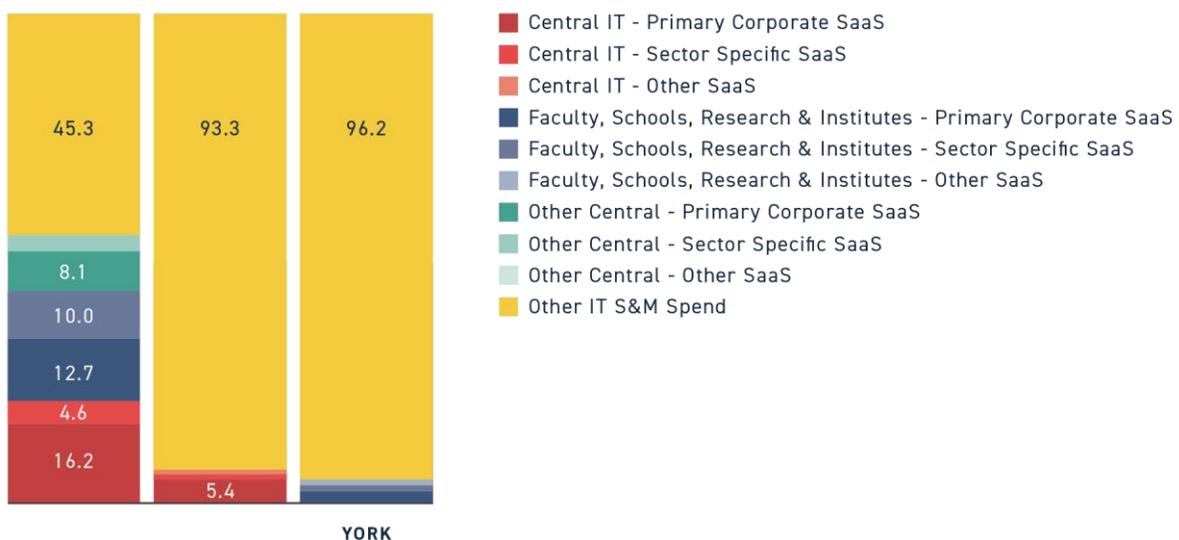


**Figure 2: Proportion of Central IT Services (shades of red) vs. IT Services in Other Units (shades of blue)**

<sup>8</sup> Figures 2 and 3 are from Cubane (2018), UniForum CAN: 2016/17 Information Technology Function Workshop.

Technology solutions differ between faculties and divisions, and individual units can have limited visibility into the technology and processes used in other units.

Like most other higher education institutions, York lags the private sector in technological development and the adoption of state-of-the-art solutions. The size and complexity of the institution has historically limited the speed and agility of York IT's ability to address problems or implement solutions. Further, enterprise-capable solutions adopted by the private sector are often purposely built to that paradigm. Adoption of such solutions in a higher education context often requires a translation or adaptation of both the processes and tools. These added activities act as complexity amplifiers even for simple solution adoption efforts. When considering cloud technology adoption, York University lags its Canadian counterparts. Figure 3 shows that most of York's applications, over 96%, are traditional on-premises solutions (data for other universities have been anonymized in all following charts for reasons of confidentiality).<sup>9</sup>



**Figure 3: Proportion of On-Premises Solutions vs. Cloud solutions**

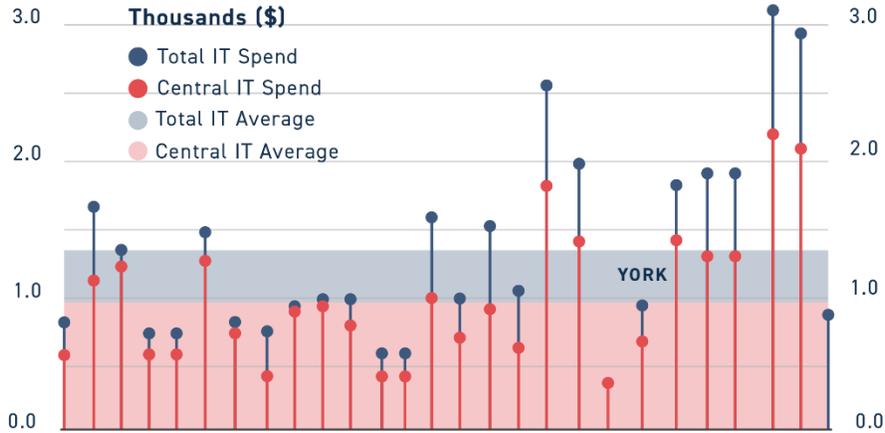
A similar pattern of underinvestment appears when considering York IT's spending per student (full-time equivalent—FTE). The following graph (figure 4), based on 2015-2016 data collected by CUCCIO, shows that York spends on average less per student FTE, both in its total institutional IT expenses and in its Central UIT expenses.<sup>10</sup> The subset of Canadian universities displayed in this graph are those with a similar complexity index to York's.<sup>11</sup>

<sup>9</sup> Note that this chart is based on data that predates the adoption of Office 365 at York. More current data would show an improvement in the adoption of cloud solutions at York, although the general situation compared to peer universities would remain substantially the same.

<sup>10</sup> The next two charts are from CUCCIO (2018). Benchmarking Report Year 2015-16.

<sup>11</sup> The Complexity Index was developed by the CAUDIT Benchmarking program in Australia. It is mathematically derived using research income, enrolment and employee FTE. A first group of Canadian universities are in the range of 1.0 to 1.9, a second group of 2.0 to 2.9 and a third of 3.0 and above. York belongs to this third group.

**2015-16 IT Spend Per Student FTE**

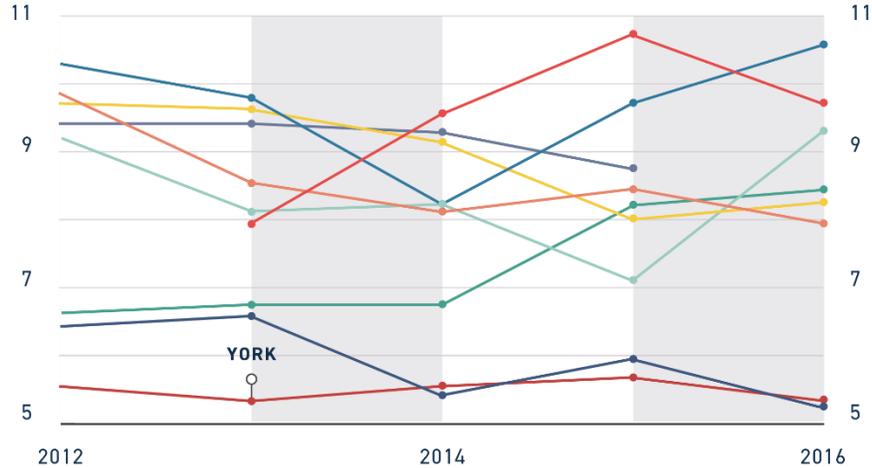


**Figure 4: 2015-16 IT Spend Per Student FTE in Canadian Universities**

This pattern is confirmed when looking at total IT spending as a percentage of institutional operating expenditures. The following chart (figure 5) compares York with similar Canadian universities (anonymized) over several years.

**2015-16 IT Spend as % of Institutional Operating Expenditures**

Universities with Complexity Index in the Range 3.0 to 9.9



**Figure 5: 2015-16 IT Spend as % of Institutional Expenditures in Canadian Universities**

Technological innovation already takes place across the University, whether it is occurring within central UIT, Faculty IT units, teaching and learning services, research areas, or inside student organizations. York is also an attractive partner for external organizations in the private and public sectors, e.g. IBM and eCampus Ontario. There are opportunities for York to advance technological innovation through information-sharing between units, the promotion and adoption of effective solutions and increased collaboration between central and Faculty units.

The costs of not adopting a strategic approach to technology are high. Low or mismanaged investments in technology risks creating the perception that York is not committed to delivering high-quality academic programs<sup>12</sup>. Furthermore, a failure to keep pace with technological change already adversely affects service delivery and the campus experience. Continued innovation on campus relies on a supportive, collaborative technological environment and a commitment from York leadership to support such an environment.

## The State of IT in Higher Education

Although lagging other sectors, the state of technology in higher education is rapidly changing. According to Gartner, close to 50% of colleges and universities have reported having already changed or having begun the process of changing their activity models toward the new paradigm of the digital university.<sup>13</sup> More digital initiatives (e.g. digital strategy, teaching and learning) are being implemented than ever before, with institutions showing a higher level of digital maturity. “Digital initiatives” ranks third (17%) in organizations’ top priorities for 2018 and 2019, after business or financial goals (25%) and revenue/business growth (24%).<sup>14</sup>

That said, Canadian universities are typically more averse to change than other global institutions, which puts them at a competitive disadvantage compared to global peers.<sup>15</sup> And compared to its Canadian peers, York is also lagging when it comes to cloud solutions (see above) and foundational technologies.

When surveyed, higher education CIOs (figure 6) declared that of the technologies that are believed to be “game changers”, digital transformation ranks third. Given its momentum in all sectors of the economy, it is unsurprising that AI tops this list. Note that while ERPs and CRMs are viewed as game changers in the educational sector, they do not even appear in the “Trailing Performers” category.

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<sup>12</sup> This is one of the Top Ten Strategic Risks for York University as an institution, as identified by an Internal Affairs risk audit and confirmed by a vote by the University Executive Committee.

<sup>13</sup> Lowendahl, J.-P. (2018). 2019 CIO Agenda: Higher Education Industry Insights. Gartner. Also, Lowendahl, J.-P. (2018). 2018 CIO Agenda: A Higher Education Perspective. Gartner.

<sup>14</sup> Ibid.

<sup>15</sup> Howard, C. (2018). 2018 CIO Agenda: A Canada Perspective. Gartner.

### Game-Changing Technologies

Percentage of Respondents

	Higher Education (n = 172)		Top Performers (n = 230)		Typical Performers (n = 2,329)		Trailing Performers (n = 276)	
1	Artificial intelligence/machine learning	24%	Artificial intelligence/machine learning	40%	Artificial intelligence/machine learning	25%	Artificial intelligence/machine learning	24%
2	Industry specific	24%	Data analytics (including predictive analytics)	23%	Data analytics (including predictive analytics)	25%	Data analytics (including predictive analytics)	21%
3	Data analytics (including predictive analytics)	17%	Cloud (including XaaS)	12%	Cloud (including XaaS)	10%	Cloud (including XaaS)	14%
4	Cloud (including XaaS)	8%	Digital transformation	10%	Internet of Things	10%	Internet of Things	11%
5	Digital transformation	8%	Mobile (including 5G)	7%	Digital transformation	9%	Digital transformation	7%
6	ERP	7%	RPA	6%	Mobile (including 5G)	6%	Industry-specific	5%
7	CRM	5%	Internet of Things	6%	Automation	5%	Business intelligence	5%
8	Immersive experience	5%	Blockchain	5%	Blockchain	4%	Automation	5%
9	Internet of Things	4%	Automation	3%	Industry-specific	4%	Blockchain	5%
10	Business intelligence	3%	Information technology	3%	Business intelligence	3%	Mobile (including 5G)	5%

Base: All answering, excluding prefer not to answer, n varies by segment  
 Showing the 10 most common answers per segment, coded open-text responses, multiple responses allowed.  
 Q: Which technology area do you expect will be a "game changer" for your organization?  
 ID: 368225

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**Figure 6: Top Technologies Defined as "Game-Changing" by CIOs**

However, when asked in which technology areas the organization will be spending the most in 2019, priorities present themselves differently.

### Technology Funding Expected to Increase in 2019

Percentage of Respondents

	Higher Education (n = 185)		Top Performers (n = 248)		Typical Performers (n = 2,540)		Trailing Performers (n = 298)	
1	Cyber/information security	48%	Artificial intelligence/machine learning	49%	Business intelligence or data analytics solution	46%	Business intelligence or data analytics solution	43%
2	Business intelligence or data analytics solution	40%	Business intelligence or data analytics solution	41%	Cyber/information security	40%	Cyber/information security	43%
3	Cloud services or solutions	36%	Digital business initiatives	40%	Cloud services or solutions	32%	Cloud services or solutions	38%
4	Core system improvements/transformation	32%	Customer/user experience	34%	Core system improvements/transformation	32%	Core system improvements/transformation	31%
5	Customer relationship management solutions	29%	Cyber/information security	33%	Digital business initiatives	32%	Enterprise resource planning	22%
6	Customer/user experience	29%	Cloud services or solutions	31%	Customer/user experience	30%	Automation	20%
7	Digital business initiatives	19%	Core system improvements/transformation	27%	Artificial intelligence/machine learning	27%	Infrastructure and data center	20%
8	Technology integration	18%	Automation	24%	Mobile applications	22%	Customer/user experience	19%
9	Software development or upgrades	18%	Infrastructure and data center	23%	Automation	22%	Technology integration	19%
10	Infrastructure and data center	17%	Mobile applications	22%	Technology integration	21%	Software development or upgrades	18%

Base: All answering, excluding prefer not to answer, n varies by segment  
 Showing the 10 most common answers per segment, multiple responses allowed, pick from a list.  
 Q: What are the technology areas where your organization will be spending the largest amount of new or additional funding in 2019?  
 ID: 368225

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**Figure 7: Top Technologies to Receive Funding Increases in 2019**

The vast majority of higher education leaders believe that technology will be driving a business model change in the coming years. The consensus also holds that the biggest barrier to this change will not be resources or the president's commitment, but rather culture. This is a clear indication that focusing efforts on fostering a culture of change will be necessary to see real change occur.

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## Appendix 3: Change Framework: Enterprise Architecture

York IT will adopt an enterprise architecture (EA) perspective in its path toward digitalizing the institution. EA is a strategic framework that adopts a holistic and integrated view of IT applications and assets, institutional activities, processes, and data and information. It defines a target state informed by the institution’s vision and creates a roadmap that facilitates changes from the current to the desired state. EA proposes governance and change management structures that support the execution of initiatives that contribute to advancing the transformational process. According to Gartner, EA is “a discipline for proactively and holistically leading enterprise responses to disruptive forces by identifying and analyzing the execution of change toward the desired business vision and outcomes.”<sup>16</sup> In the end, EA creates an integrated IT environment that enhances our ability to change.

### Core EA Principles

EA principles define the underlying general rules and guidelines for the coordinated use and deployment of IT resources and assets across the institution. These principles reflect a level of consensus among the various elements of the enterprise and form the basis for making future IT decisions.<sup>17</sup>

In this context, less is more. Among all the EA principles identified in the Open Group Architecture Framework (TOGAF), the following will be proposed to the community as guides to the institution’s EA practices:

1. Holistic approach	Design and decide based on an institutional approach
2. Value driven	Design solutions that will minimize costs and maximize value
3. Student and End-User Centricity	Design solutions taking a student and end-user perspective
4. Authoritative source of data	Manage information and data as an <i>institutional</i> asset and minimize duplication
5. Accessibility of data	Data is accessible to users, faculties and administrative units to better perform their activities
6. Reusability	Retain and reuse existing components before acquiring new ones whenever appropriate
7. Procure before build	Applications should be procured (open source or proprietary, cloud or on-premises) rather than custom-built, given funding levels
8. Adoption of leading practices	Leverage out-of-the-box product capabilities and minimize application customization
9. Interoperability	Ensure the interoperability of technological components

<sup>16</sup> B. Burton, et. al., Leadership Vision for 2019: Enterprise Architecture and Technology Innovation Leader, Gartner, 2018.

<sup>17</sup> Source: TOGAF 8.1.

10. Secure and legally compliant	Respect the requirements in terms of security, confidentiality and legality
11. Continuity and recovery	Ensure the continuity and recoverability of mission critical solutions
12. Supportable solution	Ensure that solution design will consider operational requirements and be up-to-date

In addition, EA standards, compliance processes and communication practices will be determined.

## Appendix 4: Supporting Structures

### Strategic Leadership

While essential, operational oversight is only a part of the overall accountability of the IT leadership's role. Defaulting to operational accountability often leads to operational incident management as the focus. This drives IT leadership's value primarily toward crisis management, reducing its value to the organization and limiting the achievability of the institution's strategic objectives.

The role of IT in higher education continues to expand to the point of becoming pervasive. The perception of IT is slowly transforming, from being a cost centre to a key enabler of the institution's mission.<sup>18</sup> Increasingly, key technological elements are interwoven in institutional strategy. As such, IT leadership must be positioned as a strategic institutional partner, a trusted advisor who is part of the institution's conversations and decisions.<sup>19</sup>

### Sustainable Funding

Sustainability is often associated with requests for additional funding. While this may be part of the solution, it does not address the broader complexity that needs to be considered. Sustainable funding goes beyond the balance sheet and acknowledges three factors to be tackled:

1. Technology investment or refresh has typically occurred through project-based capital expenditure funding models, which kept operating funds at a low level. However, a paradigm shift in IT services is underway where services and infrastructure are moving outside the organization, primarily in the form of cloud services. Cloud service expenditures are ongoing rather than one-time investments. This change implies a need to reconsider how technology is funded. A sustainable funding model will need to support the institution's objectives with the longer-term perspective in mind.
2. A maintenance deficit has been identified and documented at York.<sup>20</sup> The costs—both economic (including risk) and reputational—associated with maintaining York's systems must be balanced against expected benefits. Technology has a modest shelf life. Unlike building infrastructure, which can be expected to last 20, 30 or more years, technology often has a refresh cycle of 5 years or less. Sustainable funding must ensure that the technology deficit is corrected to enable—at the minimum—reliable core operations and the institution's ability to fulfil its mission.
3. The final factor is succinctly summarized by Dwight Fischer, AVP and CIO, Dalhousie University: "Failure to fund information technology adequately is failure to provide a fundamental foundation upon which to thrive in the future."<sup>21</sup> Acknowledging that technology is core to the

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<sup>18</sup> Lowendahl, J.-M. (2018). 2019 CIO Agenda: Higher Education Industry Insights. Gartner.

<sup>19</sup> According to EDUCAUSE, under the number 3 IT issue of 2018 (Institution-Wide IT Strategy), "[i]n a survey of CIOs, ECAR found that 42% of respondents serve as members of the president's or chancellor's cabinet. Those who do are positioned to have a significant impact on institutional strategy".

<https://www.educause.edu/~media/files/educause/research/2018/2018-top-ten-infographic.pdf?la=en>

<sup>20</sup> Recommendation 20 - AAPR Administrative Task Force Report

<sup>21</sup> Grajek, S (2017). Top 10 IT Issues, 2017: Foundations for Student Success. EDUCAUSE.

<https://er.educause.edu/articles/2017/1/top-10-it-issues-2017-foundations-for-student-success>

mission and function of the institution is essential. Adding more services and stretching scarce resources results in mediocrity rather than differentiated services. Certainly, efforts to eliminate waste in order to increase operational efficiency are key for immediate cost reductions. For example, reconciling existing services for their value and eliminating duplicate or ineffective services should be a short-to-medium term goal. While improving efficiencies, these changes do not in themselves ensure sustainable funding. Ultimately, new services come with a cost, and if they are deemed critical to the mission of the University, priorities must be set, and the appropriate funding models must reflect that criticality. This requires technology governance and data-informed decision making.

## Staffing and Training

Sustainability must also be reflected in staffing as it is in funding. In this case too, there are several factors to be considered. First is the nature of work within information technology. As technology has evolved, the type of work being done by IT has evolved with it. The need for programmers/developers is shifting to integrators. This calls for more vendor and service managers to handle cloud solutions, more business analysts to handle user requirements and process flows and more (enterprise) architects and data (business intelligence) analysts to support these domains. The challenge of sustainability lies in creating the appropriate staffing structure, while both new and legacy systems coexist.

The second factor to be considered is the number of IT personnel at risk of leaving. While salary is considered as part of the rationale to leave a workplace, research shows that it is rarely the primary reason for departure.<sup>22</sup> More likely factors include access to better opportunities, a more supportive environment, clearer career paths, more flexible work arrangements and better access to skills development. However, traditional loyalty in IT staff—often tied to the emotional attachment to the idea of higher education—is eroding. The new reality is less sentimental, and data shows that nearly 50% of the IT workforce is at high risk of leaving.<sup>23</sup> At York, the attrition of long-serving staff due to higher numbers of retirements compounds this reality. Further, a lack of competitive salaries creates a barrier for talent acquisition at York, where workloads compare with other sectors but often lack the corresponding compensation. Left unaddressed, these factors inevitably lead to an unstable work environment.

Identifying the problem is the first step to resolving it. The issues presented in this section are not unsurmountable obstacles and we should feel confident in our ability to advance York as a digital institution.

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<sup>22</sup> Ibid.

<sup>23</sup> Jefferey Pomerantz and D. Christopher Brooks, *The Higher Education IT Workforce Landscape, 2016*, research report (Louisville, CO: ECAR, April 2016). According to the *Campus Computing Survey* (Green, K. (2018), 2018 Campus Computing, campuscomputing.net), “more than four fifths (79 percent) of survey participants said that their campus had ‘a difficult time retaining IT talent because salaries and benefits are not competitive with off-campus job opportunities’”.