Comprehensive Review of the University's IT Functions

Executive Summary Report
The University of Guelph ("U of G") engaged PricewaterhouseCoopers (PwC) to conduct a comprehensive review of major IT functions and organizational structures across the University to (a) understand the current IT landscape, and (b) ensure IT is positioned as a strategic enabler for the future of the institution. The review assessed the state of IT on campus, including identifying best practices for University IT, opportunities for greater effectiveness and efficiencies in service delivery, and any major gaps in IT services, systems, infrastructures, and governance.

### Scope of IT Review - 6 Focus Areas

<table>
<thead>
<tr>
<th>IT Functions</th>
<th>IT Governance</th>
<th>Major Enterprise Applications</th>
<th>IT Infrastructure</th>
<th>IT Resources (FTEs)</th>
<th>IT Financials</th>
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</thead>
<tbody>
<tr>
<td>Which colleges or departmental units deliver IT functions?</td>
<td>What IT governance processes exist today?</td>
<td>What are the major business applications used by the University?</td>
<td>What are the infrastructure resources committed to IT across the University?</td>
<td>What are the total, type, and allocation of FTEs committed to IT across the University?</td>
<td>How much is the University spending and investing in IT ($)?</td>
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<tr>
<td>What are the major gaps, risks, or opportunities?</td>
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<td>What is their usage, support and cost profile?</td>
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<td>Where are they located?</td>
<td>How does it compare internally (colleges or departmental units) and externally (peers, industry, etc.)?</td>
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<tr>
<td>How well is IT running compared to leading practices and other peers?</td>
<td>What are the best practices for IT governance for a university setting?</td>
<td>What applications require remediation based on their risk or value?</td>
<td>What applications require remediation based on their risk or value?</td>
<td>What are the major gaps, risks, or opportunities?</td>
<td>What are the projects and their budget?</td>
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<tr>
<td>What are the priority functions to improve?</td>
<td></td>
<td>What are the technology trends emerging in Higher Education?</td>
<td></td>
<td>What are the major gaps, risks, or opportunities?</td>
<td>What are the opportunities to improve the University’s IT spend and revenue?</td>
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</table>
The IT Review was completed by gathering a series of inputs internal and external to the University on the needs, challenges, and opportunities with the existing IT environment. These inputs informed a set of recommendations on what actions the institution should take to establish a strong IT foundation to support the University’s strategic goals.
A core principle of the IT Review was to consult with a broad group of stakeholders across the University over 8 weeks to understand the diverse programs and services across divisions and colleges and how that impacts the needs for IT. This included a series of surveys, interviews, and workshops to gather needs from various perspectives, including:

- Senior leadership
- Department and colleges
- IT management
- IT staff
- Students

- 7 Colleges consulted
- 20+ Divisions consulted
- 150+ People consulted
- 130+ Documents collected & reviewed
- 29 Interviews
- 61 Surveys collected
- 3 Workshops conducted (~120 people)
- 8 Weekly sponsor touchpoints (status, deliverables, review, etc)
## Snapshot: Current State of U of G’s IT Footprint

### Governance
- 4 IT Committees identified:
  - IT Special Interest Group (ITSIG)\(^1\)
  - Information Technology Student Advisory Committee (ITSSAC)\(^2\)
  - Campus IT Leaders Group
  - Board for investments
- ~79 IT vendors with more than 100K cumulated spend over the last 5 years\(^8\)
- ~26 major IT Initiatives\(^6\)
  - Wireless Expansion
  - Infrastructure Upgrades
  - Security Enhancements
  - Service Desk & Desktop Mgmt Enhancements
  - Web Platform Updates

### Apps
- 10+ major apps identified (critical for business and annual costs > $100K)\(^3\)
- 150+ other major apps identified (< $100K spend)\(^3\)
- Apps represent 21% of IT Expenses\(^4\)
- ~4500+ Desktops with more than 250+ different models (⅓ managed by CCS)\(^7\)
- ~250+ Physical & ~750+ Virtual Servers\(^3\)
- Most of current infrastructure is 5+ years old with some exceptions (eg. Blackbaud, Physics, etc.)\(^3\)
- ~78 of 151 FTEs are in CCS
- Most of remaining FTEs are distributed between 9 colleges / depts
- 47% of IT spend on labour\(^5\)

### FTEs
- ~151 FTEs
- 78 of 151 FTEs are in CCS
- Most of remaining FTEs are distributed between 9 colleges / depts
- 47% of IT spend on labour\(^5\)
- ~26 major IT Initiatives\(^6\)
  - Wireless Expansion
  - Infrastructure Upgrades
  - Security Enhancements
  - Service Desk & Desktop Mgmt Enhancements
  - Web Platform Updates

### Infrastructure
- ~4500+ Desktops with more than 250+ different models (⅓ managed by CCS)\(^7\)
- ~250+ Physical & ~750+ Virtual Servers\(^3\)
- Most of current infrastructure is 5+ years old with some exceptions (eg. Blackbaud, Physics, etc.)\(^3\)
- ~$32 M annual spend\(^5\)
- 4.2% Annual IT expenses growth\(^8\)
- ~79 IT vendors with more than 100K cumulated spend over the last 5 years\(^8\)

### Financials
- ~$32 M annual spend\(^5\)
- 4.2% Annual IT expenses growth\(^8\)
- ~79 IT vendors with more than 100K cumulated spend over the last 5 years\(^8\)

### Other
- ~26 major IT Initiatives\(^6\)
- Wireless Expansion
- Infrastructure Upgrades
- Security Enhancements
- Service Desk & Desktop Mgmt Enhancements
- Web Platform Updates

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These numbers are directional based on the data we were able to collect throughout the project.

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\(^1\) ITSIG - This group meets once a month to discuss IT issues, share information and to foster a greater sense of community amongst IT staff on campus.

\(^2\) ITSSAC - Its membership includes representatives from college student governments across campus as well as members at large to discuss current and new IT initiatives and is mandated to submit a report each year.

\(^3\) Detailed Data Collection Template from 9 out 10 of the largest colleges or departmental units with IT footprint; Major Applications as defined by either more than 1 FTE support, highly critical for day to day operations and/or large user group (more than 100 users)

\(^4\) Finance Data - Op Exp Sum by Object Code - 2016/2017 expenses are as of April 10, 2017 - Apps defined as 62710 and 63751

\(^5\) Finance Data - Total Expenses by Unit - 2016/2017 expenses are as of April 10, 2017

\(^6\) IT Review Shared Folder - MAJOR IT INITIATIVES provided by CCS

\(^7\) Based on interview with CCS estimation of current coverage of desktops in the environment and Data Collection Template - a majority of them are standard models (60%+ compliance)

\(^8\) Finance Data - Op Exp By Vendor by Object - 2016/2017 expenses are as of April 18, 2017

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Based on the consultations and data collected, the figure on the right presents a University-wide view of the current IT environment across the different areas of review.
The following chart illustrates a heat map of the IT functions identified as opportunities for improvement across the University through a stakeholder workshop.
Key Recommendations (1/2)

- A set of 11 recommendations are proposed for U of G to establish a strong IT foundation for positioning the University for the future.

- U of G should start by putting the foundational recommendations in place before building the pillars - the University needs a lead, a plan, and a way to make decisions.

- Many recommendations are interconnected - their real value is realized when they work together as a recipe for a well-functioning IT.

U of G IT PILLARS

1. Enterprise Architecture
2. IT Governance
3. IT Strategy
4. IT Leadership
5. IT Functions
6. People Management
7. IT Funding Model
8. Data
9. Communication
10. Risk and Compliance
11. Innovation

U of G IT FOUNDATION
## Key Recommendations (2/2)

<table>
<thead>
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<th>1 - IT Leadership</th>
<th>2 - IT Governance</th>
<th>3 - IT Strategy</th>
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<tbody>
<tr>
<td>Clarify the role of the CIO for the University and hire a new CIO to drive the recommendations from the IT review forward.</td>
<td>Establish institution-wide IT governance as a key vehicle in supporting decisions that advance the Strategic Framework as well as departmental needs and the University's goals.</td>
<td>Develop a 5-year institution-wide IT Strategy &amp; Implementation Plan that defines a vision, roadmap, and metrics for how technology will enable U of G's objectives.</td>
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<th>4 - Enterprise Architecture</th>
<th>5 - IT Functions</th>
<th>6 - People Management</th>
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<td>Define a future state blueprint and roadmap for core applications and infrastructure across the institution and how they integrate with each other.</td>
<td>Define the target operating model for IT across the University with the core services to be invested in centrally or through partnerships to drive efficiencies while meeting the diverse needs across departments.</td>
<td>Work with HR to define a Workforce plan for people in IT to manage risks within the University around application support, ageing workforce, and IT skillsets required for the future.</td>
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<th>7 - IT Funding Model</th>
<th>8 - Data</th>
<th>9 - Communication</th>
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<td>Refine the IT Funding Model to align the IT budget (either centrally or departmentally) with the IT investment priorities and the scope and scale of service delivery.</td>
<td>Improve access to institutional data through data standards, clear roles &amp; responsibilities on data ownership, and tools to analyze, visualize, and report on the data from a variety of sources.</td>
<td>Foster an open and collaborative IT environment for departments to learn about common needs, current projects underway, leading practices, and emerging technologies.</td>
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<td>Improve U of G's IT risk profile through better visibility and mitigation of cyber security threats at a university-wide level, ensuring regulatory compliance (e.g. AODA) and implementing IT Disaster Recovery in alignment with the Emergency Mgmt. initiative.</td>
<td>Establish an IT-enabled innovation function to experiment with emerging technologies that will advance academic or research goals and differentiate the University.</td>
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U of G is not alone in the challenges it is facing with IT. The environmental scan has identified a number of lessons learned from peer universities in Canada and internationally who are facing similar challenges.
## 1- IT Leadership

Clarify the **role of the CIO** for the University and **hire a new CIO** to drive the recommendations from the IT review forward.

### Supporting Observations

- The Board recently approved a decision to split the roles of the CIO and Chief Librarian, and as a result, the University is currently in a state of transition while a new CIO is recruited.
- Implementing the recommendations of this review will require strong leadership and there currently lacks clarity where this ownership will lie.
- There is an inconsistent view in what is the role of IT—whether as a “utility” service or a strategic enabler to the University’s goals.

### Importance

- Not having a CIO will make it challenging to execute on most recommendations of the review forward.
- Some recommendations can be started, but will take longer to execute or not fully function without a CIO in place.
- There is risk of “rework” if recruitment is delayed as the CIO will be looking to shape their own agenda as part of their mandate.
- Clarity around the role for the future CIO is critical to the selection of the right CIO and the mandate they will fulfill.

### Peers’ Lessons

Success starts with strong leadership and a clear mandate for IT. IT is increasingly seen as a strategic partner, with some universities raising the profile of a CIO to an AVP level to have sufficient visibility and authority to drive change.

“It has to start with leadership and how they see IT and what technology is going to bring to the University.”
Establish institution-wide **IT governance** as a key vehicle in supporting decisions that advance the Strategic Framework as well as departmental needs and the University’s goals.

**Supporting Observations**

- U of G Strategic Framework will require institution-wide decisions on IT
- U of G currently lacks a university-wide IT governance structure to make key IT decisions for the institution such as IT priorities, investments, solutions, policies, and standards
- CIO is currently engaged through relationships with departments on major IT purchases; current practices do not require formal IT review against policies and reuse of existing investments
- IT costs are growing year-over-year faster than U of G’s revenue, putting increased financial pressure on the institution
- Speed of decisions on previous applications has lagged (interviews highlighted 2-3+ years between identifying a need and approval)
- Consistently #1 response identified by stakeholders during interviews, focus groups, and by other universities as foundational

**Peers’ Lessons**

An IT governance needs to be established to make key decisions and guide the direction of IT - it should be collaborative across the University, with IT as a key partner, but not ultimate leader.

**Importance**

- Governance is a cornerstone for driving central planning, coordination, and control in a decentralized IT environment
- Proper controls on acquisition of IT assets (e.g. purchasing Cloud services) is critical to avoiding duplicate investments, mitigating security risks, and ensuring solutions will be supportable
- A proper decision framework on IT investments, with well articulated benefits and risks, is critical to making informed decisions on IT
- Speed and agility of the decision process is critical to be responsive, given the pace of market change
- Funding more IT projects and budgets every year will not help to deliver IT responsibly to meet needs without a proper governance to align spend and U of G priorities

“IT needs to be a key partner at the table - not leading it”

“Governance needs to be collaborative - across levels and units”
## 3- IT Strategy

**Supporting Observations**

- U of G’s new Strategic Framework doesn’t have an accompanying IT plan; however, technology is expected to be significant enabler.
- There are currently no key IT initiatives or clear IT metrics tied to achieving the Strategic Framework.
- There is an inconsistent view in what is the role of IT - whether as a “utility” service, or a strategic enabler to the University’s goals.
- There are endless opportunities to invest in IT, but the foundational and high priority items to focus on given that the budget is constrained need to be clearly outlined and communicated.
- There is an opportunity to identify common business needs that require common solutions across the institution.
- Student expectations of IT are increasing (e.g. paperless, self service, wifi, etc.).

**Importance**

- The institution’s goals and expectations need to be translated into IT needs. Without a plan, U of G IT will lack a clear path forward and will continue to focus on the day-to-day operational pressures.
- IT is key enabler to achieve U of G’s Strategy and there are some key foundational pieces (e.g. IT strategy, governance) that are not in place today that are necessary for IT to be an enabler of the Strategy.
- The IT Strategy may include a vision for 2022 and strategic choices for applications, infrastructure and Cloud, integration, vendor management, and even emerging technologies to guide the future of U of G’s IT investments.

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**Peers’ Lessons**

IT needs a strategy that is 1) communicated across the organization 2) actionable, and 3) measurable, to prioritize its investments and to be a strategic partner to the rest of the institution.

“IT should be a strategic partner of the University in addition to operational tasks”

“Data and Metrics are important for strategy and prioritizing key initiatives”
4 - Enterprise Architecture

Define a **future state blueprint and roadmap** for core applications and infrastructure across the institution and how they integrate with each other.

<table>
<thead>
<tr>
<th>Supporting Observations</th>
<th>Importance</th>
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<tbody>
<tr>
<td>● Applications are planned in siloed manner with a lack of integration and documentation</td>
<td>Some advantages of having an Enterprise Architecture roadmap are:</td>
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<tr>
<td>● Legacy core systems (HR, Finance, SIS) have increasing risk levels around support (talent &amp; complexity)</td>
<td>● Help reduce costs around development, maintenance, upgrades, and support for key IT systems</td>
</tr>
<tr>
<td>● Applications and technology infrastructure are ageing</td>
<td>● Contribute to reduced risk and complexity of U of G’s current environment</td>
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<tr>
<td>● There currently lacks a blueprint that covers all the core systems structure, as well as a plan on how to add new systems moving forward (e.g. what happens if U of G changes HR systems?)</td>
<td>● Make it simpler to add new systems / change core systems and allow faster purchase and implementation timelines</td>
</tr>
<tr>
<td>● Expertise on each system is spread across the organization</td>
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<tr>
<td>● U of G has accumulated a lot of “technical debt” (e.g. bolts over bolts on core systems challenging the ability to drive efficiencies within systems and increasing the risk level of support internally and from the vendor)</td>
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**Peers’ Lessons**

A plan (i.e. blueprint) should be developed for the IT systems that looks at the systems as a whole across the organization and how they will work together.

“Just as buildings need blueprints, IT needs a blueprint.”

“Look at systems as a whole across the organization and how they will work together.”

“Moving towards enterprise applications and away from custom applications.”
## 5- IT Functions

**Define the target operating model** for IT across the University with the core services to be invested in centrally or through partnerships to drive efficiencies while meeting the diverse needs across departments.

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<tr>
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| ● IT has grown organically across departments to address their business needs, leading to duplication in functions. However, there is an appetite to shift more commodity infrastructure services centrally to focus on their core business.  
● Many units are dealing with external customers (Labs, Health Center, Hospitality, Open Ed, etc.) and cannot compromise on service levels required to deliver the unit's services  
● There is an opportunity to centralize common needs such as email, managed servers, and storage  
● There is an appetite from divisions to own/share more IT functions around business needs (e.g. business analysis) | ● Opportunity to operate as a connected university, while appreciating the diverse needs across departments  
● Opportunity to better manage risk through a secure infrastructure and security capabilities across the University  
● Opportunity to drive efficiencies through consolidation of IT contracts (increase buying power by leveraging the scale of U of G)  
● Opportunity to drive a coordinated, strategic approach to IT through central planning  
● Opportunity to avoid duplication of IT functions |

**Peers’ Lessons**

In larger organizations, IT should centralize where it makes sense - finding the right balance and implementing function distribution in a consistent way.

“Larger organizations should centralize where it makes sense - find the right balance and implement it in a consistent way.”
6- People Management

Work with HR to define a **Workforce plan for people in IT** to manage risks within the University around application support, ageing workforce (average age is 47 years old), and IT skillsets required for the future.

### Supporting Observations

<table>
<thead>
<tr>
<th>Acquiring, retaining, and developing people in IT is a key risk for the University in light of:</th>
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<tr>
<td>● ageing workforce (without succession planning)</td>
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<td>● Deep, specialized knowledge within key staff on customized systems (without proper documentation)</td>
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<tr>
<td>● Shortage of resources to transfer knowledge to</td>
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<tr>
<td>● Differences in pay scales</td>
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<tr>
<td>● Need for more engagement by leadership in strategic IT decision-making, priority-setting</td>
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Some systems are so customized that IT vendors are no longer able to provide support to U of G. Some skills and ageing technologies required to maintain some systems are very scarce on the market.

### Peers’ Lessons

Employee training and succession planning should be put in place to address changing skill sets and minimize risk of knowledge drain.

### Importance

- The level of risk around application support in every division is increasing every year, coupled with an increasing complexity of updating systems. U of G could face key system shut down for prolonged periods of time without the proper workforce planning and contingency plan.
- Additionally, the skills required today to run the IT environment might not be the skills required to run the future IT vision (Cloud, Digital, etc.) and there is an urgent need to plan and train people accordingly.

“Success will require a culture change.”

“The skillsets are changing and we need to adapt.”

“With small shops and people leaving, there is a great need for succession planning that is not there today.”
### 7- IT Funding Model

#### Supporting Observations

- IT expenses are growing at a faster rate than U of G revenue
- U of G is spending less in IT than industry average\(^{(1)}\) by:
  - Not refreshing apps (core apps are from 1990’s)
  - Providing limited support
  - Having IT resources wear “multiple hats” in terms of responsibilities
  - Levering students
- The chargeback model does not compensate for full cost of services
- Significant investment in IT may be required for the University to modernize its operations (i.e. “play catch up”) and support the Strategic Framework; “who will pay for this” is unclear
- There is appetite for more shared solutions across units to address common needs, putting additional pressure on the central budget
- “Haves” vs. “Have nots” - Profit center units that collect money tend to have a better IT maturity compared to cost centers

#### Importance

- Without funding available on time and in line with projects, U of G is increasing the risk of not being able to respond to emerging business needs and achieve overall strategic goals
- Funding more IT projects and budgets every year will not help without a proper governance to **align spend and U of G priorities**
- Chargebacks without clear objectives and simple processes can lead to expensive administrative/transaction costs creating inefficiencies

#### Peers’ Lessons

IT requires a funding model that 1) aligns the funding to deliver services with services provided, and 2) offers a competitive costing solution to service users.

\(^{(1)}\) Gartner 2017 - Higher Ed North America

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“Rethink alignment of funding and the chargeback model.”

“Thinking creatively about IT funding.”
8- Data

Improve **access to institutional data** through data standards, clear roles and responsibilities on data ownership, and tools to analyze, visualize, and report on the data from a variety of sources.

### Supporting Observations

- Departments and colleges consistently expressed desire for better access to institutional data (e.g. HR, Finance, Students, etc.). A common complaint heard in most interviews included: “we can’t access data” and even if we can, “we can’t use it”
- There is no official source of truth for every core system; people are using whatever data they can find
- There is a lack of clarity on custodians / owners of data or processes for requesting access to data
- There is a lack of ability for stakeholders to access data without intervention from system owners (e.g. HR, Finance, etc.)
- There is a lack of university-wide tools and expertise in data and analytics

### Importance

- There is a strong desire for better, easier, more comprehensive data (including related management of data risks) - identified as a key factor informing the need for more strategic and integrated approach to IT
- Data maturity would allow the U of G Strategic Framework to be translated into metrics
- OVC is a good example where implementing a BI solution was a necessity. It allowed them to start making data driven decisions; for example, doing program costing allowed OVC to identify actionable savings and efficiency opportunities
- Many “pockets” of IT in research are trying to solve important problems using data (Biodiversity, Food Institute, etc.). There is an opportunity to pull expertise together and define a data strategy for U of G - driving innovation and differentiating the University

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**Peers’ Lessons**

Lack of data to support decision making can become the first driver to get rid of custom/aging applications from the IT environment (well before risk, costs or support).
## 9- Communication

Foster an **open and collaborative IT environment** for departments to learn about common needs, current projects underway, leading practices, and emerging technologies.

### Supporting Observations

- There is a strong appreciation among all of those engaged in U of G's review project about the importance of IT to the future of the University, and a willingness to work together across colleges and departments to achieve a common goal.
- There is an appetite for information sharing between colleges and departments (e.g. simply sharing the list of projects).
- Some forums exist today, but they are not exhaustive. Effective communication requires going to meetings rather than having a free flow of information or published information.

### Importance

- Better collaboration and communication between IT providers can help avoid duplication and work together on shared needs.
- Examples of information U of G could start sharing in a more accessible manner are IT needs, projects, applications and contracts.

### Peers’ Lessons

Institutional IT should be transparent on initiatives - fostering conversation about common needs across the organization - to present IT as a partner.

“Transparency is important. It comes through communication and speaking in terms of common needs across the organization and between levels”. “Data is an asset that should be shared”. “Sharing project information aligns and informs people across the University.”
10- Risk and Compliance

**Improve U of G’s IT risk profile** through better visibility and mitigation of cyber security threats at a university-wide level, ensuring regulatory compliance (e.g. AODA) and implementing IT Disaster Recovery in alignment with the Emergency Management initiative.

**Supporting Observations**
- Significant progress has been made within CCS to improve the institution’s information security posture
- The security program and policies are currently focused on CCS-managed IT environment. As a result, there is a lack of visibility of the security posture and risks across the institution
- There is a lack of formal IT security policies
- The University has implemented initiatives on Disaster Recovery (DR) through a reciprocal agreement for backup services with York University. There is an opportunity to further take a more coordinated approach to institutional-wide DR planning.
- While progress has been made on the main web site, the University currently has ~4,000 smaller web pages that are not compliant to Accessibility for Ontarians with Disability Act (AODA)
- There is a lack of institution-wide policies or forums to manage IT risks and compliance to regulations

**Peers’ Lessons**
Security is a key investment area of focus for all universities we talked to. Security creates a platform to harmonize the IT environment (e.g. desktops and servers) if enforced by policy.

**Importance**
- Risk and compliance is about reducing risk for U of G and requires the right policies, controls, and resources to be successful
- A security breach or non-compliance to regulations can have a significant reputational, financial and operational impact to the University if not managed properly
- In case of a disaster, U of G could face a significant challenge getting some core systems back online

“Security and compliance need to be enforced by all stakeholders.”

*(1) Interviews with CCS*
11- Innovation

Establish an IT-enabled innovation function to experiment with emerging technologies that will advance academic or research goals and differentiate the University.

Supporting Observations

- Innovation is core to U of G’s identity
- IT-enabled innovation is becoming critical to Higher Education Institutions in both research and academics
- There are pockets of innovation today across U of G leveraging emerging technology to drive student or research outcomes (e.g. OpenEd, Food Institute, Biodiversity)
- Other colleges and divisions may benefit from applying similar innovations to modernize their services
- The primary focus for IT investments has been running the operations and managing risks with some pockets of innovation. There is a desire and a need to further leveraging IT as a strategic asset for the University in addition to running the day-to-day

Importance

- U of G is missing an opportunity: an IT-enabled innovation function (e.g. common investments in connectivity, big data platforms, etc.). This could encompass innovating in other areas (e.g. academics and research) and operationalizing these new innovations once they become the norm

Peers’ Lessons

There is often a clash of culture and capability between Academic/Teaching and IT. One solution is to create a “Hub” with co-located staff to work together on emerging technologies
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2. Our observations are based on interviews and review of documents provided to us by the University of Guelph. No additional information was provided, requested or reviewed, as per the engagement scope. As such, the observations and findings contained in this report are not meant to be exhaustive.

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