"Meeting Challenges – Seizing Opportunity":

York University Information Technology Strategy 2009

Introduction and Background

This report is the culmination of a strategic, pan-university information technology (IT) assessment. It examines how York University uses technology today, how it might use it in future, and more importantly, how information technology can be leveraged to better meet the needs and strategic objectives of the University. It proposes a strategic roadmap that defines the future direction of IT and aligns it to the University's academic priorities.

The impetus for this review and the need to revisit the University's IT plan stem from a number of factors.

- More than ever, information technology plays an integral role in serving the University's academic mission. To properly serve this mission and contribute to the overall well-being of the University going forward, difficult choices must be made given the scarcity of resources.

- The sheer size and complexity of York requires a sharpened understanding of IT infrastructure capacities and limitations. It is no longer financially viable or operationally efficient to exist as IT silos. Demands for sophisticated and integrated data management, security and related reporting as well as the ability to develop and maintain integrated, complex systems are increasingly forcing the need for enterprise solutions to the surface.

- With increased government requirements for compliance, tied funding and complex government reporting, IT is challenged to support the University in an environment characterized by competing demands and accountabilities. It is essential to leverage and enhance pan-university enterprise IT solutions, service delivery frameworks and infrastructures in order to meet the demands inherent to the changing accountability expectations.

This report responds to these pressures by:

- Identifying major initiatives or opportunities where the University can leverage IT capability to address apparent needs or support the University's strategic and operational objectives

- Providing a shared context for future planning and decision-making, recognizing that unanticipated issues and opportunities will inevitably surface

- Recommending changes to the University's IT capability (application strategy, operations/infrastructure strategy, staffing and organization, funding and governance) which will be necessary to support planned initiatives and ensure overall effective and efficient IT operations

Appendix A contains background information on the methodology that led to the development of this report.

1. Planning Context

1.1 University Strategic Priorities

The University's strategic priorities have been set out in the President's "Moving forward with the University Academic Plan", which builds on the academic priorities articulated in the 2005 University Academic Plan (UAP).

The UAP made several explicit references to information technology:

- Investing in more research infrastructure, including information technology resources
- Encouraging the use of technology for furthering internationalization at home (e.g. through online collaboration with students outside of Canada)
- Promoting learning through the use of technology where appropriate as part of the response to managing growth

Other UAP themes can be seen as having the potential to influence priority setting for information technology:

- Recognizing the importance of the classroom experience as foundational to the student experience at York
- Calling for increased collaborative research within York and beyond
- Recognizing the challenges of York as a largely commuter university when attempting to engage students and multiplying their opportunities to interact meaningfully with faculty and their peers
- Contemplating the concept of delivering "community education" that "recognizes the world outside the walls of the academy as a source of education and research partnership"
- Leveraging technology as a means to realize a commitment to achieving operational effectiveness

Supported by an "external scan", the "Moving Forward" plan reinforced the UAP through the articulation of six key strategic priorities:

- Efforts to intensify and strategically expand research activity
- Expansion of programming with a focus on the life sciences and applied sciences
- Restructuring leading to a new faculty
- Student experience
- Community relations
- Improving administrative procedures and integrated resource planning

In keeping with the University planning principle of strategic alignment, these priorities have guided to the development of strategic priorities for information technology at York.

1.2 Relevant Information Technology Trends -

In the fall of 2007, as part of the President's planning process that led to the development of its strategic priorities, the University engaged in an environmental scan

to identify prevailing themes in our external environment expected to influence the University's plans and strategies. The themes identified included:

- Globalization / internationalization
- GTA demographics
- Government decisions and political will
- Information & communication technology revolution

The scan described an external environment that is becoming increasing complex and challenging. The bounds of a university's interests are increasingly global in both competition and opportunity (e.g. students and research collaboration).   The demand for advanced education is growing due to both rising participation and, in the case of York's traditional GTA "catchment" area, significant demographic change.   Looming over these challenges is an existing and increasingly challenging fiscal environment – a situation that has grown more acute and prevalent since the development of the external scan.

The environmental scan identified information and communications technology (ICT) as one of its key themes highlighting the changing nature of the undergraduate student (a population soon to dominated by the "Internet Generation" or so-called "Digital Natives" – people that have always lived in a world of near-ubiquitous connectivity) - and the rapid rise of "web 2.0" technologies and social computing. There is t demand from this demographic to consider profoundly different means and norms of communication.

Another observation was the growing impact of digital communications technologies on scholarly work. There are new opportunities for collaboration across disciplines and physical distances and for dissemination and advancement of knowledge creation that would benefit from more fully leveraging IT.

The scan posited that a university's ability to distinguish itself and compete could hinge on its ability to successfully innovate, adapt and embrace the significant changes wrought by rapid ICT change.

The scan of technology trends undertaken for this report confirms and amplifies the trends identified in 2007:

- Consumer services lead the way: technology is playing an increasing role in "everyday" life - individuals and organizations are being exposed to a flood of technology innovations that are easily accessible via the web/internet.
- Mobility is a growing "norm": access to highly functional, connected mobile technology (laptops, smart phones, multi-function entertainment systems) is relatively inexpensive and the penetration of these devices and their diversity, already high, will soon reach almost 100%.
- Connectivity is just assumed: consumers expect to get a network connection wherever they are and therefore reasonably think that information and services should be just as available. Ubiquitous connectivity makes services (e.g. file storage, office applications) that are resident "on the network" or "in the cloud" viable.
- Students entering York are now primarily of the generation that has never lived without computers and the Internet around them. Notable, though, the ability to use Facebook, SMS, email, and iTunes does not make people "technical"; rather, it leads them to having sophisticated expectations for the use of technology.

- Social networking and communications platforms have created widespread evidence of new capabilities and norms for engaging and working with others.

Among the many implications for planning:

- Expectations for IT services are increasingly set by a responsive, "self-serve" world – we will be judged by standards set in a broader environment. Juxtaposed against this, personal, "face-to-face" interactions are expected to be high impact and "special".
- Students and to a lesser, but increasing, extent staff and faculty are comfortable with and often expect online personal interactions that transcend geography. The cost of long distance communications is nearing zero.
- Ubiquitous, reliable connectivity combined with an explosion of easy to access and use services mean that University stakeholders (faculty, staff and students) aren't necessarily dependent upon "internal" IT providers to bring innovative solutions.
- Prevalence of connected, mobile devices creates an expectation of "what I need, when I need it, where I need it".
- Stored "knowledge", whether in the form of books, journals, films, photographs, and maps will only be useful and accessible to most people if it is digital (and it will be).
- Ubiquitous connectivity and a plethora of new online tools and services raise the risk of maintaining appropriate security and privacy of information.
- Disaggregated "solutions" can be developed or delivered via an assembly of diverse, loosely connected services as an alternative to delivery via "monolithic" systems or services.
- Access, information storage and connectivity infrastructure are akin to "utilities" – always there and always "on".

The University's last IT strategy was developed anticipating the changes and opportunities of a highly connected world. What was expected has indeed emerged – perhaps beyond even what was imagined seven years ago. Organizations, including universities are only just beginning to come to terms with some the disruptive implications of this technology environment.

In a recent Educause publication, "The Tower and the Cloud", editor Richard Katz, summarizes the nature of these changes:

> *The revolution in IT is making possible the emergence of a networked information economy, one that is simultaneously centered on information and on the existence of cheap computation and persistent connection to a global network. Ubiquitous access to people and between people and information resources and services is profoundly disrupting institutions of all sorts. These disruptions include the massive empowerment of the individual consumer to do things and the ability of large-scale service and infrastructure providers to sell interoperable personal and enterprise capabilities over the network. These disruptions in turn are leading to the evolution of new creative relationships among people, new and beneficial cost structures for businesses, the unbundling of services, and the globalization of talent and economic prosperity. They are also contributing to increased fragmentation, balkanization, and politicization of discourse*

*and to the rise of new industries and approaches that will threaten
traditional ones. It is a fluid and uncertain environment.*

The University's own external scan in 2007 and Richard Katz reach similar conclusions
regarding dealing with this uncertain environment - planning is crucial. While we cannot
see the future with complete clarity, we must engage in a planning exercise that is both
flexible and adaptable to periodically reassess direction and priorities. The risk of arriving
at an accidental future is too large a risk to take.

This report forms York University's information technology strategic plan, and proposes
a response to these emergent challenges and opportunities.

1.3   Current State of Information Technology at York –

York last undertook an IT strategic planning process in 2000-2001. The plan articulated
five recommendations and a set of associated actions aimed, in large part, at improving
access and connectivity driven by a vision of a "connected campus":
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The implementation of recommendations from that strategy resulted in vital infrastructure
and service enhancements, among them:

- Renewal of the campus network
- Connection of York to the ORION research and education network
- Implementation of campus wireless
- Aggressive implementation of online student services including the student portal
- Introduction of the computer renewal program to provide computer access for
  faculty
- Implementation of over 200 "eClassrooms"
- Introduction of "YUCard" as an integrated "one card" service
- Creation of a widespread, common login - "passport york"

The prevailing and consistent theme arising from consultations with the York community
indicated the University must focus on delivering "higher value" IT services, more
focused on providing value in the areas of teaching and learning, research and
administrative efficiencies. We have invested a great deal in our IT infrastructure, but
are perhaps not gaining the greatest benefit from it.

The community consultation, survey and assessment done for this report also revealed a
number of issues and challenges with the IT environment at York:

- **An expectation of better, "customer centric" service delivery –** quality and
  process of service delivery and support in seen as inconsistent. A low level of
  confidence exists amongst the constituents of York that IT, "central IT" in
  particular, can provide quality service. Many York IT users would rather have
  improvement of service delivery, before pursuing new initiatives.
- **Clarity of service delivery –** an often cited difficulty was a lack of clarity around
  service delivery and development – what services are available, how they are
  accessed, the terms of service and who delivers them is a source of confusion
  for many at York.

- **Input into priority setting –** the process for setting priorities or addressing emergent demands or opportunities is not apparent to most in the York community.
- **Existing IT resources feel stretched –** addressing the urgent, not the important; and unable to effectively address "enterprise" problems emerged as a concern. Attempting to meet growth in service demand, features, services etc. has taken precedence over definition of policies, processes and clarity of service.
- **Ease of access and use –** there is a perception that IT services and training can be difficult to access and lack of attention to training lessens the effective use of services and tools that are available.
- **Need for improved overall management of IT investments –** York has historically invested at roughly the education sector average for IT; however, the University does not have a clear understanding of its total IT expenditures or assurance that the outcomes derived from those expenditures align with University priorities.
- **Lack of integration and an organizational approach –** the IT environment at York is diverse and complex; however, there is a distinct lack of coordination and integration across the University (e.g. applications and data).
- **No established and agreed upon University-wide principles for IT** – this has led to a lack of coordination, inconsistent goals and difficulty aligning IT efforts with University priorities.

Despite these issues, the overall sense given by staff and faculty was that IT at York was not badly "broken" or in crisis, rather the sense is that there is a distinct potential to do better. It is equally evident that the potential to leverage information technology to the benefit of the University's strategic priorities is only going to increase. There is a need to address some of the fundamental challenges with IT to ensure that York is able to respond to emerging opportunities.

2. Vision and Guiding Principles for IT at York: 2010 to 2015

The "vision" for IT at York, developed in 2001, focused on the importance of (network) connectivity and the impact of changes in communications technology:

The world of which York is a part is becoming a pervasively connected place and this "communications revolution" goes to the core of what we do as a University – teaching, learning, research and service rooted in interaction and the search for and communication of knowledge.

Our vision for technology at York is to embrace the communications revolution - to create a connected campus and through it develop a connected community.

The York University connected community will integrate the best attributes of our physical campus and the greatest strengths of information technology to enhance the way students learn; enhance the way faculty teach, advise, and conduct research; enhance the way administrators and staff provide services; and enhance the way the University itself is managed.

> *Having such an environment will enable York University to attract the best possible students, faculty, staff and external support by demonstrating our willingness to explore and exploit the possibilities that technology creates for advancing our educational and research missions.*

This vision continues to resonate today, and while much has been achieved, there is an underlying sense that while some capacity was created, it has not been exploited to its full potential for maximum benefit to the University. Looking to the future, we must extend the 2001 vision, ensuring we sustain the gains that we have made, while working toward delivering greater benefit from information technology to both support and enhance the University's strategic priorities.

Our renewed vision for technology at York is to use ubiquitous connectivity to enable innovation and collaboration in all that we do, making York an easier place to learn, research and work. This vision embraces the diversity of our constituents and community, and enhances and enriches the way York, as a whole, operates. We will strive over the next five years to provide an enterprise view of services, integrating and enhancing collaboration with all stakeholders while also balancing the specific needs and desires of each, including:

- *For researchers: IT at York will be the gateway to research IT services - connecting researchers to infrastructure, people and ideas around the world, York IT will provide the capability to access information, compute, share and collaborate.*
- *For students: IT at York will provide a single identity and a technology environment that aligns with their day-to-day behaviours. It will allow multi-location work, comprehensive support for completing administrative and academic activities online and a complete record of the student's life at York.*
- *For staff: IT at York will work in partnership to continuously improve the efficiency of administrative activities by integrating systems and enhancing end-to-end business processes.*
- *For instructors: IT at York will provide a digitally enabled teaching platform that includes classrooms, teaching tools and appropriate training and support that is consistent across the University and beyond.*
- *For leadership: IT at York will provide integrated information for decision-making, informed input into the direction of IT, and ongoing accountability for resources.*

In working toward this vision, the York community expects that the IT organization at York will:

- Drive innovation – not necessarily being the innovators, rather providing the forum, tools and processes to foster innovation
- Focus on integrated solutions – by seeking opportunities to apply technology to University processes and activities in order to improve the performance or value of the activity
- Support staff in their technology – go beyond just fixing IT systems when they're not working
- Define standards and the degree of diversity allowed across the University
- Guide the University in setting goals on the application and use of technology
- Bring faculty and leadership together on common IT issues

- Provide a technology infrastructure that fosters excellence in research and becomes a factor in attracting new faculty
- Continue to enhance the application and availability of technology to support teaching in the classroom, particularly with the growth of social networking and newer forms of interaction

3. Recommendations – Challenge and Opportunity

The future outlook for IT at York is challenging – the University has developed a broad, diverse "platform" of IT infrastructure and services that must be sustained and enhanced while, at the same time, is facing increased demand for new IT services, applications and potential opportunities.

Figure 1, below, illustrates our **framework for strategic priority setting** for information technology.
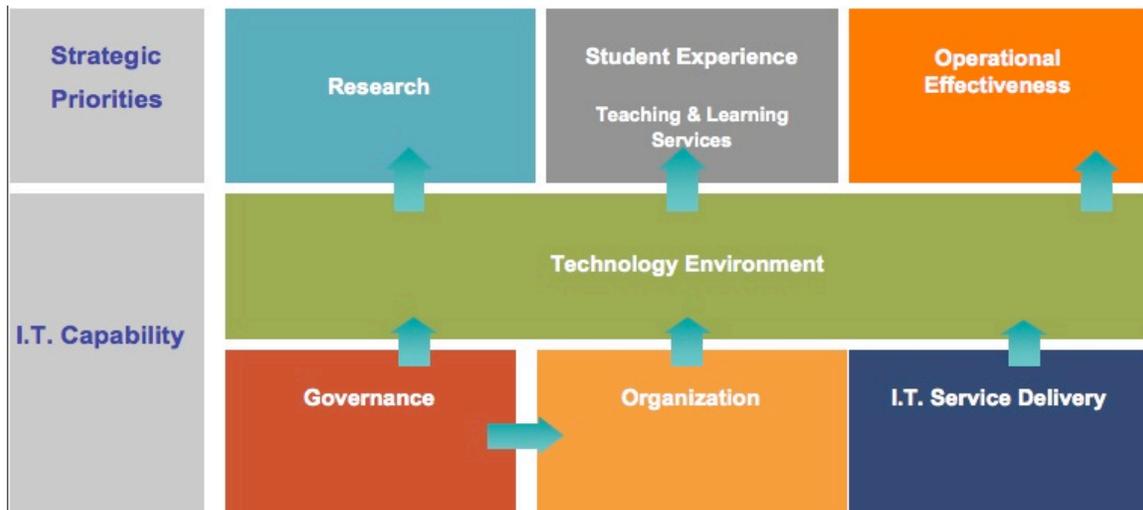

Figure 1

Information technology strategic priorities are set out in two broad areas: the foundation of "IT capability" consisting of the technology, people and processes in place to support and deliver services and solutions; and initiatives that advance the University's strategic priorities related to research, student experience and enhanced operational effectiveness.

These priorities and associated objectives are detailed below and are focused on moving toward a renewed vision for IT at York – addressing the challenge of meeting the community's expectations for improvements in our IT capability, and identifying opportunities where information technology can be used to advance the University's strategic objectives.   The plan that follows will allow University IT decision-makers to readily identify opportunities and set priorities, and allow IT planners to work quickly and effectively to act on those priorities.

3.1 Enhancing Our IT Capability

The University's ability to apply and use information technology effectively is reliant upon the quality and variety of the technology and tools available; however, the people, processes and organizational structures that "surround" the hardware and software are equally important. Taken together these components make up our IT capability:

- The processes and structures used to set priorities
- The abilities of our people and the way we choose to organize them
- The processes used to deliver services
- The quality of the technology environment itself
- The policy framework that guides planning and use of information technology

Community feedback gathered as part of this IT strategy planning process can be summarized by the view noted earlier that IT at York is not terribly "broken" - there is general recognition that York has a solid, widely available technology infrastructure; however, there are aspects of our capability that fall short of expectations. Salient requirements and expectations that were articulated included:

- Timely and knowledgeable response from IT support to address IT problems
- Improved communication from IT on services provided and changes to services to avoid disruptions in service
- "Customer centric" IT service providers who have a better understanding of and sensitivity to the work of the University;
- Clarity of roles and responsibilities of various IT service providers (Many members of the community have to engage with numerous groups for different services and lack clarity as to who to work with, on what problem, and what the service expectation should be, resulting in frustration and delays in getting IT support.)
- Greater transparency on project priority setting by the various IT groups to help users understand how and when their needs are going to met as well as which IT group will be accountable for meeting these needs

Rising to meet these expectations – to be a quality service provider, responsive to the needs to the University – is a fundamental challenge for York IT. Success in this is a prerequisite to moving forward with initiatives that advance strategic academic and supporting administrative goals of the University.

3.1.1 The Governance of Information Technology at York

Information technology governance is comprised of the processes and structures involved in providing input into and making decisions about information technology resources. That is: What decisions need to be made to ensure that technology fully supports the learning, research, student experience and administrative objectives of York? Who should make those decisions? How they will be made?

Community feedback obtained during consultation for this planning process emphasized the shortcomings of York's current IT governance.   There is no clear, shared understanding of how to provide input into priority setting or how to get IT enabled

initiatives advanced. Further, IT is not viewed as being sufficiently engaged and responsive to University priorities.

There are over a dozen groups, ranging from Faculty or Unit level groups to an executive level steering group, that have some involvement in IT direction setting and decision-making; however, there is little formal integration of the groups' mandates and processes. The roles and responsibilities of all of the groups themselves are also not uniformly documented or widely understood.

In essence, at York it is unlikely that the question "How do decisions about IT priorities get made?" can be answered easily or consistently. In the absence of well-defined processes and structures, priority setting often defaults to being made, with varying degrees of consultation, by those that control the resources that are needed to carry out an initiative.

Some of the consequences of not having an effective IT governance model were reflected above in the community's feedback. Moreover, there are additional risks of not addressing the governance challenge including an inability to deal with large, enterprise issues, to respond quickly to opportunities and, generally, little guarantee that IT funding and resources are well aligned with the University's priorities. Strategic Priority #1 and corollary objectives address this challenge.

> **Strategic Priority #1: Ensure ongoing alignment of information technology resources with University strategic priorities by putting in place clear and widely understood structures and processes for priority setting around IT.**

Research on IT governance has shown that healthy governance can bring clarity and focus, and ultimately better value from information technology investments. Specifically, as the use of information technology becomes increasingly pervasive and closely integrated with the core mission of the University, the importance of having strong processes and structures for decision-making grows. The discussion around IT is becoming increasingly about managing the University, not just managing IT.

Objective 1.1 - Clearly define advisory and decision-making structures and processes around four domains: Strategic Direction; Academic and Research Computing; Administrative Computing; and Information Technology Standards and Architecture.

A new governance model is required to move IT governance from autonomous to federal – that is, one in which there are a number of groups, each with oversight of one of the key "domains" of IT planning and decision-making, that are inter-related and co-dependent. The role, membership and decision-making responsibility of each group must be clearly defined.

This renewed approach to governance must provide for:

- Oversight at the senior level of IT strategy and guiding principles
- Priority setting via a formal review and approval of IT projects and management of a portfolio of initiatives

- Oversight of IT funding and investment in line with the institutional budget planning processes
- Measurement, reporting and review of IT performance
- Communication of IT governance decisions and processes
- Definition of, and adherence to, IT architecture and standards

Concerns were also raised through the planning consultations that there was little connection between the needs of researchers and IT decision-making and priority setting. University leadership must ensure that in the redesign of IT governance structures and processes, the interests of research and researchers are represented.

This new IT governance model must ensure that decision-making structures and processes make improved IT responsiveness a primary goal, It should also take into account the University's needs for both enterprise and smaller initiatives.

Objective 1.2 – Implement information supports for decision-making and priority setting including: project portfolio management, consolidated reporting of IT investments and IT performance.

To advance the University's academic mission, significant investments are required. As supported by community feedback, strategic investment in information technology is crucial to ensure that learning, teaching, research and administration have the necessary tools and resources to support and enhance York's future. University leadership must, through governance, ensure that IT investments do, indeed, advance institutional priorities. To do so, decision-making groups must have complete and appropriate information on:

- A context for considering new initiatives as well as those that are underway and their status (i.e. a "portfolio" of projects)
- An account of IT expenditures across the University and how they are aligned with priorities
- A process that measures how IT is performing at all levels of the University

Objectives 1.1 and 1.2 are interdependent and to be successful must be supported by robust planning processes and information related to current and proposed information technology initiatives.

Objective 1.3 – Improve the alignment of information technology initiatives with University priorities by implementing an integrated planning process, consistent with the University's broader "integrated resource planning" process, for information technology that includes all IT groups.

Using the priorities and objectives set out in this plan, along with appropriate unit level priorities (e.g. in the case of a Faculty), every IT unit should prepare an annual IT plan. While "computing plans" are currently prepared each year by most IT groups, they are done somewhat in isolation from each other.

Moving the IT planning process into the IRP context would provide a set of plans that include both "local" and "enterprise" initiatives and an integrated and consistent understanding of the institutional context.

Objective 1.4 - Introduce a student advisory body or leverage existing groups to assist in setting direction for the student technology environment.

Educational institutions enjoy a unique relationship with their students – while in many ways students can be perceived as "customers", they are also more deeply engaged with the University than that simple connotation might suggest. Increasingly, students come to the University with expectations of how technology ought to be used and the University would benefit from understanding these expectations and work to improve the student experience through the application of IT.

York's students have the potential to provide valuable perspectives and input into the direction of IT at the University. Not only are they directly affected by the University's application of IT (in services and teaching) but many are also advanced technology consumers who can be a source of ideas and innovation.

3.1.2 An Integrated, Customer centric IT Service Model

York is a large and complex institution served by a number of IT groups: University Information Technology (UIT formerly CNS and ITS) provides common, enterprise services while most Faculties and some other units have "local" IT groups that provide varying scopes of services, have different service relationships with UIT and operate with a fair degree of autonomy from "the centre". This is a structure that has evolved to its current state over time rather than by intent or design.

A decentralized organizational model like York's is typical of large universities (roughly 60% of York's IT staff work in "central" IT; – just slightly higher than average as reported in a recent survey of Canadian universities). It has provided a means for fostering innovation and responsiveness to local needs, but, arguably, at a price of lost efficiency, varying quality of service delivery and an apparent difficulty in executing on university-wide initiatives.

The natural "silo" tendency of a decentralized model has also been reinforced by the lack of strong governance – if the processes for getting one's IT related problems addressed are not clear and responsive, a common "path of least resistance" is to, within available means, establish one's own locally controlled IT.

As a consequence, the number of IT groups and variance in scope has contributed to the creation of confusion and frustration, for some community members, around accessing IT services and the consistent availability of those services.

Among the challenges documented in the planning review:

- Some "users" do not understand the IT organization, have difficulty accessing services and are uncertain what services are available to them
- The balance of services delivered between central and Faculty IT is inconsistent and not selected based on the most efficient delivery model (e.g. two central departments, multiple service desk functions)
- Enterprise-wide initiatives can be difficult to execute due to organizational silos and a complex IT governance structure

The 2001 IT Strategy document also made reference to the appropriateness and challenges or our decentralized approach to the organization of IT:

> *The hybrid structure aligns with the overall culture of decentralized control and management at York and is certainly the appropriate approach to the organization of IT resources. Our challenge is to manage the hybrid organization in such a way to continue to gain the benefits of innovation and empowerment without allowing ourselves to lapse into organizational "silos" that fragment and diffuse effort. The management challenge is one of balancing the innovation and responsiveness of the decentralized approach while maintaining architectural cohesion and economies of scale of the centralized approach.*

Achieving this balance remains at issue: to reap the value in "local" IT deployment while ensuring that all of the IT units operate in a fashion that promotes integration, efficiencies of scale, and cooperation.

Jim Davis, the CIO of UCLA, in an article "Toward an Integrated Approach" summarizes one view of trying to strike this balance:

> *"… Institutional and departmental IT units can no longer compartmentalize their services and are forced to wrestle with their respective roles, turf, and accountability about services that are inherently integrated.... Too often, we refer to IT services provided by a central organization versus those provided by individual units or departments. This has become a false dichotomy, creating an unproductive kind of competition among IT operations and preventing our common goal of a seamless, responsive, end-user IT environment."*

The findings of this current IT review strongly support the need to establish "a seamless, responsive, end-user IT environment." This vision for an IT organization speaks to the characteristics that the York community is seeking and one that can provide both effective service delivery to the University's various constituents as well as exert greater control over the growing technology portfolio and improve efficiencies.
Strategic Priority #2 provides a framework for how this can be achieved.

Strategic Priority #2: Provide a seamless, responsive information technology support and service environment through the development of a strong federated organization that provides "user-centric" support and fosters innovation through close ties with researchers, faculty and staff while supporting an efficient IT infrastructure and capacity to deliver on enterprise initiatives.

York will need to continue to work towards a balance between centralized and decentralized responsibilities for the provision of IT services. The community highly values the specialized knowledge of local staff but most also desire an IT service organization that is integrated, comprehensive, responsive, seamless and well understood – with multiple units acting as one.

A renewed organization and service model must:

- Provide a balanced structure that centralizes functions that benefit from scale, but ensures that support is available locally at the point of need
- Provide clarity of services and of roles of various IT groups, including explicit definition of service delivery processes
- Deliver quality, responsive, "customer-centric" service
- Enable greater technology standardization and integration across the University
- Enable IT to move forward with large, enterprise-wide initiatives
- Increase the ability to implement enterprise policies and standards
- Foster collaboration between the IT groups so that lessons learned and "best" practices can be leveraged by all the teams

Objective 2.1 – Provide clarity in IT service availability through the creation of a well-defined "catalogue" of services and a clear definition of roles and responsibilities amongst IT groups.

The creation of a comprehensive "service catalogue" would provide clarity to IT users at York on what services are available, terms of service, service delivery commitments, and measures of service outcome and quality. The catalogue would also serve as a starting point to define processes and roles/responsibilities of different IT groups involved in the delivery of services.

The unique needs of constituents should be accommodated in the distribution of responsibilities in order to leverage the specialized knowledge of local support groups/individuals.

Objective 2.2 – Ensure responsive, consistent, quality service delivery across the all University IT units through the development and implementation of common best practice processes based on a standard framework such as ITIL (Information Technology Infrastructure Library).

In recent years the standard frameworks available to manage IT processes and organizations has matured significantly. ITIL has emerged as the most widely accepted approach to managing the delivery of IT services.

York has had some experience with the adoption of ITIL-based processes through work done in 2001-2002 by CNS and ITS. These efforts resulted in a limited implementation; however, over time the ITIL framework itself has significantly improved, as have the supports for its implementation.

The benefit of an ITIL implementation is to bring greater order and consistency to the delivery of IT services – putting in place a foundation for ongoing service management and improvement. In order to see the greatest impact from process improvement in IT service delivery, the implementation must take a broad organizational perspective that considers all of the "players" in the delivery of services regardless of location in the organization.

To assist in the implementation, York should consider the following activities to help realize the full benefits of this process improvement initiative:

- Focus where the most impact will be realized – processes that have a direct impact on the client. (notably ITIL processes for incident, problem, change, configuration and release management).
- Set targets for service levels, not only to provide a goal for which to strive, but also clearly set expectations that the processes will mature as adoption and staff continue to use the processes.
- Document and communicate processes.

Objective 2.3 –Implement a common service desk system that supports common processes, service measurement, and integration of service delivery.

Achieving the goal of having York's distributed IT support model deliver service in a consistent, integrated fashion requires the support of a common, shared system that enforces standard processes and enables information exchange.

All of the IT units at York should share a common service desk system with all requests for support and service moving through the system. Along with common processes the system should include: a common asset repository and a shared "knowledge-base" to facilitate the aggregation and sharing of information.

Objective 2.4 – Ensure that the University has the ability to execute on its information technology priorities by providing a quality work environment, including training and development of staff in areas of strategic importance.

York's staff represents a very significant part of its IT capability. The University has seen consistent challenges over the years – shortage of some skills and difficulties in recruitment. Additional challenges are evident from this IT strategy consultation: the expectation of a greater customer focus, better knowledge of the University and adoption of new skill sets. As a result, through structured training and development and strategic recruitment the University must:

- Shift the IT culture towards a greater client focus and away from an operations focus
- Develop a staff skill set around emerging needs, for example: business process analysis and improvement; service management delivery; and project portfolio management

The University should also continue to leverage in-house expertise (e.g. students in technology and related programs) to promote technology innovation and potentially integrate student/faculty/staff collaboration within units and programs to promote knowledge transfer and build future capacity.

The need to develop IT-related skills beyond the IT functional areas is also required. Staff in functional units who work closely with IT in development and implementation of solutions will also benefit from skills in areas such as project management, training and business systems/process analysis.

3.1.3 A Sustainable Information Technology Environment

Information technology infrastructure - the networks, telecommunications systems, servers, storage, databases, application development tools etc. - is the "foundation" of our IT capability. Like physical infrastructure (e.g. building, electricity), the IT infrastructure is critical to enabling the solutions to address teaching and learning, research and administration.

One of the five major recommendations in York's 2001 IT Strategy stated that:

> *York will put in place an information technology environment that is accessible, sustainable and adaptable to change. This environment will be secure, reliable, and simple to use. It will promote innovation and flexibility by facilitating information access, communication and collaboration within the York community and beyond, removing boundaries of time and place.*

While the complete ambition of the 2001 recommendation was not achieved, substantial progress was made and recognized by the York community in the recent round of consultations. However, the community still carries the same expectations of the IT infrastructure that were articulated in 2001 - that it be accessible, sustained, adaptable, secure. Strategic Priority #3 proposes an approach to developing an adaptable and sustainable IT plan.

> *Strategic Priority #3 - Ensure that IT can adapt to the changing needs of the University and provide a sound platform for innovation through the efficient operation and sustainable development of our common IT infrastructure.*

The review of the current state of IT at York, though acknowledging the overall quality of the IT infrastructure, pointed to a number of continuing and emerging issues including the need to: improve planning, control and management of the infrastructure to ensure both the sustainability of the infrastructure and improve efficiencies; and increase streamlining of the infrastructure to reduce costs and improve the overall agility of the enterprise.

Objective 3.1 - Develop and maintain a multi-year IT infrastructure roadmap and sustainability plan.

The efforts and investments of the past number of years have provided York with an enabling IT infrastructure that is valued by the community and is certainly comparable to that of our peers. A key expectation, consistently expressed, is that this common IT infrastructure must be sustained through component and technology lifecycles and managed to ensure its utility for current and future needs.

As the infrastructure becomes more indispensable for the operation of the Institution, continued priority must be given to planning and funding the evolution of data centres, servers, storage, and networks to include reliability, resiliency and disaster recovery capability.   Increasingly, considerations related to energy efficiency and "green IT" also must be factored into our future planning.

At present there is no clearly defined sustainability framework to manage and fund the regular refresh and upgrade of essential infrastructure components of data centre facilities, computing power, storage and networking. There is a risk in episodic and reactive upgrades that can lead to a less robust and reliable IT infrastructure that has difficulty accommodating regular growth in demand and specialized needs.

The development of a multi-year sustainability plan and roadmap will ensure that there is a vehicle to manage the evolution of the infrastructure and ensure that investments required for sustainability are identified. This plan should also serve to regularize the funding/capital budgeting process for infrastructure.

Objective 3.2 - In view of continually growing challenges, improve security, and preserve the confidentiality, integrity, and availability of the enterprise infrastructure.

To date, York has had very good experience in managing the risks related to information security. However, the challenges in this domain continue to grow and change requiring the University to constantly adapt and enhance its capability and practices – particularly as the reliance on IT grows. Among the potential strategies to pursue:

- Building on the institutional records management policies, develop a data classification policy to drive standards for data ownership, decision processes and authority, security parameters and implementation relevant to the sensitivity and confidentiality of the data and systems that handle it.

- Increasing outreach and education of good security practices for end-users. Development and ICT support staff should be trained in security programming and systems management practices.

- Continuing to invest in systems to help prevent, detect and respond to security incidents.

Specific consideration should also be given to the security of data on mobile and/or unmanaged devices with all of the above.

Objective 3.3 - Improve agility and efficiency though the simplification of our IT environment – increasing standardization and integration via the definition of architectures for data, applications, and infrastructure.

The University currently supports a diverse set of technologies (including server/desktop models, operating systems, applications and application development environments) within its infrastructure. This diversity and lack of standardization increases the range of skills and knowledge required to maintain the technology environment and makes support and problem resolution more complex.

Strategies to support efficiencies through simplification will include:

a) Reducing the diversity of hardware, operating systems, vendors etc. within the IT infrastructure:

  o Identify key platforms for servers, storage, backup and networks, and define standards for hardware, operating systems and configurations -

University-wide. Deploy services on standard platforms in cases where there are no unique requirements that preclude it. Seek to operate 80% of services on standard platforms.

b) Increasing standardization of applications and reducing duplication using an application portfolio management process as starting point:

- o Introduce use of application portfolio management at an organization-wide level, including an annual review of risks and opportunities for the current application portfolio.
- o Develop an organization-wide application architecture, the "to-be" state to support ongoing application planning.
- o Develop policies to govern the addition and use of applications - an approval process for new systems and consideration of buy/build/rent.

c) Creating standards for application development:

- o Create a University standard for application development that includes languages, databases, development environments, etc. This move would reduce the support risk for applications, and increase the potential for locally developed applications to be extended for broader use and integrated into a University-wide application architecture.
- o Develop training and migration programs to support the move toward standards.
- o Develop a software and data reuse architecture with supporting processes and policies that makes it easier for developers to reuse existing functionality and data.

Objective 3.4 - The University will mature its practices used to manage the IT environment in order to improve reliability and reduce costs.

The scale and complexity of York's IT infrastructure has grown significantly over the years. However, while tools and processes are in place for measuring utilization and monitoring on most systems, there are a diverse number of tools in place and some tools provide only basic monitoring.

To respond to the growing demand on system availability the University should assess the potential for improvements to its ability to proactively manage capacity and availability of services. The consolidation, integration, and improvement of systems management tools have the potential to reduce the administrative burden on IT and to improve support provided.

Beginning with centrally (UIT) supported services there should be an inventory of current monitoring tools and an initiative to define standards that integrate with the service desk system.

Objective 3.5 - In support of measures to improve operational efficiency and the provision of management information, extend integration between key systems and data.

The University's application and data is not as integrated as it might be. This lack of integration stems, in part, from the development/purchase/implementation of applications in a manner that addressed problems or opportunities in a somewhat isolated (rather than systemic) way and in the absence of an overarching application "architecture".

The consequence of lack of system and data integration is that these become impediments to improving processes. When applications and data are not integrated, the need arises for manual processes to transfer information (for example) often resulting in delays, errors, poor data quality, and unsatisfied clients.

To identify integration opportunities, York should develop an application map using the application inventory to show the relationship between systems and "business" functions within the University. York should focus on gaps between systems where multiple systems are used for a process and where there is no linkage between the systems.

This analysis should be used to define a "data architecture" that identifies existing interfaces and repositories of data and centralizes storage of particular data items where possible, replacing (where resources and performance issues permit) "shadow databases" with live access to authoritative sources.

System integration opportunities should be considered as an alternative for consolidation opportunities that are not feasible. This is an enterprise-wide initiative and, as such, will require the involvement of both centralized and decentralized IT.

Objective 3.6 - Identify strategic opportunities for use of "cloud"/external services and create guidelines for the acquisition and operation of such services, consistent with goals of data and application security and reliability.

The vast majority of York's IT service and support is provided in a traditional manner – using onsite hardware and software. There are a growing number of alternatives for obtaining IT services and infrastructure - the services available "in the cloud" are growing in variety and maturity, as are options for obtaining specialized development skills in a global market. As we seek solutions at all levels, the University must ensure that its processes provide for consideration of these emerging opportunities while maintaining appropriate safeguards regarding data and application security and reliability.

A key enabler for the appropriate use of external services will be the development of supporting policies and guidelines for decision-makers. Currently there is uncertainty, confusion and lack of understanding regarding the implications for factors such as data protection and ownership and system integration in the use of external services. The University must develop the frameworks necessary to ensure the appropriate and effective use of such services.

Objective 3.7 - Create an office or roles for "architecture, planning and project/program management" with pan-University responsibilities.

Many of the initiatives that have been described above are reliant upon the creation of and ongoing management to standards and "architectures" (e.g. for applications, data, etc.). In order for these measures to be effective, there must be processes and

management/oversight roles established to facilitate the maintenance and adherence to the standards.

3.2   Advancing University Strategic Priorities

As has been noted earlier, the prevailing and consistent theme arising from consultations with the York community was that the University must focus on delivering "higher value" IT services, more focused on providing value in the areas of teaching and learning, research and administrative efficiencies.

There is a real and growing sense that there are a multitude of opportunities for IT to be used in a systemic way to have a significant and direct impact on the core functions of the University. Indeed, in some areas such as enterprise administration there is a belief that the gap between what we do at York and what is possible or even routine in most large organizations is large and growing.

The priorities below identify the opportunities that exist for York to begin to fulfill the potential for IT to more fully support the University's strategic priorities: enhancing our research capacity and profile, improving the student experience and improving operational effectiveness.

3.2.1 Enhancing York's Research and Research Profile

The University's academic plan and the President's "Moving Forward" plan both place significant emphasis on the intensification of research at York.   The UAP pointed to the need to:

- Intensify and widen the research culture at the University and invest in more research infrastructure
- Develop the means – both quantitative and qualitative – to measure and document York's research successes
- Complete a review of research structures and regulatory processes to ensure that they complement overall research priorities, and provide the resources to sustain the structures in place to realize research objectives
- Foster cooperative research within the University and build cooperative partnerships outside York

And the "Moving Forward" plan looked to:

- Strategic initiatives that ensure major short-term leaps forward while creating a sustainable, innovative and enhanced research culture in the long-term
- Ensure research intensification across the entire spectrum in the humanities, social sciences, fine arts and professional schools
- Investments in research infrastructure and services … to attract world-class scholars in strategic areas to drive forward York's research performance

In response to the UAP, in 2006 CNS engaged in a consultation and planning process that sought to enhance IT support for research. This process resulted in the

development of the *CNS Research Computing Support Plan*[1]. The outcomes of the consultation for this IT Strategy pointed to findings very similar to that earlier work.

The actions taken through the implementation of the *CNS Research Computing Support Plan* have seen some successes particularly in the area of consultation and coordination of larger, externally funded projects. In spite of these efforts, the impact has not been widespread and expectations of many researchers remain unfulfilled.

Supporting the University's research mission is one of the most daunting challenges for IT services. The diversity of research needs confounds both planning and provisioning of IT services, making it necessary to simultaneously provide a suite of common, reliable IT services, an infrastructure, as well as open and functioning channels of dialogue between IT and researchers, enabling facilitation of unique solutions and needs.

IT can and must enable the research mission by removing barriers to research work - including administrative, information access, and dissemination barriers - and by making channels for promotion and information dissemination readily available.

Strategic Priority #4 focuses on IT objectives that enhance the internal research experience as well as facilitate external collaboration and innovation among the research community.

> *Strategic Priority #4 - Foster innovation in research and advance York's research profile through the provision of a set of commonly available and clearly defined IT services across the research lifecycle.*

To foster and support innovation and research, IT must provide the following:

- Make it easier for researchers to find opportunities and access existing services by enhancing the visibility of these services
- Provide clear channels for consultation with faculty on IT related needs
- Provide a common, reliable "basic" IT infrastructure, thereby reducing efforts from researchers on non-research work
- Provide a variety of tools and services to facilitate the research process - e.g. automate processes for submission and grant management
- Provide robust and flexible mechanisms for the storage and dissemination of research

Objective 4.1 - Mature and formalize a common set of IT support services for research across the research life cycle.

The information technology requirements of researchers will continue to grow across the diverse disciplines at York. There is an expectation that a set of common services be available and that these services and related processes be clearly defined.

The University IT groups will work together to put in place a suite of common services of and support processes for research, tiered to match scale of varied research budgets and clearly articulated around the research project lifecycle.

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[1] http://www.yorku.ca/uit/planning_projects/CNSResearchComputing2007.pdf

The *2006 CNS Research Computing Support Plan* provides a starting point in defining the potential scope of services through all stages for the research lifecycle/process:

- Professional services: including consultation on external grant submissions, advising on the scale and nature of IT elements in submissions to ensure compatibility of support, consultation on procurement/sourcing, eligibility of IT costs with granting agency guidelines, and support for application development.
- Technical services: including desktop/laptop support; system hosting and/or management; large scale storage and backup. Web-site development.

The availability and terms (i.e. eligibility, support levels, costs) of these services will be articulated clearly via a service catalogue.

The services and support processes that are developed must also consider the flexibility (variance from standard configurations, irregular support hours, speed of response) required of many research projects.

The definition of services and processes must also define the complementary roles of different services providers ensuring that there is a clear point of contact.

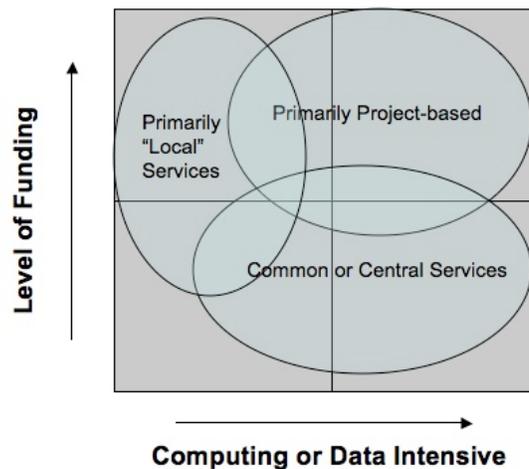Figure 2 illustrates a possible framework for discussion:

Figure 2

For example: large computing intensive projects will likely have the locus of their support within the research project, while projects with less funding may be more reliant upon central computing resources. A framework such as this should be used to ensure clarity and integration around IT services and processes for research.

Objective 4.2 - Provide a suite of collaborative tools (online meetings, web-based collaboration) suitable for use by groups within York and beyond.

Research work is becoming increasingly collaborative – involving universities and organizations around the world and there is an emerging sense that web-based

communications and collaboration resources have the potential to enable the research process from concept to project completion.

As such, researchers require more effective ways to share information securely and in a timely fashion. Faculty will become increasingly reliant on York IT to assist in providing methods to share information securely both within the University and externally with other organizations.

University IT groups will work together to specify requirements for and pilot collaborative space technologies within the research community to provide assistance with information sharing and collaboration. To yield the maximum benefit, these facilities must be easily and directly accessible by researchers ("self serve") and allow them to create their own environments and communities.

Objective 4.3 - Implement a web-based "portal" for faculty, highlighting research opportunities, active research, potential collaboration opportunities and a view into administering research.

While numerous facilities exist at York, there is no clear, comprehensive approach to the use of the web across the research project lifecycle. Web-based services, for example, could play a key role in assisting researchers in the formative planning stages by assisting them in identifying funding opportunities or information on potential collaborations.

There is an opportunity for York to leverage the portal platform that has been implemented for students to begin to integrate the fragmented information and services related to research. This portal would provide a view into relevant, personalized information and services for researchers including:

- Access to central repository of research projects that are currently underway or proposed, offering potential for collaboration
- Information on relevant external grant opportunities
- Access to internal and external repositories of research results (possibly in the Libraries) to foster collaboration and external public dissemination of results
- Provide integrated services for ongoing management of research proposals and projects

Objective 4.4 - Develop and maintain mechanisms for dissemination of research and data curation.

The ubiquity of broadband connectivity and emerging primacy of the web as a platform for communication and dissemination of information has significant implications for research and scholarly communications.

The University has an opportunity to build on the work started at York University Libraries for the preservation, promotion and dissemination of research at York. Currently the Libraries are hosting and supporting a number of electronic journals on the Open Journals Systems platform and are soliciting research, data and grey literature for storage in "Yorkspace", the institutional repository.

There is a need to expand cyber infrastructure support by developing deeper collections of health, statistical and geospatial data through initiatives such as ODESI. Data management, preservation and curation initiatives should be explored to help researchers store, share and analyze their data and related metadata. Ways of promoting the use (and re-use) of research data sets in e-research and e-learning should also be investigated.

Library services in these areas, currently led by the Digital Initiatives Librarian, need to be scaled in order to meet demands and expand at an institutional level.

3.2.2 Enhancing the Student Experience at York

The University's goals in improving student experience point to a desire to have students become more actively involved in their learning experience leading to greater engagement both as students and alumni. We have also recognized the importance of providing academic, social and personal support to connect students with their university experience – both inside and outside of the classroom.

While the foundation of a student's experience at York relates to his/her exposure to the University through the in-class experience we also recognize the importance of supporting service experiences that all students engage in as they are admitted, enroll, pay fees, obtain advising and counseling etc. as well as the quality of the facilities and environment in which they work and study.

Information technology touches on most every aspect of the student's experience – in and outside the classroom. Indeed, the University's 2001 IT Strategy, and many of its accomplishments related to the multiple dimensions of student experience – access to technology, technology in teaching and services for students.

Student expectations for the use and availability of technology have grown considerably since the first York IT Strategy in 2001. At that time, broadband internet access was just becoming commonplace, wireless access was considered a pleasant surprise, social networking services didn't exist, Web 2.0's emphasis on participation, interaction, personalization and customization was just emerging, and cell phones for students were the exception rather than the rule.

The 2008 EDUCAUSE *ECAR Study of Undergraduate Students and Information Technology*[2] found that Net Generation (born in the 1980s onwards) students:

> *"… value IT's role in providing convenience and expect IT services to be available when they need them; they actively use multiple modes of IT to communicate, socialize, and stay connected with others; they perceive themselves as net savvy; they choose mobile technologies and use of visual media; and they take advantage of Web 2.0 technologies to express themselves on the Internet in varied and creative ways. Older students*

[2] Salaway, Gail and Caruso, Judith B., with Mark R. Nelson. The ECAR Study of Undergraduate Students and Information Technology, 2008(Research Study, Vol. 8). Boulder, CO: EDUCAUSE Center for Applied Research, 2008, available from http://www.educause.edu/ecar.

show many of these characteristics as well.

> *At the same time, Net Generation students, along with older students, report that they are not looking for extensive use of IT when it comes to their academic courses. They do not take lots of entirely online courses, and most indicate that even when course lecture materials are posted online, they still attend classes. Instead there is a widespread attitude that IT resources are best situated in learning environments where technology is balanced with other learning activities, especially face-to-face interactions with faculty and students in the classroom."*

Students expect ubiquitous connectivity, through wireless access for laptops or mobile devices. Their default expectation has been characterized by the acronym WINWINI (read: win-winnie) – "what I need when I need it." In focus groups, students expressed frustration with the inconsistent access to online resources, whether from student services or individual instructors.

Strategic Priority #5 offers IT objectives in support of a high quality student experience while attending York University and an affinity to the University post graduation.

Strategic Priority #5 - Provide a convenient, integrated learning and service experience for students across the "lifecycle", recognizing their unique needs (e.g. commuter, part-time) by making more services and institutional and learning resources available online and increasingly through mobile devices.

Technology in Teaching and Learning

The teaching and learning recommendations of the 2001 IT Strategy accordingly focused primarily on the use of technology by faculty, rather than students. Of the recommended actions, the CST has taken the lead role in disseminating basic information about technology and teaching (Action 1.4), and the coordination with the Faculty Support Centre has created elements of a one-stop shop for interested faculty (Action 1.2). However, there continues to be a multitude of pockets of TEL support among the faculties, inconsistent access to resources for instructors (Actions 1.2, 1.3), and no university-wide strategy for technology in teaching and learning (Action 1.4).

As noted above, in considering any aspect of technology related to students we are now facing a very different set of student expectations. Interestingly, however, in their courses and classrooms, students prefer a moderate amount of IT, valuing the face-to-face interactions with instructors. A comprehensive survey of over 400 studies about student retention found that "face time" with both faculty and peers contributes to academic success because students feel integrated and included in the academic environment. (Veronica A. Lotkowski, Steven B. Robbins, and Richard J. Noeth, *The Role of Academic and Non-Academic Factors on Improving College Retention* (ACT, 2004), http://www.act.org/research/policymakers/pdf/college_retention.pdf).

The widespread adoption of "consumer" technologies among students has made instructors more aware of the new possibilities for restructuring the delivery of their courses. The easiest changes involve Web 1.0 strategies of simply putting course

content and resources online, which current students expect as a matter of course, for convenience (WINWINI).

More involved restructuring would take advantage of the technologies and students' expectations and expertise in online interaction. More difficult changes will create blended courses, where some of the course's learning objectives are achieved through traditional face-to-face time, and some are achieved online. The longstanding pedagogical emphasis on the importance of active learning, when combined with current technological possibilities for online interaction, has created new possibilities. These include: more collaborative student work, instructors acting as a partner or guide in creating a learning community (with librarians, other academic support partners, and students themselves) rather than as the "sage on the stage," the audience for student work expanding from the instructor to communities of discourse that include peer feedback and exchange, and course content that is publicly accessible and shared beyond the registered students. Such shifts to blended learning are more difficult because most instructors do not have the expertise (technological or pedagogical), time or incentives for such a fundamental rethinking and restructuring of their courses. And there still is uncertainty about the learning payoff from such extensive restructuring efforts.

Thus, the challenges we face are the growing expectations of students around ubiquitous access to information, which meet uneven technological availability of resources, and a limited understanding by most instructors of how they might apply technology to meaningfully enhance the learning experiences of students.

Objective 5.1 - Support the enhanced experience of mobile, web-oriented students by making more institutional and learning resources and services available online and accessible from mobile devices.

An important emerging theme is enhancing York students' institutional and learning experiences, by recognizing and responding to the particular needs of our commuter student base. Our students, most of whom work part-time, want scheduling flexibility, off-campus access to student services and learning resources, information accessible through mobile devices, and opportunities for online collaboration.

This can be accomplished by:

- Ensuring ubiquitous online access to institutional and course materials and information
- Putting in place procedures and resources to simultaneously create mobile-device access to as much institutional and course materials and information as possible
- Implementing easy-to-use digital lecture capture technology for all instructors who request it, which would provide both online and mobile-device access to classroom presentations
- Using technology to facilitate online "learning communities" in courses that, for example, can be created either by instructors or students though linkages to predefined class list information

Objective 5.2 - Improve the consistency of experience for students and faculty with technology for teaching and learning.

A second emerging theme, for instructors, is easy access to distilled and useful technology enhanced teaching and learning strategies for restructuring their courses. To make implementation possible, instructors will also require consistent, easily identifiable technical support for their efforts.

This can be accomplished by:

- Completing the plan for classroom technology equipment upgrades, so that all teaching spaces meet a minimum but highly functional standard
- Supporting the implementation of classroom technology with training and measures to ensure reliability of the technology
- Enhance room scheduling to better align instructors' use of classroom technology with assignment of rooms.
- Completing the transition to Moodle as the only supported course management system when WebCT support ends
- Developing a faculty portal with self-serve tools and training modules for technology in teaching and learning (Those tools and modules would include standardized, structured approaches to developing or enhancing blended courses.)
- Developing a framework that promotes the use of technology in course delivery in parallel with timely technology and pedagogical support to faculty members
- Standardizing the processes used to develop technology enhanced courses – exploring the potential use of workflow tools to assist in this process

The Student Experience Beyond the Classroom

The need to aggressively pursue the implementation of "web-based" services was a key thrust of the University's 2001 IT Strategy and one that has seen consistent and significant growth over the past number of years through the development of a large number of web-based, self serve features for students. The implementation of the student portal in 2008 represents a significant milestone in meeting the 2001 Strategies expectations.

The influences that drove the direction of the 2001 recommendations remain and in some cases, have intensified. As noted earlier:

- Students are coming to the University with service expectations formed by their broader "online" experience.
- Access to technology (increasingly laptop and wireless data device) is nearing 100%.
- Internet-based communications and web-based social networking type services are widely and heavily used in place of "traditional" services (e.g. Skype not telephones).

In part as a result of efforts stemming from the 2001 IT plan, the University has made significant strides in using IT to improve the student service experience - aggressive implementation of online services, the student portal, campus wireless, single logon, YUcard etc. Our primary challenge in this regard is to continue to improve - to sustain the effort and maintain parity with other schools and meet the growing expectations of

new students and our alumni. The University can also look to leverage opportunities to integrate students' own "consumer" technologies (e.g. Facebook, instant messaging, Twitter, etc.) with University-provided services.

Objective 5.3 – Meet students' expectations and increase the convenience of dealing with the University by continuing to extend online services for students.

Though great progress has been made, the University must continue to strive to meet students' service delivery expectations by continuing to expand web-based, self-service - replacing manual interactions with integrated, web-based services.

As with "operational effectiveness" issues discussed below, the migration of services for students to the web will benefit from both a student life-cycle and a process based approach. In both cases we must work towards an integrated experience for students that adopts an organizational view of services.

Among the strategies that might be pursued:

- Continue to add functionality to the student portal to integrate the vast majority of tools/services and extend access to mobile devices.
- Examine the processes that currently make use of any of the remaining manual forms with a view toward improving the overall organizational process for which the forms are used.
- Extend the use of the student portal to applicants to the University – using it as the consistent integrating platform to deliver services.
- Review/extend student e-commerce practices (e.g. charging items to YUCard vs STAC).

Objective 5.4 - Adapt York's student IT experience to be increasingly accommodating to students' laptop use/mobility.

As noted earlier, the majority of York students own laptops and virtually all own cell phones. As a result, students increasingly expect connectivity wherever they are and that the information and resources that they need will be available wherever they have connectivity.

The University should adapt to the changing nature of student work habits providing, where appropriate, an IT enabled environment "friendly" to mobile devices. Among the potential strategies:

- Continue to expand the capacity of web-based access to computer lab applications (e.g. Web Acadlabs) and migrate "lab files" storage to be "web-based" as primary access.
- Increase accommodation for laptop spaces with power, network, printing.
- Revisit the role of internally supported email - implement or source standards-based e-mail and calendar that integrate with mobile digital lifestyle
- Continue to expand/upgrade AirYork as a key service to students.

Objective 5.5 - Improve the continuity of students' experience in transitioning to Alumni

The University has long recognized the potential value of information and communications technologies in maintaining and growing relationships with its graduates/alumni. The processes that remain in place for dealing with graduates and alumni, particularly the transition from student to alumni, are disconnected rather than integrated.

The University should develop a better understanding of how the transition process can be made more seamless through the effective use of IT – fostering improved relationships with our graduates. Among the strategies that may be pursued:

- Assess the needs of graduating students/alumni and the potential role for new services and the use of the portal by Alumni.
- Give consideration to the maintenance of a consistent ID (passport York) for life (e.g. change privileges, don't cancel accounts upon graduation).

3.2.3 Enhancing York's Operational Effectiveness -

The President's "Moving Forward" plan called for "major initiatives to ensure achievement of academic objectives and the successful implementation of the UAP through streamlining current procedures, aligning resources to strategic initiatives, building administrative infrastructure to support planning and creating a culture of accountability and active performance management."

The potential for improvements in this regard were reinforced by a strong and consistent message from the York community regarding the burden of administrative processes. They are uniformly seen as complex, paper-intensive and reflective of a time when IT was lagging in providing alternative, cost effective automated options. It was also evident to many that the University's internal processes and systems are at odds with broader trends – seamless on-line experiences (enabled by the integration of systems and services) and the rising use of technology to enhance collaboration.

York has an opportunity to leverage available technology to move towards becoming an integrated, collaborative enterprise as reflected in Strategic Priority #6.

Strategic Priority #6 - Improve operational effectiveness and make York easy to work with and within by taking an organizational-wide, process oriented approach to the way work is done and by leveraging communications and collaboration technologies.

At the core of this priority is the goal to use technology combined with a broad, "system-oriented" view to change the operations, the way we get things done, at York. The aim is to move from an environment characterized by many as rigid, bureaucratic, siloed and inefficient to one that is efficient and responsive providing:

- Clear and efficient interactions amongst staff, faculty, students and external stakeholders.
- An internal community empowered to make faster and more informed decisions.
- Reduced operational costs associated with administrative activities

- The ability to collect important institutional data in a consistent and meaningful manner.

To move towards this new environment will take both organizational change as well as the effective application of existing and new technologies.

Objective 6.1 - Improve operational effectiveness and efficiency through a process improvement approach, potentially supported by broad deployment of the University's existing ERP systems beyond central functional units.

The strong, consistent feedback through the IT strategy process regarding frustration with burdensome administrative process is symptomatic of the University's lack of a strong foundation of consistent, University-wide administrative processes. In simple, general terms, work is done through "local" processes that (sometimes) connect into independent "central" processes. As a consequence work processes are disconnected and often labour-intensive requiring manual data re-entry etc.. This lack of process automation exists at a departmental or unit level - developed and implemented in isolation from other related processes and systems in other parts of the organization.

This situation has led to duplication of effort, continued high use of "paper-based" work, multiple redundant departmental systems, inconsistent work processes and data - and a source of frustration and workload for students, staff and faculty. This situation may have been tolerable in the "smaller" organization that York once was, but is far less so in one that has grown rapidly into a large, resource-strapped organization.

The improvement of administrative processes is an imperative for York. By first taking and organization-wide, "system" approach to the way work is done the University can begin to improve the effectiveness of its operations. In many instances the benefits can be deepened through the application of existing technology – in some cases tools (e.g. the PeopleSoft ERP, SIS) that we already own.

We have unexploited capacity in our ERP systems. Although the University has invested significant resources in this enterprise resource system (including financial, human and technical), it has not deployed its capabilities to the broader community. In support of the UAP and its goals, it is imperative that we maximize and expand on the capacity of these enterprise-wide systems and make access more broadly available to achieve these goals.

Research administration processes deserve particular emphasis. A common frustration voiced by researchers is the burden of cumbersome administrative processes involved in the administration of research grants. The examination of applications supported by the University also revealed a gap in this area. York may have a particular opportunity to enhance research capacity through the critical examination and improvement of end-to-end processes surrounding research administration, from application to grant completion.

Objective 6.2 - Relieve the administrative burden of manual, paper-based processes by pursuing a broad-based, enterprise approach to the use of document management and workflow technologies.

Like many large organizations York has a tremendous uses and maintains a very large volume of paper forms and documents of many types. The review conducted for this strategy confirmed other work that has been done at the University that there is significant opportunity to replace paper document and forms and their associated handling with information technology.

Introduction of integrated, enterprise-wide workflow and document management technologies, associated with process redesign, holds the potential to:

- Enhance existing enterprise investments including "office automation" (e.g. email, document creation), Peoplesoft, SIS etc..
- Improve productivity and service through improving process throughput and cycle time.
- Advance the university's records management program improving capability for compliance.
- Improve access to shared information.
- Save time in searching for documents, multiple versions etc.

Objective 6.3 - Increase ease of access to diverse applications and web-based services through the implementation of unified login/authentication capability for staff and faculty.

The University already has numerous applications and online services that require authentication. Work has been done with student applications to unify many services under Passport York for authentication purposes: however, the same has not been done for faculty and staff, and the feedback received on this issue is compelling.

Providing single login/authentication to faculty and staff will eliminate the need for multiple passwords and frequent password changes for security purposes, which currently inhibit utility of a significant number of applications.

The University could also consider an IT authentication framework that accommodates a diverse group on "non-employees" (e.g. visiting faculty, research colleagues, etc.).

To address this issue the University should implement technology for enterprise "identity management", with central authentication and provisioning of almost all systems, and an enterprise directory of all members of the community that accommodates and "links" people with multiple identities (e.g. students that are also employees) and that supports collaborative communities that extend beyond the traditional York community. This system must also support workflow for approvals of changes in status and authorization.

Objective 6.4 - Improve return from existing and future IT investments through attention to usability and provision of accessible training for end users of systems.

York has generally fallen short in providing effective, formal training in applications and their use. Accomplishing this is a daunting and resource-intensive effort for an organization as large and diverse as York. Our inability to grapple with this challenge, however, has meant that many people have had to rely upon their own ingenuity or informal traning, resulting in applications being used below capacity and with variable effectiveness.

An enterprise approach to training will be a necessary support to the success of any initiative to implement new, enterprise-wide processes and supporting technology.

This will also demand new, flexible approaches to training (e.g. online, on-demand delivery, "just-in-time" tutorials and help). As people are hard-pressed to find time to attend formal IT training sessions, there is a tendency to rely on what is readily available, often resulting in increased effort and potential rework. Training demand can also be decreased through attention to the "usability" of both processes and applications, that is, "make the right thing to do, the intuitive thing to do".

Objective 6.5 – Enable a collaborative, integrated work place through the implementation of a platform for organizational communications, collaboration, information sharing and process-based work.

Another common theme that emerged from the consultation process is the community's dissatisfaction with email reliability and the lack of options to enable work collaboration. At York is, for many, the predominant (and in some cases sole) means for facilitating information sharing and process automation, particularly when working cross-unit/division. Individuals correspond/collaborate/share information via email, send documents as attachments (debilitating our email systems), often using email as a network accessible document repository. Numerous departments/units have begun to make use of tools within their areas to facilitate information exchange, communications and collaboration; however, email is practically the sole common tool available at York to facilitate this kind of activity.

This situation exists within a broader environment where there are a large and growing number of sophisticated technologies to enable communications and collaboration (blogs, wiki's, intranets). "Lightweight" collaboration is becoming the norm, with ad hoc and long term groups appearing and disappearing frequently and able to easily leverage different modes of communications/collaboration (voice, video-conferencing, document sharing, instant-messaging etc.).

The University must move beyond email to provide its members a suite of communication and collaborative technologies that will enable work within the University and also allow participation with and from external communities.

One of the emerging concepts for this type of platform has been dubbed "unified communications and collaboration" (UCC) integrating voice, real-time conferencing, email, and various collaboration technologies. The University must begin to develop a roadmap for convergence from our current multi-vendor, multiple technology environment toward UCC. The starting point is likely to be the adoption of an integrated email/calendaring/shared workspace platform.

Objective 6.6 - Enhance access to common, high quality information for decision-making thought the implementation of a data warehouse.

Although operational reporting at the university is available and robust and continues to serve its purpose, consultation process again revealed the strong desire for access to integrated authoritative management information from a centrally managed "data

warehouse". This reinforces the importance of the data warehouse initiative that is in progress as well as the data integration objectives cited earlier.

4. Leveraging Emerging Technologies for Strategic Advantage

The priorities for information technology at York that have been outlined above generally describe ways in which IT could be used, better used or improved in order to support the University's existing strategic priorities.

In many industries information technology has gone beyond being a "supporting player" to having a transformative, disruptive affect such as the impact that information technology has had on traditional businesses like music distribution, newspapers, travel and book retailing. In these cases, competitors, sometimes new entrants, have used emerging technologies to change the shape of industries (enter Google, iTunes, Amazon, Expedia).

The IT review conducted for the purpose of developing a renewed IT strategy for York University identified several areas of potential "disruption" by emerging IT trends. A detailed examination of these trends are beyond the scope of this review, but are noted and described in Strategic Priority #7 for potential consideration by other University planning processes.

Strategic Priority #7 - Examine opportunities for the innovative use of information technology to have direct impact on strategic priorities.

Objective 7.1 - Look to the future for a potentially "transformational", IT enabled research initiative in which York could take a leadership role (e.g. digital asset aggregation/management, visualization).

Signaling what many see as a seismic shift in both the technologies underlying research support and collaboration and the increasing availability of new raw data, the concept "cyberinfrastructure" has become a topic of much attention. Cyberinfrastructure has been defined as the computing systems, data storage systems, advanced instruments and data repositories, visualization environments, and people, all linked together by software and high performance networks, to improve research productivity and enable breakthroughs not otherwise possible.

Research in all its varieties is increasingly computational and data intensive in all disciplines, with simulation and visualization becoming routine tools, requiring intensive processing and large-scale storage. Research is also increasingly framed around a problem or application fueling cross-discipline approaches and there are growing opportunities for distributed research with collaboration across institutions and geography.

Universities around the world are grappling with the implications of these changes with new disciplines and leaders emerging. York has the potential to play a leadership role in one or more of these emergent areas. In particular the area of "cyberinfrastructure in the humanities" is gaining considerable attention as the importance of large-scale computing and data needs moves rapidly beyond the realm of "big science".

Institutions as diverse as the University of Illinois at Urbana-Champaign (with The Institute for Computing in Humanities, Arts, and Social Science (I-CHASS)) and Brock University (with the Centre for Digital Humanities) are establishing initiatives in this realm. York also has collaborations that involve fine arts, the social sciences and humanities and computing science/technology; however, there may be an opportunity to foster a greater locus of attention on a project or set of projects that would better raise York's research profile.

Objective 7.2 – Pursue a transformative change in to teaching and learning at York though the development of a pan-University strategy for the use of technology in teaching and learning.

A second area of strategic impact is the potential for an institutional strategy around technology and teaching and learning. Over the past number of years York, like most Universities, has seen the broad adoption of technologies in the support of teaching and learning ranging from simple presentation technologies to the use of social media and "virtual worlds". In the vast majority of cases these uses of technology have been driven by the interest and initiative of individual faculty.

As the scale and scope of use of learning technologies grows at York and elsewhere and with rising student technology expectations and increasing enrolment competition from both geographically proximate universities and online offerings from universities across Canada and the world, there is a growing imperative to understand the potential strategic impact of technology in teaching and learning.

A pan-University strategy would address questions such as: Are we seeing the expected/desired impact from the use of technology? Can York distinguish itself strategically through the application of technology in teaching? What applications of technology might uniquely serve York's current and future students? To what degree is the application of technology in teaching and learning necessary simply to maintain parity with other Universities? Are we organized appropriately and are the necessary policies, incentives etc. in place?

On a positive note, there exists an abundance of knowledge and experience within York with regards to Teaching and Learning technologies. The early adopters have pursued instructional technology disciplines for over a decade, resulting in rich experiences and experimentations while also assisting their colleagues in furthering their adoption. However, its adoption appears to be incoherent and fraught with pursuit of diverging strategies (technical and pedagogical) and their subsequent delivery mechanisms inconsistent across the breadth of the academy. Thus, it is strongly felt that an institution wide strategy would significantly harness the knowledge and experience, provision for a methodical pedagogical and technical support structures for students and instructors, and provide the necessary framework to encourage its use.

Objective 7.3 – Further leverage the "world wide web", the Internet and associated emergent communications and collaboration capabilities to enhance University communications and reputation.

The University's web presence and its use of the web and associated technologies has grown to be a critical part of many University processes including student recruitment,

delivery of services and teaching to students, dissemination of research information and much, much more. For example in it's 2008 study of applicants the Acadmica group found that over 90% of York's "first choice" applicants cited the University web site as a source of information for their decision on what University to attend (visits to the physical campus were half that number).   The University web presence is clearly already a prime vehicle for informing prospective students and its importance in other domains is becoming equally important.

While there are many examples of innovative use of the web in a number of domains (e.g. use of blogs by faculty, multimedia and blogs by admissions), York's web presence is predominantly a first generation web site with static information. There is a potentially strategic need for an strategy for the active evolution and growth of the University's web presence that would ensure that innovation is encouraged and good practices are widely adopted; and that the University web presence grows and changes in a coherent, planned fashion.

Arguably the University's web presence – from the web site to emerging blogs, wikis and participation in social networks – has the potential to have an impact on University reputation approaching and even eclipsing its physical presence.

The University must put governance and plans in place to ensure that actively manages its online presence – not only for "control" but also to take greatest advantage of the opportunities it presents.

5.   Implementation Considerations -

This plan identifies a broad range of priorities and directions for information technology at York that serve as a fundamental context for IT planning and will ultimately be put into action through the development of annual operating plans in line with the broader University integrated resource planning processes.

The implementation plan here is meant to guide the development of operational plans by defining some principles for priority setting and from those direction on what priorities and objectives are most important in the near and longer term.

Implementation of this plan is seen as proceeding in two broad phases. In the near term (the first phase) we are guided by two key principles:

- In order to advance towards successful, strategic applications of information technology we must work from a sound foundation – we must address the evident "gaps" in our I.T. capability.
- The prevailing financial challenges must give priority to initiatives that can contribute to improvements in operational efficiency.

Initiatives in line with these principles will have the greatest positive impact on the University in the near term. With these directions firmly in place and informed by emergent strategic directions for the University (i.e. via the provost's "whitepaper" process), the second phase would bring an increasing focus on addressing the opportunities and aspirations for our use of IT to more directly advance strategic priorities.

It is important to note that the "phases" cannot be seen as distinct – there will always be activity in each of the domains that defines each of these phases (e.g. there will continue to be work done on supporting technology in learning in the near term). Rather, it is a question of emphasis (Figure 3.)
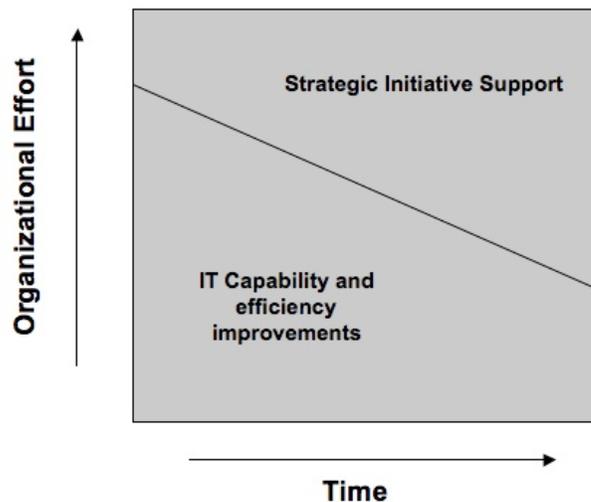

Figure 3

Transcending the entire scope of the implementation is one overarching priority, identified above as "Priority #1" – the implementation of effective I.T. governance. Processes and structures that ensure that directions for the application of information technology are aligned with University priorities is a pre-requisite for success particularly in the longer-term application of IT to University strategic priorities.

Near term (phase one) priorities –

The objectives and supporting actions described below should be pursued over the next 12 to 18 months. Resource investments required for these initiatives are not outlined in detail below – while some number can be pursued without invest beyond the effort and attention of University leadership and staff, others will likely require some incremental and/or ongoing financial commitment. Where this is likely to be the case this is noted.

The need to consider these potential investments in the near term further highlights the critical need to put in place effective governance with the capability to make these decisions.

In support of Strategic Priority #1 –

- Design and implement processes and structures as outlined in objective 1.1 along with the student advisory group described in objective 1.4;
- Develop information supports for the governance process as described in objective 1.2, particularly in the areas of project activity, IT service utilization and expenditures across the University;
- Ensure that existing planning processes for computing/IT are maintained and brought into alignment with IRP processes (per objective 1.3).

In support of Strategic Priority #2 –
- Put in place service catalogues and service agreements to improve clarity around service delivery (per objective 2.1);
- Continue the implementation of the University-wide IT service desk (objective 2.3) for "incident management" and "change management" processes (objective 2.2);

In support of Strategic Priority #3 –
- Develop the IT infrastructure "roadmap" as described in objective 3.1;
- Develop a data classification framework and policies/guidelines specifically related to mobile device security (objective 3.2);
- Complete an application portfolio analysis and a plan to work towards a common application environment (objective 3.2);
- Develop policies and guidelines to support the use of "cloud" services; identify potential current and future candidates for use of external services (object 3.6).

The above initiatives focus on making improvements to our IT capability. Resources required are generally internal staff time, though modest amounts of external services/expertise may be required in some cases.

Beyond improvements to IT capability the greatest near term opportunity for York rests in the potential to use IT to improve York's operational effectiveness – the way we get things done. Improvements in this area have the potential to drive efficiencies and

create a less burdensome work environment. Most of the initiatives will require some incremental investment and as such should be supported by appropriate justification and priority setting through the renewed governance process. Key initiatives for "phase 1":

In support of Strategic Priority #6 –
- Begin to develop the expertise and organizational knowledge around a broad process improvement initiative, addressing improvements in 1-2 key organization-wide processes to begin (objective 6.1) – *Investment required*;
- Implementation of document management technology (e.g. addressing opportunities in finance, student administration and human resources) (objective 6.2) – *Investment required*;
- Pursue the implementation of streamlined access/authentication for staff and faculty including the use of federated identity (objective 6.3) – *Investment required*;
- In conjunction with human resources ensure that adequate training and education is included in new initiatives and that adequate training is made available for existing technologies (objective 6.4) – *Investment required*.
- Develop requirements for technology to support a "collaborative work environment" (objective 6.5);
- Continue to pursue the implementation of the enterprise data warehouse (objective 6.6).

As noted earlier "phase 2" of the IT Strategy implementation will be characterized by a shift of energy more towards priorities in research, teaching and learning and student experience in general (Strategic Priorities #4 and #5). While work in these domains will continue it is expected that substantive change will be driven by definition of strategic priorities arising from current academic planning processes. In order to ensure alignment with these priorities it is recommended that the priorities and objectives in this strategy be reviewed in the next 12-18 months as University priorities become clear.

APPENDIX A

Methodology

The process used to develop this strategy involved three major stages:

- Data gathering to understanding the current University and IT environment, services and user perceptions: this included a "documentation review" (e.g. University plans/strategies; current projects, past IT plans, organization charts, etc.); over 70 working sessions/interviews involving over 300 York faculty, staff and students; an online survey for both students and faculty/staff.

- Assessment of IT at York based on information gathered, external review and targeted research: this produced a summary of expectations of the community; challenges and opportunities; areas for improvement and strengths upon which to build.

- Establishment of a vision for IT at York: through a set of workshops, developed provisional direction for IT services at York leading to final recommendations addressing the "vision" for IT, and examination of IT's role in supporting and improving academic research, the student experience, operational effectiveness, and IT capability.

The planning process was sponsored by the IT Executive Steering group and was undertaken by an IT Strategy working group with the assistance of external consultants.

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