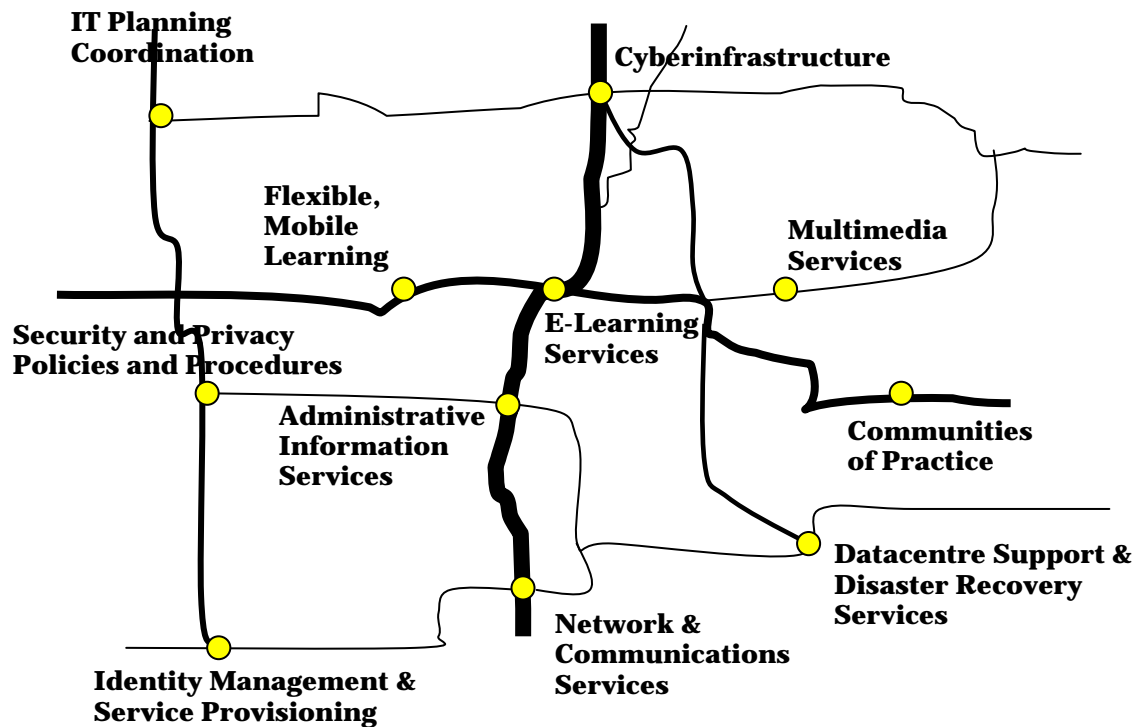


# Information Technology Planning Roadmap

– A Focus on Service Delivery –



prepared by:

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## 1. PURPOSE AND OVERVIEW

Information technology (IT) provides critical support for all important activities in higher education: teaching, learning, research, administration and community involvement. The development of our Academic Plan would be incomplete without considering the use of technology to better serve the needs of our students, faculty, support staff and our greater community. A plan for IT should follow and support the academic plans coming from the faculties, both their individual plans and the plans arising from the consolidation of these plans. The IT plan must also support the other areas of service in the University including finance, administration, physical facilities and infrastructure, alumni and community relations.

This document does not provide a grand new vision of how information technology will or might transform our University over the next five to ten years. Such a vision must be developed and evolved in concert with the academic community and aligned with the academic plan. What is presented is a strategy to follow – a roadmap – focused on a service model approach to continuous planning, improvement, measurement and assessment of key service area. Using this approach, we are confident that a grand or, at the very least, a long-term attainable vision can be developed.

This “roadmap” document is provided in advance of the academic plans for two reasons. Because IT has become a huge enabler for new ways to capture, manage, store and retrieve information, it is important to identify at an early stage new processes, approaches and opportunities IT can provide academic units as they plan for their future. This roadmap should identify possible directions in IT services and how academic units can link into the opportunities provided by these directions to help realize how each unit can contribute more fully to the academic plan. Secondly, this roadmap provides an initial view of what the full IT plan will be based on and will look like. It has been many years since a comprehensive IT plan has emerged; in developing this plan we need the full University community’s input and support to create a valuable and evolvable plan.

In the past sixteen months the Vice-Provost (IT) office has held three planning workshops focusing on: *the influence of IT on the Academic Plan* (Jan. 12, 2005), *the elements of an IT Plan* (June 3, 2005) and *identification of IT services* (Feb. 17, 2006). These have helped to shape this roadmap effort, ensuring that our IT plan does not focus on IT *per se*, rather on the services that can be delivered using IT. The remainder of this document sets the stage for a services-oriented approach to IT planning that we are promoting. We outline the current trend towards service-oriented architectures, applications delivered through web services, service identification, deployment and improvement. The Appendix describes a services’ baseline survey that we are asking faculties, support units, and/or individual faculty and staff to complete. This survey should provide both valuable self-assessment and important input for our final IT plan.

## 2. OPEN SERVICES: THE *wikipedia* STORY

We begin our IT roadmap with a story about the emergence of an open service, *wikipedia*<sup>1</sup> (see - <http://en.wikipedia.org>). We could have chosen many examples including the emerging demand for flexible, mobile learning, the growing importance of cyberinfrastructure in support of our research, and the need to better understand how to leverage the vast amounts of information in our Oracle-PeopleSoft systems to allow us to operate more effectively and efficiently. This example is interesting because it comes from an emerging area that has been given the name “social computing” and not from the traditional high profile areas such as scientific computing, health informatics or advanced networks and communications.

“What would happen if everyone could be given free access to all knowledge of the world?” This is a question that was posed by Jim Wales, the creator of *wikipedia*. He began his journey to answer this question in a project entitled *nupedia*. He spent over two years and hundreds of thousands of dollars trying to build an on-line encyclopedia the old-fashioned way – by enlisting experts to provide articles in different areas of specialization. He managed to produce 12 articles at an average cost of just over \$20,000 each. Then he struck upon the idea of using a *wiki*<sup>2</sup> (meaning *fast* in Hawaiian) to create his encyclopedia which he has since called *wikipedia*. Within a matter of weeks he made further progress on his on-line encyclopedia than he did in the previous two years of his project. Anyone who has used and followed the ascent of *wikipedia* as a knowledge support service find it to be a valuable tool for a quick, informal source of information. Does it compare favorably with the traditional authoritative sources such as Encyclopedia Britannica? Many argue that it does not and should not be used because of the high potential for error. Others feel that it should be used with caution, recommending that before taking the information as accurate one should carefully check the links provided and make an informed judgment on the use of the information provided. They cite new, somewhat controversial studies (see [www.nature.com/news/2005/051212/full/438900a.html](http://www.nature.com/news/2005/051212/full/438900a.html)) that have shown *wikipedia's* error is very comparable to those of authoritative sources such as

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<sup>1</sup> **Wikipedia** (IPA: [ˈwɪkiˈpiːdi.ə] or [ˈwɪki-/]) is a [multilingual Web-based free-content encyclopedia](#). It exists as a [wiki](#), and thus is written collaboratively by [volunteers](#), allowing most articles to be changed by anyone with access to a [web browser](#) and an [Internet](#) connection. The project began on [January 15, 2001](#), as a complement to the expert-written (and now defunct) [Nupedia](#), and is now operated by the [non-profit Wikimedia Foundation](#). Wikipedia has more than 3,700,000 articles in many languages, including more than 1,000,000 in the [English-language version](#). Since its inception, Wikipedia has steadily risen in popularity,<sup>[1]</sup> and has spawned several sister projects. Editors are required to uphold a policy of "[neutral point of view](#)" under which notable perspectives are summarized without an attempt to determine an [objective](#) truth.

<sup>2</sup> A **wiki** (IPA: [ˈwiːkiː] <wee-kee> or [ˈwɪkiː] <wick-ey><sup>[1]</sup>) is a type of [website](#) that allows anyone visiting the site to add, remove, or otherwise edit all content, very quickly and easily, often without the need for registration. This ease of interaction and operation makes a wiki an effective tool for [collaborative writing](#).

the Encyclopedia Britannica. Whatever your opinion, one cannot deny the popularity of this new type of service. Important aspects of the service are that it is open and freely available. Our new generation of learners will rarely, if ever, use a multiple volume, bound set of books called an encyclopedia. In fact, the term wikipedia may eventually replace encyclopedia in their common vocabulary (like Xerox for copier and Google for search engine). It is interesting to note that entering the search term *wikipedia* in Google yields 332M hits, *Encyclopedia Britannica* yields 22.9M hits, and *encyclopedia* yields 416M hits. The emerging popularity of several functional variations (sister projects) of the *wikipedia* theme, including wikidictionary<sup>3</sup>, wikibook<sup>4</sup>, wikinews<sup>5</sup>, wikisource<sup>6</sup>, wikispecies<sup>7</sup>, wikiquote<sup>8</sup>, and meta-wiki<sup>9</sup> adds further support for the popularity of this form of service.

*wikipedia* represents the new types of *service* that students and faculty want to use in the future. Note the emphasis on service as opposed to system or application – this is intentional because users view these as services they can select to meet their needs as they arise, in contrast to systems or applications that require substantial initial training to understand their special nuances in order to use them effectively. There are several other reasons to focus on services as outlined in the following discussion.

### 3. WHY EMPHASIZE SERVICES?

In planning for our future IT needs it is important to focus on the services that are required because a services viewpoint reflects how users are more and more thinking of their IT needs. Focusing our IT planning on the IT (hardware, software, networks, etc.) is fraught with danger because IT products, including applications, change too rapidly.

What exactly do we mean by “emphasizing IT services?” It means more than just planning for IT services; it means adopting or adapting over time systems and applications with resilient service-oriented architectures that better support integration across applications and services composed of common (or shared) sub-services. It means delivering all services in a user-friendly fashion, anywhere, at any time. Today this is possible by provisioning all of our services through the web using a web services approach. An IT services approach involves creating mechanisms to evaluate the quality of services delivered (together with processes to improve these services) and finding the appropriate funding to support and enhance services on an ongoing basis. The latter

<sup>3</sup> [http://en.wiktionary.org/wiki/Main\\_Page](http://en.wiktionary.org/wiki/Main_Page) - a free, multilingual dictionary with definitions, etymologies, pronunciations, sample quotations, synonyms, antonyms and translations (currently 131,145 entries)

<sup>4</sup> [http://en.wikibooks.org/wiki/Main\\_Page](http://en.wikibooks.org/wiki/Main_Page) - collection of free, open-content textbooks that you can edit (currently 14,000 book module in over 600 books)

<sup>5</sup> [http://en.wikinews.org/wiki/Main\\_Page](http://en.wikinews.org/wiki/Main_Page) - the free-content news source you can write!

<sup>6</sup> [http://en.wikisource.org/wiki/Main\\_Page](http://en.wikisource.org/wiki/Main_Page) - an online collection of free content source texts built by its contributors (currently has 22,689 text units).

<sup>7</sup> [http://species.wikipedia.org/wiki/Main\\_Page](http://species.wikipedia.org/wiki/Main_Page) - an open, free directory of species covering Animalia, Plantae, Fungi, Bacteria, Archaea, Protista and all other forms of life to the extent that our users allow us.

<sup>8</sup> [http://en.wikiquote.org/wiki/Main\\_Page](http://en.wikiquote.org/wiki/Main_Page) - a free online compendium of quotations from notable people (the English version has 6,422 pages with many thousands of quotations and proverbs)

<sup>9</sup> [http://meta.wikimedia.org/wiki/Main\\_Page](http://meta.wikimedia.org/wiki/Main_Page) - a website about the Wikimedia Foundation's projects, including Wikipedia, and the MediaWiki software that powers it.

implies a new model for budgeting and planning IT support that is based on service needs and not simply on models related to IT equipment, licenses and support staff salaries.

We provide more details about the directions and advantages of the IT service model approach in a short companion document entitled “*A Brief Introduction to Service-Oriented Architectures and Web Service Delivery*”<sup>10</sup>

#### 4. SERVICE IDENTIFICATION

The previous discussion provides a brief, high-level view of the technical directions related to the organization and deployment of future information systems based on services-oriented approach. Although it will take sometime for IT organizations, in general, and the University, in particular, to plan for and then develop or acquire IT systems based on service-oriented architectures, it is important to begin to move in this direction now.

Service identification is a key first step in this direction. Important sub-activities in service identification are:

- a) **Services Map** – *A services map is simply a list of all key service areas supported by information systems and who has sole or shared responsibility for these systems.*
- b) **Service Delivery Chain** – *Many services rely on other services in order to be deployed effectively and efficiently. It is important to identify service delivery chains and other associated service relationships. These elements can be used to identify critical shared processes in an organization many of which can be supported by workflow models.*
- c) **Service Areas** – *Based on the service area maps and delivery chain analysis it will be necessary to group services into identifiable service areas.*

Once service areas are developed they can be used as a basis for determining an access model for stakeholder groups (i.e. student, faculty, staff, alumni, etc.) in the University. This access model is realized in our IT systems through identity management services.

#### 5. IDENTITY MANAGEMENT AND SERVICE DEPLOYMENT

Identity management refers to the process of employing emerging technologies to manage information about the identity of users and control access to an organization’s information resources. The goal of identity management is to improve productivity and security while lowering costs associated with managing users and their identities, attributes, and credentials. The Office of the Vice-Provost (Information Technology), together with many key stakeholders, is currently examining how to improve access to IT services with respect to security, privacy, efficiency and effectiveness. A key step in this direction is the development of mature and robust identity management services that

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<sup>10</sup> See [www.vpit.ualberta.ca/planning/roadmap/introduction.php](http://www.vpit.ualberta.ca/planning/roadmap/introduction.php)

would, among other things, significantly reduce the number of usernames and passwords required by our students, staff and faculty in order to access the information services provided on campus. The goal is to develop a secure single-sign-on approach that also meets our obligations with respect to privacy and, in particular, the Freedom of Information and Protection of Privacy (FOIPP) Act requirements.

The Identity Management subcommittee of the IT Committee (see - [www.vpit.ualberta.ca/itc/](http://www.vpit.ualberta.ca/itc/)), is currently developing the set of identity management requirements that map user types against available services. These requirements will be used as a basis for developing a more substantial identity management service than what is currently provided on campus through our existing Kerberos authentication process. More will be said about identity management services planning in the next section.

## 6. NEW AND ENHANCED SERVICES

This section identifies an initial set of service opportunities made up of new and enhanced services that we believe represent important areas for new or sustained investment for the University. We also believe they are directly relevant to or in support of many of the aspirations of the four cornerstones forming the foundation of our emerging academic plan. Although the list is not complete – we need your help to make it complete – and not prioritized, it forms a starting point in the process of developing a campus IT Strategic Plan. More will be said about the continuous process of prioritizing which new and enhanced services will be selected for implementation in the next section.

The service opportunities are grouped into a set of service areas that are also not complete and undoubtedly need further review and modification. As a method of receiving concrete feedback on this roadmap, we will ask all faculties and other major units and departments to comment on and rate the value of these new or enhanced services and to add other services that are omitted from this list. We will gather your feedback using an on-line survey in a manner described in the conclusion of this paper. A summary of the feedback received will be provided to the university community and used as important input to the IT Strategic Plan.

### 6.1 *E-learning Services:*

#### **new services**

##### 6.1.1 *Evaluation, adoption and assessment of new e-learning tools*

At present, the University does not have a well-defined process to evaluate, adopt and finally assess the impact of using new tools that can assist in teaching and learning. Examples of emerging tools that should be considered are e-portfolios<sup>11</sup>, personal

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<sup>11</sup> From *wikipedia*: In [education](#), **portfolio** refers to a personal collection of information describing and documenting a person's achievements and learning. There is a variety of portfolios ranging from [learning logs](#) to extended collections of achievement evidence. Portfolios are used for many different purposes such as accreditation of prior experience, job search, continuing professional development, certification of competences. Tens of millions of people across the world have already used some kind of **portfolio**... The

response systems<sup>12</sup> and serious games<sup>13</sup>. The creation of a new tools assessment service will require the cooperation and coordination of instructors, faculty support staff and central services groups such as AICT E-Learning and UTS.

### 6.1.2 Integration of teaching and learning information with student information

Our Learning Management System (WebCT) and our Oracle-PeopleSoft Student Information System (Oasis) do not “talk” to each other very well. At present, course registrations can be downloaded to WebCT from Oasis if explicitly requested. We have recently completed a trial of uploading student marks from WebCT to Oasis and learned that this service needs some significant improvements and a better process for handling the sign-off of grades. In the next five years, there will be an increasing need and better support for integrating these two systems to provide new services in addition to automating grade reporting from the LMS.

### enhanced services

#### 6.1.3 Learning Management System<sup>14</sup> (LMS) services

The University is currently committed to supporting a standard LMS which is WebCT<sup>15</sup>. An LMS service is much more than just installing and managing WebCT Vista licensed software; it involves course creation and management, student and faculty support,

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recent explosion of knowledge, information and learning technologies has led to the development of *digital portfolios* or *electronic portfolios*, commonly referred as [ePortfolios](#).

<sup>12</sup> From *wikipedia*: A **Personal Response System (PRS)** or **Audience Response System (ARS)** allows large groups of people to vote on a topic or answer a question. Each person has a [remote control](#) with which selections can be made. Each remote communicates with a [computer](#) via receivers located around the room. After a set time, the system shuts off and tabulates the results. Typically, the results are instantly made available to the participants via a bar graph displayed on [projector](#).

<sup>13</sup> From *wikipedia*: **Serious games (SGs)** are [computer and video games](#) that are not intended to only entertain users having additional purposes such as education and training. They can be similar to [educational games](#), yet are primarily focused on an audience outside of primary or secondary education. Serious games can be of any [genre](#) and many of them can be considered a kind of [edutainment](#), but the main goal of a serious game is not to entertain, though the potential of games to engage is often an important aspect of the choice to use games as a teaching tool. A serious game is usually a [simulation](#) which has the [look and feel](#) of a game, but is actually a simulation of real-world events or processes. The main goal of a serious game is usually to train or [educate](#) users, though it may have other purposes, such as [marketing](#) or [advertisement](#), while giving them an enjoyable experience. ...

<sup>14</sup> From *wikipedia*: A **Learning Management System (or LMS)** is a [software package](#), usually on a large scale (that scale is decreasing rapidly), that enables the management and delivery of learning content and resources to students. Most LMS systems are web-based to facilitate "anytime, anywhere" access to learning content and administration. At a minimum, the LMS usually allows for student registration, the delivery and tracking of [e-learning](#) courses and content, and testing, and may also allow for the management of instructor-led training classes. In the most comprehensive of LMSs, one may find tools such as [competency management](#), [skills-gap analysis](#), [succession planning](#), [certifications](#), virtual live classes, and resource allocation (venues, rooms, textbooks, instructors, etc.). Most systems allow for learner self-service, facilitating self-enrollment, and access to courses.

<sup>15</sup> For a detailed description of current services see [www.ualberta.ca/WEBCT/](http://www.ualberta.ca/WEBCT/)

training, helpdesk, etc. The pending integration of the WebCT/Blackboard products by Blackboard Inc. presents both an opportunity and challenge for our LMS services. A major challenge is to monitor the quality and direction of the WebCT product to ensure that WebCT will continue to meet the general University community's requirements. In terms of future directions of LMSs, there is a need for more advanced systems (sometimes called *knowledge management systems*) that faculty will use for both teaching and research. To this end, Computing Science and Educational Technology have initiated a pilot project that is evaluating the potential of *Sakai*, an open-source LMS sponsored by a number of the larger research intensive universities in the United States including Stanford, MIT, Indiana University and the University of Michigan.

#### *6.1.4 An integrated approach to planning, policy development, and shared practices in teaching, learning and technology*

As recommended in the E-Learning Report<sup>16</sup>, the University (faculties and departments) must develop a greater capacity to support faculty in teaching and learning (i.e. support for the **integrated distributed model**). This involves participation in the proposed Teaching, Learning and Technology Council, the creation of a new Centre for Teaching and Learning; and the formation of teaching, learning and technology committees in each faculty.

#### *6.1.5 Services for online programs*

Many of our faculties are offering one or more programs of study in which some or all of the courses are conducted online (e.g., the Faculties of Nursing, Education and Extension). The service requirements for students in these programs are somewhat different from those who primarily attend lectures on campus. First, students in online programs typically need access to services outside of the normal working hours of the University. Because they are often part-time students with other commitments, they rely on being able to access help desk services during the evenings and weekends. Second, there is an increased interest in using synchronous online technologies in lieu of lectures for online programs. AICT, working with the Online Program Support Group, is exploring ways to enhance the availability of services for students in our online programs. To assist in improving our synchronous communication services, the University has recently purchased a site license for Elluminate<sup>17</sup>, which is one of the best synchronous communication tools available today. Because of the growth in and increasing importance of online course delivery, IT plans must take address the unique and expanding needs of online programs.

## **6.2 Flexible, Mobile Learning**

### **enhanced services**

#### *6.2.1 Wireless campus*

A proposal valued at approximately \$3.5 million has been developed by AICT to create an integrated wireless network on campus that provides extensive coverage of public places and strategic coverage in departmental and faculty areas. The proposal leverages

<sup>16</sup> See: [www.vpit.ualberta.ca/elearning/reports/elearning\\_report/](http://www.vpit.ualberta.ca/elearning/reports/elearning_report/)

<sup>17</sup> See: [www.illuminate.com](http://www.illuminate.com) and [www.ualberta.ca/WEBCT/faculty/illuminate/index.html](http://www.ualberta.ca/WEBCT/faculty/illuminate/index.html)

as much as possible existing infrastructure that is in place in several departments and faculties. The strategy recognizes the rapidly growing need for students to access learning resources (e-learning, digital library, other student services) anywhere, at anytime, while on campus using portable and handheld devices. The plan is to develop the integrated wireless campus over an 18 to 24 month period beginning no later than April 2007.

### 6.3 *Multimedia Services*

#### enhanced services

##### 6.3.1 *Multimedia object creation*

There is an increasing demand for the creation and use of many different forms of media: sound (including voice), graphics, image (both two dimensional and multidimensional), video and other types of sensory data (e.g., force and smell). Several campus units currently provide services to create multimedia objects, including AICT, Creative Services, Museums and even units within faculties and departments. Some departments also contract outside the University for these types of services. An important IT planning question is: does the existing *ad hoc* situation with respect to multimedia services serve the University well now and in the future? Current trends in the use of IT strongly suggest that more faculty and students will be creating multimedia information for teaching, learning and research. For example, many universities, including our own, are experimenting with pod casting lectures and seminars. This activity, if widely adopted, would create huge amounts of new multimedia information that may require the provision of new and/or additional services. Should better coordination of multimedia creation services be sought? Is the rapidly evolving nature of multimedia such that the current mixture of creation services works well enough until such time that multimedia production becomes more standardized? What is the best approach to enhancing our services in this area?

##### 6.3.2 *Multimedia object management through federated repository services*

Not surprisingly there is more need for the management (i.e., storage and use) than the creation of multimedia objects. Most faculty and students use multimedia objects on a regular basis; far fewer actually create large amounts of multimedia information. Digital libraries containing content with integrated text, sound, image and video information are growing rapidly and becoming widely available over the internet or as special subscription holdings. This trend will accelerate in the future because multimedia objects support interesting and novel ways of engaging the learner and because multimedia objects will become easier to create. The management of multimedia-based learning objects using Learning Management Systems like WebCT already presents major performance challenges. A promising and emerging approach to the management of multimedia objects using a federated repository service is being developed cooperatively as part of the *Folkways Alive! project*<sup>18</sup> involving the University of Alberta and the Smithsonian Institute. The opportunity to leverage this experience and expertise should be pursued. Unquestionably, the University will have to find more funding to support the management of multimedia objects in the future. There is a need for better coordination

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<sup>18</sup> See: [www.washingtonpost.com/wp-dyn/articles/A17513-2005Mar31.html](http://www.washingtonpost.com/wp-dyn/articles/A17513-2005Mar31.html) and [www.expressnews.ualberta.ca/article.cfm?id=7148](http://www.expressnews.ualberta.ca/article.cfm?id=7148)

of multimedia management across faculties and departments and between Learning Services (the Libraries and Museums) and AICT.

#### **6.4 Communities of Practice:**

##### **new services**

*6.4.1 Use of Communities of Practice<sup>19</sup> (CoP) to engage on-campus and off-campus learner* Through the sponsorship of the Vice-Provost (Information Technology) office an informal group (or learning community) was formed in 2005 to explore how CoP could be used to engage our campus community in collaborative learning activities. Discussion summaries of this group can be found at: [www.vpit.ualberta.ca/cop/](http://www.vpit.ualberta.ca/cop/). Faculties and departments are encouraged to examine how communities of practice might be used in their disciplines as a way to share knowledge and best practices within professional, alumni or other types of communities. Special initiatives related to CoP could be considered as part of the new Teaching and Learning Enhancement Fund.

#### **6.5 Cyberinfrastructure:**

##### **enhanced service**

##### *6.5.1 Sustainable, reliable IT support and services for research*

Cyberinfrastructure (CI) consists of the information and communication technology needed to support advanced, internationally competitive and groundbreaking research. CI includes high performance computers, advanced research networks (e.g. NeteraNet and Supernet), visualization tools, data storage facilities, grid software, remote sensors and advanced collaboration facilities.

In April 2005 a provincial Cyberinfrastructure Task Force (CTF) was struck with the primary purpose of developing a strategic plan for CI support in Alberta. The CTF has produced an extensive background paper, entitled *Cyberinfrastructure White Paper: Alberta's Research Infrastructure*<sup>20</sup>. A final draft of the CTF Strategic Plan will be completed in June 2006 for review by the University community. Faculties and departments should consider how their researchers can take advantage of the proposed support and increased services to CI in Alberta.

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<sup>19</sup> From *wikipedia*: The concept of a **community of practice** (often abbreviated as CoP) refers to the process of social learning that occurs when people who have a common interest in some subject or problem collaborate over an extended period to share ideas, find solutions, and build innovations. The term was first used in 1991 by [Jean Lave](#) and [Etienne Wenger](#) who used it in relation to [situated learning](#) as part of an attempt to "rethink learning" at the Institute for Research on Learning. In 1998, the theorist Etienne Wenger extended the concept and applied it to other contexts, including organizational settings. More recently Communities of Practice have become associated with [knowledge management](#) as people have begun to see them as ways of developing [social capital](#), nurturing new knowledge, stimulating innovation or sharing existing [tacit knowledge](#) within an organization. It is now an accepted part of [organizational development](#) (OD).

<sup>20</sup> See [www.vpit.ualberta.ca/cyberinfrastructure/pdf/CIWhitepaper.pdf](http://www.vpit.ualberta.ca/cyberinfrastructure/pdf/CIWhitepaper.pdf)

## 6.6 *Administrative Information Services:*

### **new services**

#### 6.6.1 *Smart form services*

Transactional activities for many of our PeopleSoft administrative information systems can be significantly enhanced in terms of ease, accuracy and distribution of data capture by using “smart form” interfaces. These are interfaces that are web-based and typically supported by wizards<sup>21</sup>. The first area we plan to deploy smart forms is in the human resource services area. With this approach, the entry and modification of staff information related to hiring, termination and job changes will be sensitive to the job type. The approval process associated with changes to job status will also be stream-lined using work lists and other forms of workflow improvements. Smart forms promise more efficient IT processes and more accurate and complete data creation and management than provided in our current systems.

#### 6.6.2 *Electronic document management services*

The University does not provide good support for the management and tracking of documents. This is particularly evident in the large number of student and personnel records that are either still managed through paper processes or are converted into an image format but can not be tracked or linked to our student information or our human resource information databases. We also rely extensively on inefficient processes that use email with attachments to carry out our administrative tasks. These attachments are stored many times over and take up significant space on personal workstations and servers throughout the University. A proper document management service will allow documents to be stored, managed and archived centrally and be linked to other document or records. Such a service will discourage the use of attachments with email messages thus providing both time and storage efficiencies.

### **enhanced services**

#### 6.6.3 *Major upgrades to financial, student, human resources and research support systems*

The University’s central Oracle-PeopleSoft ERP systems have improved substantially from the early implementations in the year 2000. They can and should be further improved in terms of their functionality, performance, responsiveness, and reliability. Because Oracle will be moving to a new ERP middleware framework called *Fusion*<sup>22</sup> in the next three years, the University will need to upgrade its current financial, student, human resources and research support systems to version 8.9 or 9.0 to be able to migrate to the Fusion framework in four to five year. The distressing news – we seem to be at the mercy of Oracle, at least for the next five to ten years. The good news is that Fusion is based on a Services-Oriented Architecture approach which should allow for better tuning for performance, integration across platforms, and more and better functionality in the

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<sup>21</sup> From *wikipedia*: A **wizard** is an [interactive](#) computer program which acts as an [interface](#) to lead a [user](#) through a complex task, using step-by-step [dialogs](#). See [http://en.wikipedia.org/wiki/Wizard\\_\(software\)](http://en.wikipedia.org/wiki/Wizard_(software))

<sup>22</sup> See: [www.oracle.com/products/middleware/index.html](http://www.oracle.com/products/middleware/index.html)

systems that are delivered. What is also important is that the University invests in the services related to these evolving application systems. This means greater strategic thinking and change management planning are needed to take advantage of these new services including more and better training for existing staff, hiring new support staff with significant information literacy skills, embracing new ways of operating that include a greater emphasis on self-service and workflow. The net result should be services that better meet our information needs including more flexible and analytical reporting through data warehousing, better information security and privacy, and more tunable and friendly portal-style user interfaces.

#### *6.6.4 More flexible, more informative reporting services*

Many of our PeopleSoft applications provide good transactional support for our business areas such as financial accounting, and student and staff record management; however the reporting capabilities do not to meet our needs quite so well. Perhaps this is why we still have too many administrative shadow systems – which is both inefficient and, as pointed out by our auditors, risky because the shadow system may not have correct or up-to-date information. We also need new approaches for getting “more out of our data” through data warehousing (also sometimes called “Business Intelligent”) approaches for building analytical models that can display and in some cases even discover interesting relationships between data. For example, suppose we wanted to find out if the number of rural students entering a particular Faculty (e.g., Medicine and Dentistry) is in the same proportion as the overall participation rate of rural students in our post secondary system. Developing a report like this could be quite difficult and time consuming using our existing reporting systems. More flexible reporting would be possible if we deployed data warehousing capabilities with associated analytical report services to campus units and departments. A long-term investment of between \$700K to \$1.2M would be required to delivery this new type of reporting service.

### ***6.7 Network and Communication Services:***

#### **enhanced services**

##### *6.7.1 Higher speed backbone network*

Plans are underway to increase the speed of the University’s backbone network from 1 to 10 gigabits/sec to handle the increasing demand for network capacity brought about by advanced application services for e-collaboration (e.g., distributed and shared visualization), video conferencing, large multimedia-based learning objects, remote sensing, etc. This upgrade to the existing backbone will be accomplished over the next 18 months and the resulting enhancement to network services should enable faculties and departments to plan for new and enhanced ways to conduct research, integrate teaching and research, and explore provincial, national and international collaborations in teaching, learning and research.

##### *6.7.2 More sustainable, more integrated central services*

The campus currently operates several dozen email servers. Is this really necessary? Many departments and faculties would prefer not to run their own email servers, but are concerned that AICT does not have the capacity in personnel or infrastructure to manage services like email centrally. We need to review the costs and the potential cost saving in

the longer term of centralizing services that have now become very common and utility-like in nature such as email, server operations and data back-up and recovery. Centralizing services will allow departments and faculties to deploy their IT staff in more of a direct support role for their staff and students rather than providing common services. Currently we are trying to place our central services on a more sustainable footing. This includes on-going funding for refreshing hardware infrastructure and software licenses. This needs to be done before additional centralization of services can be undertaken.

### ***6.8 Datacenter Support and Disaster Recovery Services:***

#### **new services**

##### *6.8.1 Disaster recovery services*

At present the University does not have an adequate disaster recovery capability. Recent reviews of our information technology systems and services by internal and external auditors have identified the lack of a disaster recovery plan and capability as a major risk for the University. We are currently developing plans and examining implementation strategies for disaster recovery for both our administrative and academic IT systems. Faculties, departments and other campus units should consider planning for the use of full back-up and recovery services developed by AIS and AICT for their own IT systems.

#### **enhanced service**

##### *6.8.2 Datacenter support services*

AICT, working with the space planning staff from Facilities and Operations, is developing requirements for future datacenter space. At present they are focused on the needs for centrally operated and maintained systems. In response to the growing concerns related to the security and privacy of data, departments and faculties are encouraged to locate their servers in a properly provisioned and highly secure datacenter. Because of our networks are increasingly more reliable and faster, the use of datacentres off the main campus are being examined.

### ***6.9 Identity Management and Service Provisioning:***

#### **new services**

##### *6.9.1 Identity management services*

The important role of an identity management system as it relates to security, privacy, single sign on, and services provisioning was outlined earlier in this report. A project that builds on our current central directory authentication services is being defined. Initial estimates are that the project will take approximately 18 months at a cost of over \$500K.

##### *6.9.2 Student, faculty and support staff portals*

Web portals<sup>23</sup> represent a relatively recent approach to delivering information on the web that allow users to personalize how they interact with the web through self-subscription to services. Typically web portal users are able to subscribe and gain access to services by linking into a common identity management system that supports both single sign-on (or authentication) and authorization to access properly provisioned services. Web portals for students are now quite popular because they provide an attractive way to bring together in one site the collection of common student services, e.g., access to on-line library services and associated digital resources, WebCT, course registration, fee payment, award information, etc. together with subscription services. e.g., judo club activities, live theatre performances, local weather, and parking services. Plans to develop a student portal together with enhanced identity management services are being contemplated. It is likely that faculty and support staff portals will be developed after a student portal. A specialized PeopleSoft portal that will allow administrative staff to connect to AIS PeopleSoft services is currently being planned.

## ***6.10 Security and Privacy Policies and Procedures***

### **enhanced service**

#### ***6.10.1 Refreshing, and re-aligning our current policies and procedures related to information security and privacy***

The University currently maintains two sets of policies related to security: those under the Office of Information System Security<sup>24</sup> dealing with conditions of access and use and those under the AIS Security Committee<sup>25</sup> dealing with secure access to our ERP PeopleSoft systems. There is a need to revisit these policies under one common policy of access and use with separate procedures for our administrative and academic systems. Efforts to bring these under a common security policy framework should make issues of access and use clearer and thereby provide better and more integrated IT security services for the campus.

The Vice-Provost (IT) office is also working closely with the Access and Privacy Office<sup>26</sup> to define policies related the privacy of information on computer systems that are consistent with and meet the FOIPP Act and associate legislation. As policies related to privacy develop, it will be important they remain consistent with security policies related to conditions of access and use.

## ***6.11 IT planning coordination***

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<sup>23</sup> From *wikipedia*: **Web portals** are sites on the [World Wide Web](#) that typically provide personalized capabilities to their visitors. They are designed to use [distributed applications](#), different numbers and types of [middleware](#) and hardware to provide services from a number of different sources. In addition, business portals are designed to share collaboration in workplaces...

<sup>24</sup> See [www.ualberta.ca/AICT/OISS/policies/policies.htm#Policies](http://www.ualberta.ca/AICT/OISS/policies/policies.htm#Policies)

<sup>25</sup> See [www.ais.ualberta.ca/nav01.cfm?nav01=37247&CFNoCache=TRUE](http://www.ais.ualberta.ca/nav01.cfm?nav01=37247&CFNoCache=TRUE)

<sup>26</sup> See [www.ipo.ualberta.ca](http://www.ipo.ualberta.ca)

**enhanced services***6.11.1 Greater clarity and communication in IT planning*

As identified in the introduction of this paper, it has been quite some time since a campus-wide IT Plan has been developed. When such planning was undertaken in the past, it was generally sporadic and developed plans were rarely reviewed or refreshed. Two major activities of the Vice-Provost (Information Technology) are to undertake and sustain IT plan development on a campus-wide basis and to oversee the implementation of the activities identified in the IT plan. The Vice-Provost (IT) has and will continue to encourage greater IT planning both centrally and in faculties and departments. Faculties and departments should consider developing the capability (if not already in place) for IT planning that is coordinated with the campus IT plan, which in turn should align with and support the University's Academic Plan. The Vice-Provost (IT) office will continue to increase its IT planning services in direct response to the needs and interests of the campus community.

**7. SERVICE BASELINES AND IMPROVEMENT**

The identification and deployment of a services approach is an important beginning in the creation of a robust IT planning strategy. The real benefits of this strategy are realized only if we include mechanisms that detect service deficiencies and dissatisfaction, which can then be used to determine service improvements. To achieve service improvements, it is generally recognized that we must baseline service performance using key measures of quality of service (QoS) and then initiate regular (at least annual) assessments of QoS using these key measures in order to determine if service improvements are achieved. For critical services, we need to identify service level "agreements" (measurable commitments) that will meet our user's needs. An example of a service level agreement might be that access to student information system services should be available 99.9% of the posted hours of operation each month. Using this approach, continuous service improvement is achieved when we regularly determine, through measurement and consultation, how services can be improved and then define an action plan that leads to desired improvements that meets user needs.

Delivering a continuous service improvement model is a long-term goal we want to achieve. We will want to proceed toward this goal more vigorously in some areas of IT services than others. In particular, high priority should be given to those areas that are critical and those with the largest QoS gap. The critical areas will be determined primarily from the Academic Plan. For example, if improving the student experience is deemed one of the most important areas to focus on in the Academic Plan, then the identification, deployment and QoS baselining of IT service areas directly relevant or closely related to the student experience should have high priority in a continuous services model. Similarly, IT services in which the delivered QoS is significantly less than the QoS demanded by the user should also be early candidates for continuous service improvement.

## 8. SETTING PRIORITIES

Thus far our IT Roadmap has discussed what to see along the road (namely IT Services), how to identify key services using service maps, how to baseline and then improve services using a continuous QoS measurement approach. We have also developed in Section 6 an initial set of 22 service opportunities that we should consider in order to complete our IT planning process. But we have not discussed how we plan to prioritize which new IT services will be developed, which existing IT services will be enhanced, and which existing IT services will be reduced or terminated. Key decisions on priority must be made through efficient and effective community consultation relying on the best information available related to user needs, emerging technological improvements, expected ROI (Return On Investment) and current QoS measurements for existing processes. Efficient and effective community consultation requires a well-understood and workable governance model, and therefore an important part of an IT plan must be a review of the existing governance model to determine shortcomings and improvements to that model.

At present, we have a set of governance models that are evolving to fit the rapidly changing and growing demands for IT services in all aspects of our institutional operations: teaching and learning, research, administration and community service. The most mature governance model is the one used to set priorities for our Administrative Information Systems. The combination of the AIS Steering Committee and the AISSC Executive Committee are used to discuss and set priorities about new application services development and the Joint Operations Group (JOG) reviews existing operations and assists in determining the nature and priority on enhancements to existing AIS services. Some changes were made this past year to the terms of reference and how these committees operate in response to our new preferred-vendor development process introduced as part of our renegotiating of our vendor outsourcing contracts. We anticipate some further evolutionary changes to AIS governance model during the term of our current five-year contract.

In the past two years, the Faculty-Based ICT Committee was formed to discuss and provide user input into a variety of services offered by Academic Information and Communication Technology (AICT). Two subcommittees were formed: the E-Learning Subcommittee, which reviewed the E-learning services provided by AICT and the recent E-Learning Report, and the Resource Allocation Subcommittee, which reviewed funding priorities related to the AICT's budget for hardware infrastructure renewal. Further review of how the Faculty-Based ICT Committee can provide input into the prioritization of new and enhanced academic IT services is needed as part of the IT Plan.

A major activity of the proposed TLT (Teaching, Learning and Technology) Council is to review annually updates to the evolving E-Learning Plan. An important part of this review will be the development of recommendations on the priorities of new and enhanced E-learning Services. Details of how the TLT Council will carry out this part of its mission still need to be defined.

In summary, additional work in governance will be an important component of the forthcoming IT Plan.

## 9. SERVICES SCIENCE INITIATIVE

Discussions and investigations of how to develop and improve IT services are part of a Services Science research project sponsored by the Alberta CAS<sup>27</sup> (Centre for Advanced Studies) program. Of particular interest in the Services Science Project is how to best deliver services that are shared with other organizations or institutions such as cyberinfrastructure in Alberta through Netera and WestGrid or the University's Administrative Information Systems (AIS) production contract with IBM.

The Services Science initiative sponsored through Alberta CAS will assist in bringing to our IT planning process many of the new findings in the areas of service-oriented architecture, web services and IT service delivery, quality and improvement.

## 10. CONCLUSION

This first version of the IT Roadmap has focused on the need to plan our future IT requirements based on both new services that are or may be needed and existing services that need enhancements. We believe our concentration on services will help our campus community understand both the opportunities and the challenges provided by IT without too much IT jargon related to the newest piece of computer equipment or "killer" software application. Please provide us with comments about both the content and the clarity of the report. If the report is not well understood it will be of limited value in our current academic planning process.

The content of the report will evolve based on input from the campus. We will be soliciting direct feedback from Faculties and other campus units through an on-line survey found at: [www.vpit.ualberta.ca/planning/roadmap/services\\_survey.php](http://www.vpit.ualberta.ca/planning/roadmap/services_survey.php). At least one major revision of this document will occur after receiving feedback through the on-line survey and any direct comments received (email: [vpit@ualberta.ca](mailto:vpit@ualberta.ca)). IT Strategic Plan to be developed in the fall of 2006 will be based on the Academic Plan and the feedback received from this IT roadmap document.

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<sup>27</sup> The IBM Alberta Centre for Advanced Studies (AB-CAS) is a strategic Research and Development Partnership Agreement whose mission is to solve problems of utmost importance for IBM research, products and services. It is a strategic IBM approach for investing in universities, engaging University of Alberta professors and students with IBM research and development staff. More details about Alberta CAS can be found at: [www.vpit.ualberta.ca/cas/](http://www.vpit.ualberta.ca/cas/).

## APPENDIX A – LINKING SERVICES TO ASPIRATIONS

Listed below are the new or enhanced service initiatives described in Section 6 of the report. Appended to each initiative is a list of the most relevant aspirations associated with the four cornerstones presented in the [Dare to Discover: Vision of a Great University](#) document from President Samarasekera. The aspirations are coded as shown in Appendix B. Note that aspirations D6 and D7 apply to all the new and enhanced service initiatives and therefore are not listed explicitly with any of the service initiatives.

### 6.1 E-learning Services:

#### new services

- 6.1.1 *Evaluation, adoption and assessment of new e-learning tools [B1,B3,D4,D5]*
- 6.1.2 *Integration of teaching and learning information with student information [D6,D7,D4,D5]*

#### enhanced services

- 6.1.3 *Learning Management System (LMS) services [A2,A4,B1,D2,D4,D5]*
- 6.1.4 *An integrated approach to planning, policy development, and shared practices in teaching, learning and technology [A1,A2,A3,B1,B3,B6,C4C6,D2,D4,D5]*
- 6.1.5 *On-line delivery services [A4,A7,B5,C2,C3,C4,C5,C7,D2,D4,D5]*

### 6.2 Flexible, Mobile Learning:

#### enhanced services

- 6.2.1 *Wireless campus [A4,B2,B7,C6,D4]*

### 6.3 Multimedia Services:

#### enhanced services

- 6.3.1 *Multimedia object creation [A2,B1,B3,B4,C7]*
- 6.3.2 *Multimedia object management through federated repository services [B1,B3,B4,C7]*

### 6.4 Communities of Practice:

#### new services

- 6.4.1 *Use of Communities of Practice (CoP) to engage on-campus and off-campus learners [B7,C1,C2,C3,C4,C5,C6,D1]*

### 6.5 Cyberinfrastructure:

#### enhanced service

- 6.5.1 *Sustainable, reliable IT support and services for research [A1,A5,D1,D2,D3,D4,D5]*

**6.6 Administrative Information Services:****new services**

6.6.1 *Smart form services*

6.6.2 *Electronic document management services*

**enhanced services**

6.6.3 *Major upgrades to financial, student, human resources and research support systems*

6.6.4 *More flexible, more informative reporting services*

**6.7 Network and Communication Services:****enhanced services**

6.7.1 *Higher speed backbone network [A4,A5,D2,D4,D5]*

6.7.2 *More sustainable, more integrated central services [A5,D2,D4,D5]*

**6.8 Datacenter Support and Disaster Recovery Services:****new services**

6.8.1 *Disaster recovery services [D4,D5]*

**enhanced service**

6.8.2 *Datacenter support services [D4,D5]*

**6.9 Identity Management and Service Provisioning:****new services**

6.9.1 *Identity management services [D4]*

6.9.2 *Student, faculty and support staff portals [B2,D4]*

**6.10 Security and Privacy Policies and Procedures****enhanced service**

6.10.1 *Refreshing and re-aligning our current policies and procedures related to information security and privacy [D5,]*

**6.11 IT planning coordination****enhanced services**

6.11.1 *Greater clarity and communication in IT planning [A2,B1,C4,D2,D3,D4]*

## **APPENDIX B – DARE TO DISCOVER CORNERSTONES AND ASPIRATIONS**

Below is a presentation of the cornerstones and a description of the aspirations under each cornerstone. Appended to each aspiration are codes of the new or enhanced service initiatives listed in Appendix A that apply.

### **CORNERSTONES**

We have anchored our vision on four cornerstones that provide the foundation for a great university.

#### **A. TALENTED PEOPLE**

- A1. Attract outstanding students from Alberta, Canada, and the world. [6.1.4, 6.5.1]
- A2. Create a dynamic, discovery-based learning environment by aiming for a mix of undergraduate and graduate students typical of leading public research universities. [6.1.3, 6.1.4, 6.3.1, 6.11.1]
- A3. Attract post-doctoral fellows, researchers, and visiting faculty from around the world to join the academic community already in place. [6.1.4]
- A4. Improve access for rural, Aboriginal, and non-traditional students through partnerships with colleges and by linkages with high schools across the province and improve affordability by enhancing bursaries and scholarships. [6.1.3, 6.1.5, 6.7.1]
- A5. Recruit and retain outstanding and diverse academic staff through endowed professorships, competitive start-up funding, attractive career support, and by providing a vibrant intellectual climate that celebrates and rewards achievement. [6.5.1, 6.7.1, 6.7.2]
- A6. Recruit and retain the best staff by fostering a culture of excellence within a healthy and safe workplace, providing progressive career opportunities and rewarding leadership and outstanding accomplishments.
- A7. Enhance the global perspective and intercultural climate at the University by celebrating and drawing upon the diversity within it. [6.1.5]

#### **B. LEARNING, DISCOVERY, AND CITIZENSHIP**

- B1. Create an exceptional and life-changing university experience for students through curricular and extra-curricular offerings that integrate learning, discovery, and citizenship to develop the intellect and the imagination, educate leaders, and enhance a global perspective. [6.1.1, 6.1.3, 6.1.4, 6.3.1, 6.3.2, 6.11.1]

- B2. Engage students through mentorship and peer-based activities such as clubs, athletics, and social events to inspire high achievement, improve retention, and enhance graduation rates. [6.2.1, 6.9.2]
- B3. Foster scholarship and discoveries that are transformative and at the cutting edge by rewarding quality and impact over quantity and by enhancing cross-disciplinary initiatives. [6.1.1, 6.1.4, 6.3.1, 6.3.2]
- B4. Demonstrate the contribution of university discovery and scholarship to public policy and enhance these social, cultural, and economic dividends by celebrating and rewarding achievements in knowledge translation and dissemination. [6.3.1, 6.3.2]
- B5. Foster national and international research collaborations that advance understanding and generate knowledge to address global challenges. [6.1.5]
- B6. Reward and recognize the excellence of individuals in teaching, ground-breaking scholarship, and contributions to community and nation building as public intellectuals and professionals. [6.1.4]
- B7. Inspire students, faculty, and staff alike to engage in activities that develop leadership, foster social and moral responsibility, and contribute to the further development of our society and its institutions. [6.2.1, 6.4.1]

### **C. CONNECTING COMMUNITIES**

- C1. Engage alumni in a mutually beneficial life-long relationship with the University of Alberta, enlisting their support to achieve the University's vision and to assist us in connecting to communities around the world. [6.4.1]
- C2. Build strong partnerships with the capital region, the cities of Edmonton and Camrose, other urban and rural Alberta communities, and all levels of government in order to fulfill our responsibility as Alberta's university, a leader on the national stage with global connections. [6.1.5, 6.4.1]
- C3. Foster partnerships with business and industry to advance mutual goals for supporting talented people through employment and internship opportunities for our students and access to life-long learning, identifying research challenges, and translating and disseminating our research outcomes. [6.1.5, 6.4.1]
- C4. Foster excellent relationships with Capital Health, the Alberta Cancer Board, and other provincial health organizations, the post-secondary sector, the public sector, and non-governmental organizations to further enhance the quality of life in our society. [6.1.4, 6.1.5, 6.4.1]

- C5. Enhance relationships with other nations to create learning opportunities for students and research collaborations to address global challenges and initiatives that foster mutual understanding, global peace, and prosperity. [6.1.5, 6.4.1, 6.5.1]
- C6. Promote community pride and participation in the University through its physical and intellectual openness and opportunities for ongoing dialogue and discussion. [6.1.5, 6.2.1, 6.5.1]
- C7. Engage with, serve, and draw strength from the diversity of our external communities, in particular Aboriginal, Franco-Albertan, multicultural, rural, and northern communities. [6.1.5, 6.3.1, 6.3.2]

#### **D. TRANSFORMATIVE ORGANIZATION AND SUPPORT**

- D1. Develop an endowment comparable to the best public research universities in the world. [6.4.1, 6.5.1]
- D2. Secure resources to provide the best education for our students, to support world-class research and creative activity and its dissemination and translation, and to foster citizenship. [6.1.3, 6.1.4, 6.1.5, 6.5.1, 6.8.1, 6.8.2, 6.11.1]
- D3. Provide needs-based and merit-based financial assistance to increase affordability for all students and offer competitive fellowships to attract outstanding graduate students. [6.5.1]
- D4. Build, enhance, and maintain classrooms, laboratories, libraries, and museums, as well as athletic, social, and residential facilities to provide a transformative university experience. [All of 6.1, 6.2.1, 6.5.1, 6.7.1, 6.7.2, 6.8.1, 6.8.2, 6.9.1, 6.9.2, 6.11.1]
- D5. Continue to set priorities and invest in world-class teaching and research infrastructure. [All of 6.1, 6.2.1, 6.5.1, 6.7.1, 6.7.2, 6.8.1, 6.8.2, 6.9.1, 6.9.2, 6.11.1]
- D6. Establish high standards of service based on best practices to achieve and maintain good stewardship of financial resources and capital assets. [All service opportunities listed in Appendix A]
- D7. Promote administrative effectiveness and good governance by improving communication among units, enhancing collaboration, implementing transformative ideas, and revising organizational structures. [All service opportunities listed in Appendix A with special emphasis on 6.6 Administrative Information Services]