

# 1. University Dependence Upon ICT

The University of Saskatchewan is committed to renewal by pursuing the strategic directions outlined by the President in *University of Saskatchewan Strategic Directions 2002 – Renewing the Dream*. Because ICT (Information and Communications Technology) is “tightly woven into the fabric of the contemporary university”<sup>4</sup> the quality of ICT and the choices the University makes concerning future ICT investment will be integral to the achievement of this renewal.

This section outlines the University’s current dependence upon ICT as well as how we will become even more dependent.

## 1.1 Current Dependence

The University is highly dependent upon ICT for its teaching, learning, research, service delivery and business processes. The ICT foundational document characterizes our dependence.

“The quality of our ICT environment affects the way we teach and the way we learn, the way we manage our business processes and the way we interact with our customers. This technology affects everything we do, affecting both how we do it and the quality of the product.”

The pervasiveness of information and communications technology at universities is evident by the names of the processes tools that instructors, students, researchers and staff use every day.

- e-communications
- electronic discussion forums
- e-collaboration
- building e-communities
- e-mail
- e-calendar
- e-learning
- e-libraries
- e-journals and e-books
- e-whiteboards
- e-services
- e-payments
- e-business and e-commerce
- e-science
- e-research
- learning management systems
- course management systems
- learning object repositories
- instant messaging

Many University projects, initiatives and services either depend upon ICT or have significant ICT component.

- In order to improve services for students, the ROSS (Registrar’s Office and Student Services) project recommended the establishment of “one-stop shopping” to handle student queries and transactions. This “shop” (now called Student Central) is relying

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<sup>4</sup> *Advantage U of S - Foundational Document for Information and Communications Technology at the University of Saskatchewan*, June, 2003.

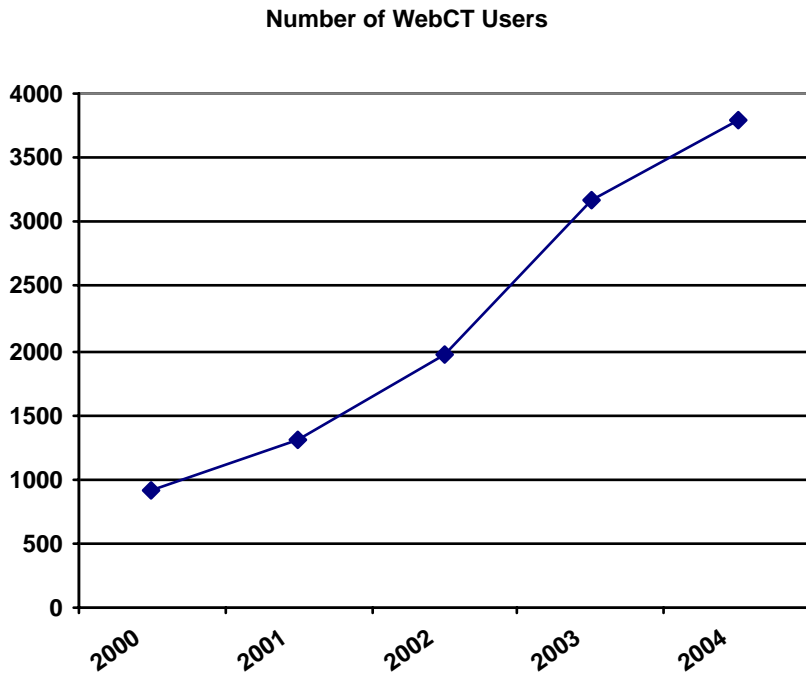
upon the recently implemented campus portal to handle, electronically, 90% of all those queries and business transactions.

- In order to improve the students (as well as faculty and college) experience, the University is implementing a new student information system that will provide self service such as online admissions, online course catalogue, web-based registration, electronic grade and fee lookup, electronic transcript requests, electronic payment of tuition, online grade submission, degree planning, degree audit and other services.
- In order to provide a supportive environment for research, scholarly and artistic work, the University had chosen to upgrade the campus network (USR-net project).
- In order to provide better services and information to the students and other members of the University community, the University implemented a portal (PAWS - Personalized Access to Web Services).
- In order to improve service, the University has implemented an e-payment infrastructure. This infrastructure makes it convenient for prospective students to apply to the University; for students to pay tuition and fees; for the University community and the public to purchase goods and services; for donors to make contributions to the University; for people to register for conferences hosted by the University. This infrastructure can help reduce the cost associated with manual transactions. All transactions will be secure and auditable.
- The University's Systematic Program Review, Integrated Planning Process and Saskatchewan Universities Funding Mechanism rely upon data from administrative information systems. ICT is also used to analyze this data.
- Building and renovation construction projects (e.g. Kinesiology, Spinks Addition) are designed and managed using computer assisted design systems and project management software. The building design must provision for network services and other technologies—such as multimedia classrooms—as appropriate.
- In order to make learning more accessible, the University is developing 20–25 online courses yearly as a partner in the province's Technology Enhanced Learning initiative.
- In order to achieve the service improvements and cost avoidances (related to not maintaining two networks) now possible with integrated voice, data and video technologies, the University has implemented an IP Telephony pilot project to investigate the related opportunities and costs.
- Students are arriving in residences today with their own computer and expect that Internet access will be available (as it was in their homes and as it is at many other universities). The University must provide network access in the residences to help recruit and retain students.
- Instructors rely upon desktop computers, office and classroom network services, Internet access, electronic access to library resources, e-mail, data projection units and other ICT tools to prepare and deliver instructional materials.
- Prospective students rely upon our web site for information about the University on a 24 hours a day, 7 days a week (24x7) basis.
- The Canadian Light Source would not be able to operate without significant investments in networking, high bandwidth access to Canadian and international research networks, workstations, data storage and compute servers, data analysis

software and ICT support personnel as well as modern administrative systems. Many of these same components apply to other research projects.

- In order to support student needs for computer access, the University has installed about 200 computers in the libraries (Learning Commons) and other spaces. Access to these computers is available to all students. This is in addition to 1,100 or so workstations in college student computing facilities.
- In order to improve the experience of students who bring the laptop computers to campus, 80 wireless network access points have been installed in libraries, classrooms and other areas in which students work.
- In order to provide a more productive work environment, the University has implemented SPAM blocking, virus detection and removal from e-mail, and other ICT security measures.
- Universities are using ICT as a marketing tool to recruit and retain students. For example, Penn State (and other universities) provides free music downloads to all their students as part of tuition. Officials and student leaders hope that this approach will appease student demand for online music while satisfying record companies by using the now-legal Napster service. [New York Times, 7 November 2003]

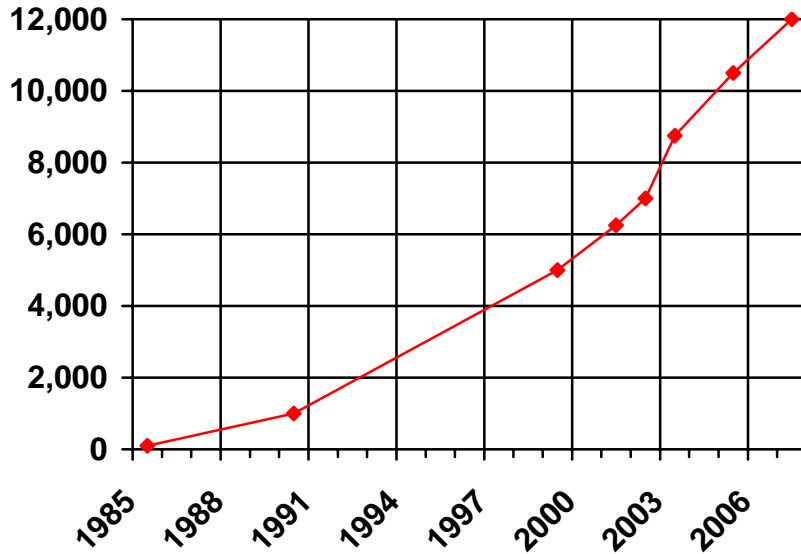
Usage statistics for existing ICT services demonstrate our increasing dependence upon ICT (see graphs and text, below) and the growth of that dependence over very short time periods.



Faculty and student WebCT usage is growing at about 50% per year.

WebCT is now used in over 115 courses and by almost 4,000 students.

### Number of Computers/Network Connections

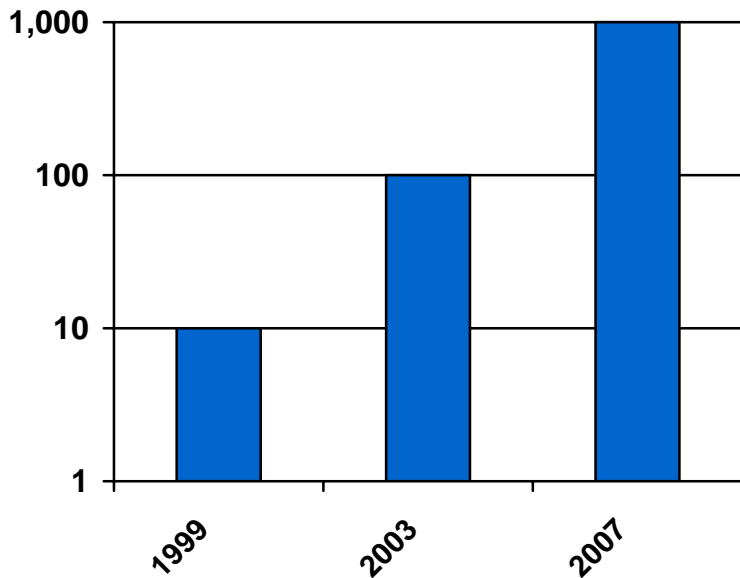


The desktop computer and the Research and Education Network are the “backbone” of the University’s ICT environment. As of fall 2003, there were over 8,000 network connections and computers on campus.

We expect that an additional 3,000 network connections and computers will be installed in the next three to four years.

The primary driver for this is the University’s increased commitment to graduate education and research. The USR-net project alone will add 2,000 more connections in the next two years.

### End-User Network Connection Speed (Capacity) in Mbps

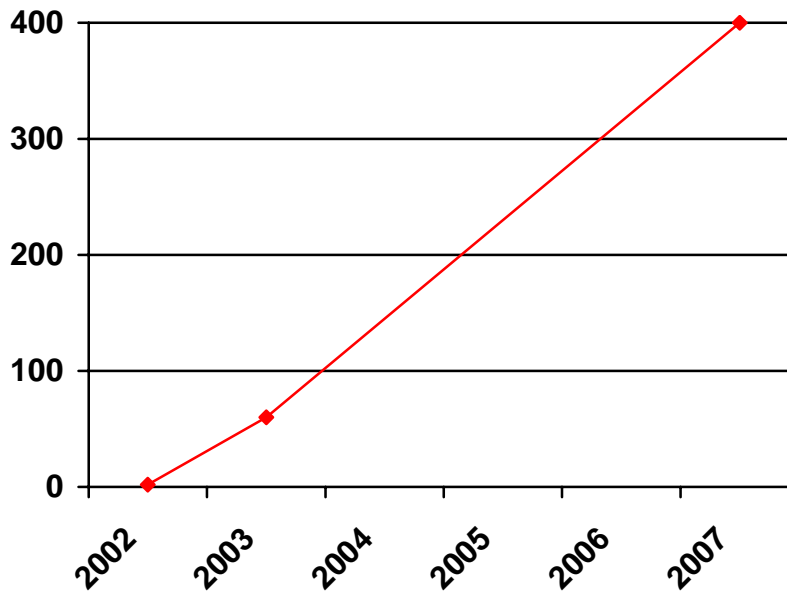


Not only have the number of connections increased but the network connection speed has increased tenfold in the last three years.

The network speed will again increase another tenfold in the next three years to support research and communications.

We estimate that 1,000 of these high speed (1Gb) connections will be needed and must be installed in the next three to four years.

### Number of Wireless Network Access Points



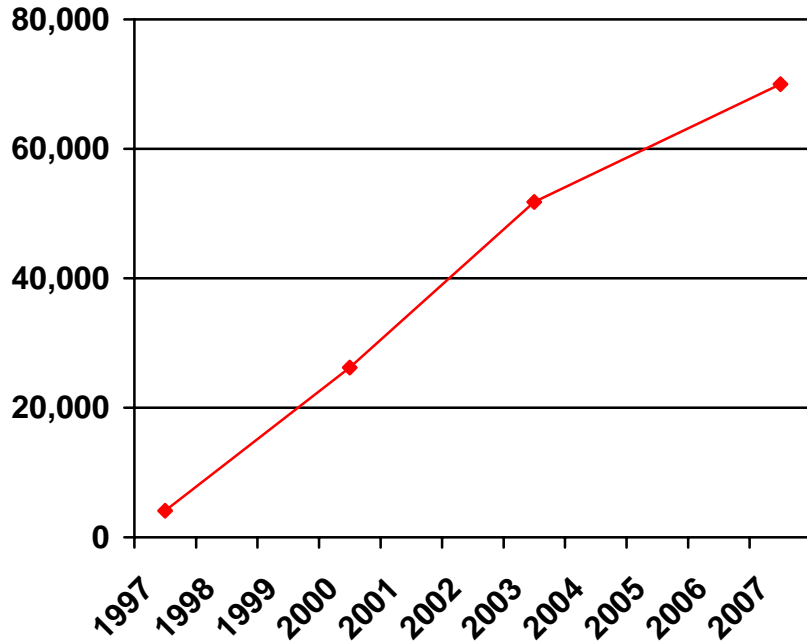
Today's students are demanding "anywhere, anytime" access to ICT resources. There is evidence that the notepad is giving way to the laptop in student backpacks. The University is beginning to address the demand for mobile student computing.

Currently, there are 80 wireless access points in the Libraries, student work areas and classrooms. An additional 200 access points will be required over the next three to four years.

The installation cost for each access point is estimated at \$3,000 (including FMD costs).

The U of S is not alone in this endeavor; UBC and McGill have installed 1,200 and 240 access points respectively.

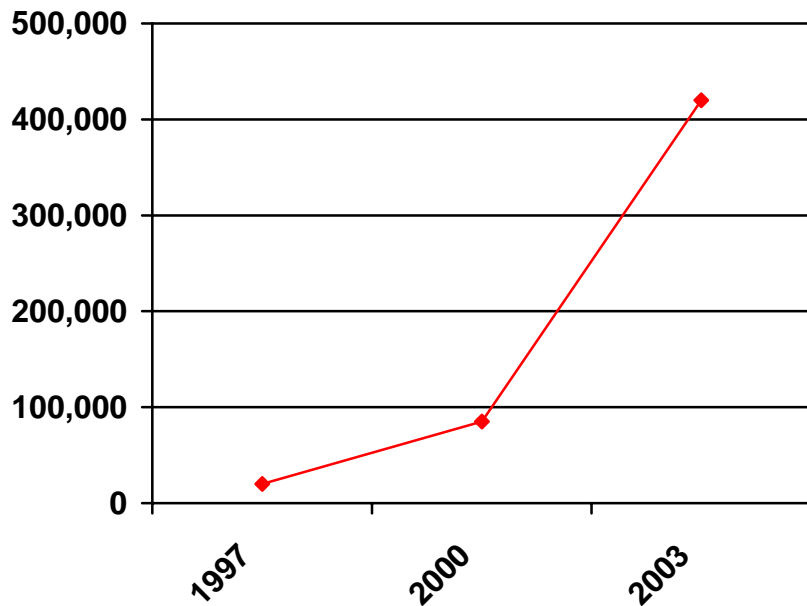
### Number of Email Accounts



E-mail is a tool that has been integrated into the daily lives of almost all faculty, staff, researchers and students.

The University provides e-mail services to 50,000 users today. In three to four years this is expected to exceed 70,000 accounts as the University offers more services to its expanding community (prospective students, provincial health care professionals as part of the Academic Health Sciences Network, more alumni, etc.).

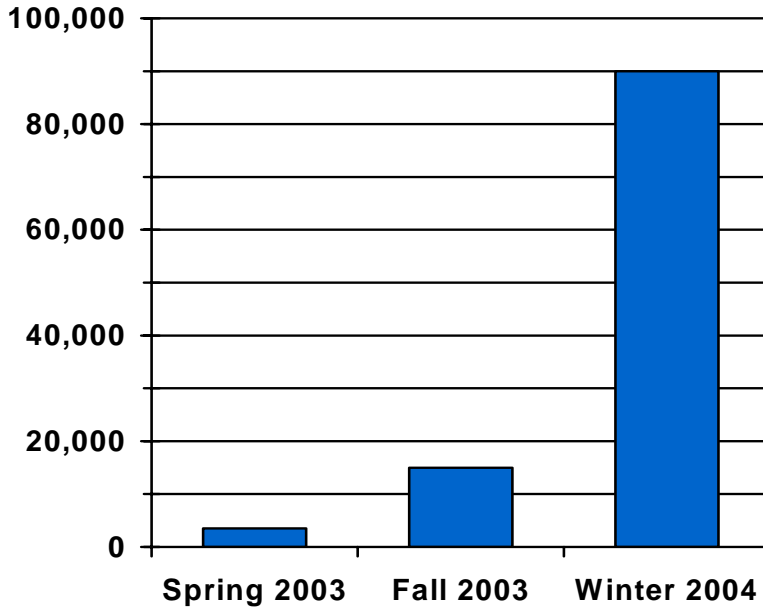
### Email Messages Delivered Daily



The number of e-mail messages has grown even more dramatically, doubling almost yearly.

At peak times, we now deliver more than 400,000 e-mail messages per day.

**Email Messages with Viruses  
(Peak Daily Rate)**



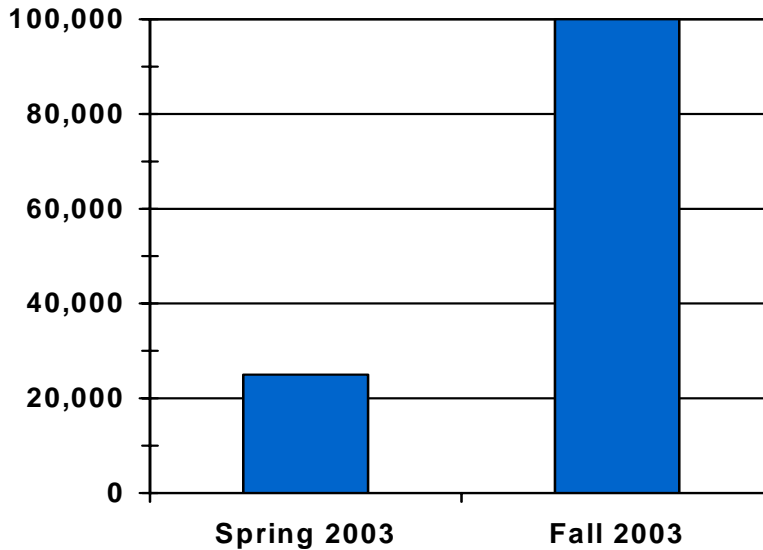
The number of Internet-based attacks on University ICT resources continues to increase dramatically.

Campus e-mail servers remove 90,000+ e-mails that contain viruses daily (peak daily rate).

The number of viruses removed has quadrupled every four months between spring 2003 and winter 2004.

ICT security will continue to be an issue that the University will have no choice but to address.

**Blocking Email Connectons From Known SPAM and Open Relay Sites (Peak Daily Rate)**

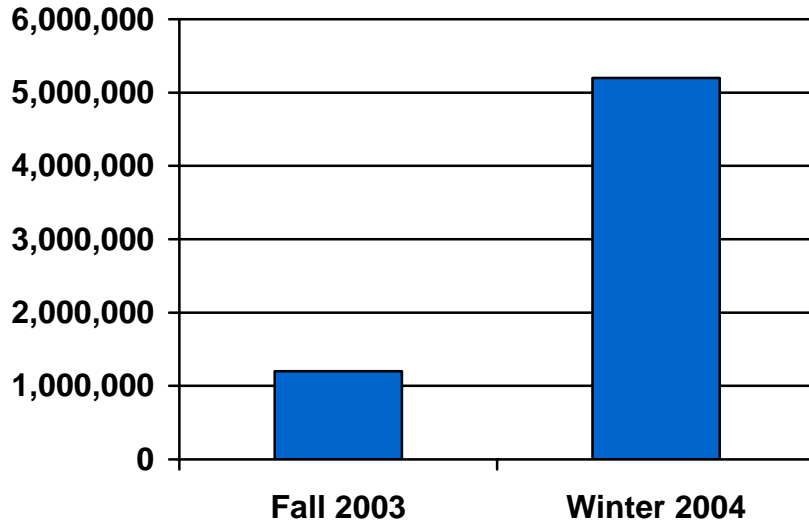


We currently block 100,000+ attempts to send SPAM to campus e-mail servers, daily.

This is a fourfold increase since spring 2003.

Additionally, over 55,000 e-mail messages were “quarantined” daily as suspected being SPAM (as of November 2003).

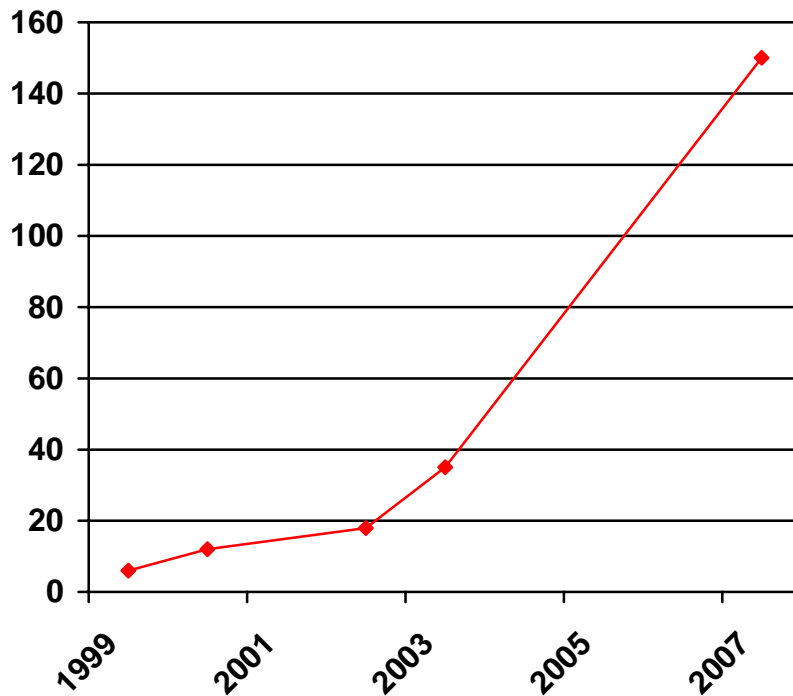
### Number of Network Probes



5,200,000 attempts, daily, to probe or attack campus ICT resources are blocked daily (February 2004).

This is a fourfold increase from fall 2003.

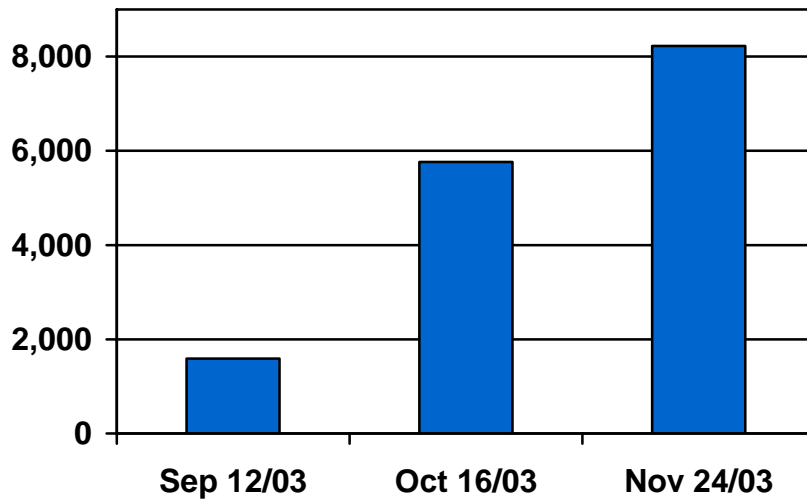
### Access to "Commercial" Internet (Mbps)



The demand for Internet access has required an annual doubling of bandwidth (capacity) from the "commercial" provider.

The rate of growth of access to Canadian and International research and education networks is even higher. From 40 Mbps in 2002 to 1,000 Mbps in 2003, this is expected to grow to 10,000 by 2007, a tenfold increase.

**Number of People Who Have Used PAWS**



Almost 12,000 students, faculty and staff have used the PAWS portal (Personal Access to Web Services) since its implementation in September 2003 (less than six months ago).

As more services (e.g. Banner Student/Si! Banner Finance, Student Central) adopt PAWS as their service delivery method, usage will further increase.

## 1.2 Increasing ICT Dependence in the Future

The University will continue to be increasingly dependent upon information and communications technology in the future—for teaching, learning, research and service delivery. The ICT foundational document states:

“Investing in ICT is critical if the University is to attain the strategic goals articulated by the President in his Strategic Directions paper.”

Increasingly, each incoming class of students will expect “anywhere, anytime access to everything.” They will expect that all course materials will be available online, wireless connectivity will be available everywhere, ICT services will be available 24x7 and self-service for all administrative functions.

A recent graduate of Queen’s University currently taking further education at U of S recently made the comment: “At Queen’s I had online registration, a high band-width Internet connection in my room, a connection point for my laptop in every library study carrel, all my courses on WebCT and I could pay my tuition easily online or at any Bank of Montreal in Canada. How does the U of S get away with its IT?”

The attached editorial from the January 29, 2004 Sheaf is indicative of the importance that students place upon ICT. It also highlights the value of ITS’ services.

In the long-term, students will expect learning environments that are flexible, support different learning styles, are resource rich, are active and learner centered, support life long learning, are cost-effective and are of high quality. If the University is to meet its goal to “recruit and retain a diverse and academically promising body of students, and prepare them

# From the editor's desk

On Sunday night, one of the most catastrophic events of my university career transpired. During a nice, mellow, candlelit moment in my room, my laptop decided to die. A good indication of the imminent death of a computer: when the MP3 it's playing begins to skip like a scratched CD and the screen starts flashing like a \$10 strobe light from San Francisco. Turns out my "main logic board" doesn't like Saskatchewan winters any more than I do.

So where does this leave me? It leaves me without my computer for up to a month, it leaves me getting friendly with the very nice, and obliging staff at the ITS Tech Shop, and it leaves me with three little

insights into life.

Insight #1: I am incredible dependent on my computer, and technology in general. Without a hint of exaggeration, my laptop likely sees an average of at least 6 hours of active use, everyday of the year. That might even be a bit conservative. I use it at both my jobs, and in all my classes. I take all my class notes on it, write all my essays on it, have all my music on it, and edit this illustrious paper on it. Its slender, white form is a constant presence in my life. I never really realized just how much I appreciated it until it was gone.

Insight #2: My dependence on my laptop has made my life better. So much so, in fact, that I now think almost everyone should have one. The wisdom of

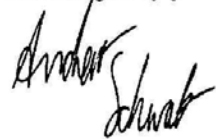
universities in the States that include a laptop lease in your tuition fees is now very apparent to me. Typing my notes improved the quality, legibility, and organization of my notes, and I would say that that had a direct impact on the quality of my essay writing and test studying. I was became more organized, and use far less paper in my day-to-day life. Basically, every student could benefit from having a laptop, if not all computer users. In addition, as ITS expands its wireless network, the use of computers and the Internet in classes could revolutionize the classroom experience.

Insight #3: The extended warranty is always worth it. When I bought my computer, I bought a

combo from the Campus Computer Store that included the 3-year warranty. At the time, I felt kind of suckered into that warranty, as it seemed like a useless add-on. Now being suckered is saving me \$800. So getting the extended warranty is never a scam, even if it feels like it at first.

Well, that's that. I'm a little disoriented and disorganized without my computer, but I have a feeling there's a newspaper something after this little rant, so I hope you enjoy it.

Technologically yours,



Andrew Schwab  
Co-Managing Editor

for success in the knowledge age” its ICT will have to compare favourably with other universities.

Increasingly, instructors will expect network connectivity in all classrooms, tools to conduct online quizzes and exams, electronic whiteboard software, desktop videoconferencing software, “smart boards” and data projectors as well as the ability to disseminate all course materials<sup>5</sup> electronically. At some universities, instructors are using new classroom technology to capture their lectures (audio, video, slides, whiteboard notes, class notes, images) for subsequent review by students. It is estimated that one third of faculty in Canada will retire in the next decade and that one half of University of Saskatchewan faculty will retire in that same period.<sup>6</sup> Competition for faculty will be intense and access to up to date well-supported technology will be a competitive advantage. Accreditation will depend increasingly on the effective application of ICT in academic programs.

The University has renewed its commitment to research, scholarly and artistic work and acknowledges that “encouraging the fruits of scholarship requires enhanced infrastructure.”<sup>7</sup> The ICT services researchers are expecting include ultra-high speed networks to move large amounts of data, large secure data storage capacity, high performance computing clusters, grid computers or supercomputers, visualization hardware and software, and desktop based videoconferencing and electronic whiteboard software to communicate with distant collaborators and graduate students. Not only are these technologies increasingly demanded by those undertaking research, scholarly and artistic work, there is also a greater demand for extended hours of service and support. If a researcher is conducting an experiment in collaboration with a colleague ten time zones away, the concept of 8:00 a.m. to 5:00 p.m. service is unacceptable. Recognizing the rapid change in technology and changing requirements, research-based universities are re-examining how ICT can better support research, scholarly and artistic work. “More than ever before, central IT organizations need to rededicate themselves to becoming involved with the research mission and enterprises at their institutions.”<sup>8</sup>

Increasingly, faculty, researchers, students, prospective students, alumni and staff expect that all administrative services will be delivered electronically (self-service), will support e-payments and will provide easy access to the data they require. Service availability must approach 24x7. The availability of effective administrative systems will help attract and retain faculty, students, researchers and staff.

The University’s increased dependence upon ICT is driven by:

- the changing expectations and needs of incoming students, faculty and researchers, as well as
- the new capabilities from ongoing ICT advancements.

ITS and other support organizations are responding to address the needs expressed by students, faculty and researchers.

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<sup>5</sup> Including course notes, images, simulations, video and recorded lectures.

<sup>6</sup> From “University of Saskatchewan Strategic Directions 2002 – Renewing the Dream”.

<sup>7</sup> *ibid*

<sup>8</sup> Bill Decker and Bonnie Neas, “Research Universities and the Central IT Organization: Rebuilding The Partnership”, *EDUCAUSE Review*, May/June 2003.