<div align="center">THE UNIVERSITY OF MANITOBA</div>

Inter-Departmental Correspondence

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TO Computer Committee, Teaching Enhancement Committee, Faculty of Agriculture

CC Will English, ACN, 609 Engineering_____

FROM Dr. Brian Fristensky, Plant Science, x-6085_____

SUBJECT: Is "THE LAPTOP UNIVERSITY" A GOOD IDEA?

Last week, representatives from the University of Minnesota, Crookston (UMC), did a presentation for the Faculty of Agricultural and Food Sciences entitled "The Laptop University". I would like to convey some of my comments regarding their model for University-wide computing. (http://www.crk.umn.edu/technology/thinkpadu/thinkpadu.htm)

To summarize briefly, UMC has instituted a University-wide effort to integrate computer technology into all aspects of teaching, research, outreach, and administration. The main features of this program are:

> •Teaching via the Web - Use of the Web for presenting lectures, giving tests, assignments, in-class learning aids
> •Outreach - extension materials on the web; Online courses
> •Goal of having every student, faculty member, department, office, and course to have a web site.
> •Every student pays a fee of $US 480 per semester which includes costs of leasing a laptop computer, which is replaced every 2 years.

I heard some useful ideas in their presentation, but I think that there are also many aspects of their computing model that, in addition to being unnecessarily costly, may actually impede teaching and research, as well as impeding the process of students and staff attaining a competitive level of computer sophistication.

1. The most important point I got out of the presentation was that technology is not the main issue; rather it is the human element. It was obvious that in most respects, the U. of M. has a far superior network and computing infrastructure to UMC. Just as critical was the level of training on the part of the user population (students and faculty). Many of us at the U. of M. have done things comparable to what was in the presentation. However, most faculty here, and most courses, do not have their own web sites, and would not know how to create one. Creating instructional media (interactive instructional software, CDs, video demos etc.) is beyond all but a few faculty members at both institutions.

Recommendations:
> a) It may be useful, as part of University 1, to institute a similar program to that at UMC, where freshmen learn to create their own web sites. Faculty members should also be encouraged to learn how to produce web sites. Web sites don't need to be fancy to be useful. It's surprising how little you need to learn to use the web as a tool for getting information out.

> A web-proficient university population would make the following possible:
> - universal access to lecture notes and other class materials
> - students hand in assignments by posting them to a web site
> - Web-based presentations, which are universally accessible via a server, rather than hardware/software-dependent presentations (eg. Power-point).that rely on a portable computer with a specific configuration
> - Lab-based web sites as a way of centralizing information in a research lab group (eg. lab protocols, database access, publication lists, extension information)
> - Administrative materials available on the web (committee membership,

committee terms of reference, forms, any documents that people routinely need access to).

b) The presenters pointed out that one of the big limitations was that faculty have little training in using computer technology. Their argument is that faculty should routinely be investing time upgrading computer skills, considering that to be part of the job.

At a competitive research university like the U. of M., this is not practical. You can't master every new courseware program that comes along. However, there are ways of accomplishing much the same ends. Increased opportunities for training of office staff and technical staff in creating and maintaining web sites would take some pressure off of professors to create and maintain web content. People need to get used to the idea that many of the documents we maintain and update as word processor files could be more conveniently maintained as HTML files. For example, if you mail a person an MS-Word file, and the recipient only has WordPerfect, the file will usually not be accurately imported. If, on the other hand, you can simply email the URL, and they can read the document either in HTML or .pdf format, the recipient should be able to read it regardless of the platform they're working on.

2. It was instructive to actually visit the UMC web site (listed above). It's really glitzy, and has a lot to say about technology, but after extensively browsing through the different sections, it became apparent that only a small percentage of courses had anything more than a syllabus on the Web, and none of the courses I looked at had any actual instructional materials (eg. lecture notes, demos). One course had a set of downloadable assignments. In comparison, although only a minority of U. of M. profs. currently maintain web sites for their research labs and courses, we have far more substance at our web sites, by and large. For example, my course, Introductory Cytogenetics, has an extensive web site including notes and figures for all lectures (http://www.umanitoba.ca/afs/plant_science/COURSES/CYTO/).

My impression is that UMC is good at talking about technology, but provides little evidence that they have actually done much of substance with it.

3. Getting more out of computers in the classroom is completely dependent upon being able to display computer screens in class. Only a small percentage of classrooms at the U. of M. currently have data projectors and network connections. These items should be a top priority in planning.

As a secondary priority, one might consider putting dedicated computers into lecture podiums in classrooms. If this is done, under no circumstances should laptops be used. Desktop computers have larger screens, that are visible from a much wider range of angles than laptops, and are usually easier to see amidst glare and reflections. The ability to reposition the keyboard and monitor independently are also an important consideration for teaching. Also, many laptops do not allow display of the screen to both the monitor and projector simultaneously. A large desktop computer is much easier to fix securely at a podium, to prevent theft.

4. The UMC presentation made a big deal out of their progress towards having a network connection at ever seat in the classroom, so that students could plug in their laptops in each class. While I can't immediately dismiss the value of such an initiative, they didn't make a compelling case for its usefulness, and I think that really remains to be demonstrated. There are clearly situations where you could put such capabilities to use, but the costs of such an installation, and the need for consistent upgrading of such an enormous number of connections, suggests that there are more effective ways of using that money.

5. One of the major points in the presentation was that all students are required to pay $US 480 per semester to lease a laptop. In my opinion, there are many problems with this approach.
•Laptops are probably the worst kind of computer for almost any purpose. They are ergonomically bad, and in particular have small screens, defeating the progress that has been made in recent years towards getting more screen real estate. We need to get away from the "one window owns the screen" model. Laptops become obsolete more rapidly, are less expandable, and are more expensive to buy and repair than desktop machines. They are also easier to steal.

•The prospect of trying to keep several thousand laptops campuswide identically configured, virus free, and networked is a terrifying prospect, from an administrative point of view. For permanently networked NT workstations, there is at least some ability for an NT administrator to do some remote administration, although the administration model of NT is still quite primitive, compared to Unix.

•The only advantage I can see to laptops is that they are portable. The idea is that the student or faculty member has the same programs, and the same data, regardless of where they go. However, essentially the same thing can be accomplished, in a much cleaner way by an increased movement toward server-based computing.

6. The stand-alone personal computer, especially the laptop, is an impediment to progress towards more network-centric computing. By definition, a laptop spends a significant amount of time NOT being connected to a network. One of the most important trends in modern computing is the increased use of network based resources, including client/server programs, the World Wide Web, email, remotely-mounted filesystems, and remote printing. Connecting a mobile laptop, routinely, to more than one network backbone presents a variety of practical problems. For example, a network card that works with one backbone at home may not work with the University backbone. A mobile laptop is therefore less likely to be well-integrated into network services such as remotely-mounted file systems, printing and client-server applications.

7. The UMC model is entirely based on WindowsNT, both for servers and for personal computers. So much has been written regarding the problems of security, scalability, and reliability associated with NT servers that it is not worth going into here. Those issues aside, if the only system students have exposure to is the standalone, MS-Windows model, they aren't really learning much about how to use computers.   In particular, Unix variants, such as Sun's Solaris at the server end, and Linux on the desktop, are a rapidly expanding segment of the market, and are arguably far superior to Windows NT in almost every area, even with respect to ease of use. Essentially all of the Internet was invented in Unix (eg. web browsers, FTP, TCP/IP, most aspects of email, Ethernet) and Unix is intrinsically far better suited to a network centric computing model, which is best summed up as "the network IS the computer". I enclose an article that I wrote for a forthcoming book, that explains more about what the industry now refers to as Network Computing, and how it can be used in science and education. More detailed information on Network Computing can be found at my Web site: http://home.cc.umanitoba.ca/~psgendb/nc/