College of Natural Sciences

Information Technology Vision Plan

1999-2000

Scope

This report presents the College of Natural Science's plans for the use of information technology in two areas: instruction and infrastructure. Funding for these efforts comes from two sources, the University-wide ITAC student fee and the College of Natural Sciences IT student fee. These funds are appropriated and managed by the college through the Office of the Associate Dean for Information Technology with the approval of the Dean of the College of Natural Sciences. There are several examples of the acquisition and use of information technology within our college that are not within the purview of this office:

* information technology acquired by faculty using research grants,

* information technology acquired by departments (such as Computer Sciences) using funds from a departmental information technology fee,

* information technology acquired by departments through direct gifts from individuals and corporations,

* information technology acquired for administrative purposes.

This vision plan does not outline plans for the use of information technology in areas other than instruction and infrastructure. As would be expected, the use of information technology in research is highly dynamic, depending on the availability of funding and the directions of individual research projects. Information technology for administration is a relatively small expense in our college that is often paid for using MO&E money. Without a guaranteed source of funding, it is difficult to have a vision plan for administrative uses of information technology.

Summary

The College of Natural Sciences is dedicated to using information technology to enrich the educational experience both of our majors and of the thousands of students throughout the university who take our courses. We believe information technology should impact our students in the lecture halls, in our science labs, and in their dorm rooms. To this end, we must provide state-of-the-art networks, instructional computer labs, powerful server machines, and technology rich classrooms and laboratories. We must have a professional staff to support and maintain these facilities, and we must be constantly upgrading our hardware and software to keep it current. And, most importantly, we must give our faculty the support they need to revise and enhance their courses to take advantage of information technology. Computational Science Courses This year the College of Natural Sciences has begun to address a significant problem that impacts all our departments. Although our college includes one of the finest computer science departments in the world, students in our college who do not major in computer science have very limited opportunities to become trained in computing and its uses in the sciences. The reason for this is simple: the teaching resources of the Department of Computer Science are overwhelmed by its majors, currently numbering over 2,000. Non-majors are usually unsuccessful at registering for computer sciences courses because majors are given priority. As a result, students graduating with degrees in the sciences have little formal training in computing and compete less effectively in the job market. This problem is being addressed in two way. The Department of Computer Sciences will

begin offering a series of course for non-majors, called Elements of Computing. Other departments will begin offering, and in some cases requiring, computational courses having titles such as Computational Biology and Computational Physics. These courses will hopefully make our undergraduate science programs more attractive to incoming students(thereby relieving some of the stress on the computer science major) and make our science graduates more attractive to potential employers. While the Department of Computer Science will undoubtedly obtain special resources to support the Elements of Computing series, resources throughout the college will be strained by the sudden increase in students involved in computing.

* The occupancy of our instructional computer labs is expected to rise as more students need to use computers. While most computer science majors own computers,fewer biology and physics majors do.

* The computers in our labs must be equipped with the software applications needed for teaching computational sciences. Even students who own their own computers may not have the Mathematica software or a gene sequencing program.

* There will be a greater need than ever before for classrooms and auditoriums in which faculty can use computers in their lectures.

* Faculty is several departments will undoubtedly ask for our help in developing computational science courses. This help may be in the form of a graduate student assistant or a special piece of software or hardware.

All the projects listed on the following page in some way support this initiative to train our science majors in computing. While this new initiative underscores the urgency and magnitude of these projects, they are nevertheless the same long-range goals our college has had for several years.

Specific ITAC Funding Requests

Auditorium Modernization $240,000

As described in the "College of Natural Sciences Vision Plan for Auditorium Modernization" (attached), we would like to modernize auditoriums in our college at a rate of four per year, each costing approximately $60,000. A model auditorium, GEO 100,has been completed and illustrates the impact we can make on our large undergraduate classes. These auditoriums will benefit students throughout the university.

Instructional Computer Lab for RLM $450,000

As described in the "College of Natural Sciences Vision Plan for Instructional Computer Labs" (attached), we plan to build a 50-seat computer lab in RLM for the joint use of undergraduates taking Math, Physics, and Astronomy courses. This lab has been badly needed and has been promised for several years. Finally, this year space will become available for the lab.

Faculty Course Development Projects $250,000

As in the past, we plan to fund faculty projects to integrate information technology into their classes and to take advantage of the computing facilities in our college. These projects will include the development of web sites for classes, the design of multimedia presentations for classes, and the use of information from the World Wide Web in lectures. Replacement of Aging Computers in Our Instructional Labs $ 240,000 as described in the "College of Natural Sciences Vision Plan for Instructional Computer Labs" (attached), a substantial number of computers in our joint-use labs will become three years old in September 1999. We are already experiencing hardware failures, and recent software upgrades have caused performance of the systems to seriously degrade. We will minimize our expenses by using the same monitors and software on the newly

purchased systems.

Software for Computational Science Courses and Elements of Computing $150,000

In the next year, the Department of Computer Science will begin offering "Elements of Computing" service courses for non-CS majors. Several departments including Physics and Biology will begin requiring computational courses of their majors. These funds will purchase special-purpose software allowing students taking these courses to use the instructional computing labs throughout our college.

Maintenance and Infrastructure $180,000

These funds will be used to upgrade web and file servers in our departments, to purchase network switches for our telecommunications closets, and maintain and enhance our special purpose labs.

College Goals and Recent Progress

Networking. Because our college occupies more than ten buildings on campus,networking is always a large and expensive endeavor. A major accomplishment this year was the rewiring and modernization of the data network in RLM, a project costing over $700,000. This substantially completes the rewiring of all our major buildings. Future projects will include upgrading the electronics in a number of our telecommunications closets, the networking of off-campus space occupied by our Organized Research Units, and the networking of new and renovated buildings such as ESB and CDFR.

Classroom and Auditorium Modernization. We have begun an exciting five-year program to modernize classrooms and auditoriums in our college with high-tech computer, projection, and sound systems. Our first effort, GEO 100, became operational at the beginning of fall semester. We believe we now have the most technologically sophisticated large auditorium at the university. By addressing large auditoriums first, we believe we will have the greatest impact on the largest number of students. Our plan is to modernize four auditoriums a year for the next five years. Details can be found in the attached vision plan for auditorium modernization. Until more classrooms can be modernized, we are buying departments high-resolution portable LCD projectors that faculty can checkout for use in classes. We purchased six in the last year at a cost of about $5,000 each.

Instructional Computer Labs. For the last two years the instructional computer labs across our college have served us well with only a need for the anticipated operations, maintenance, and software upgrade costs. However, these computers are beginning to age. We are already experiencing hardware failures and the warranties have expired on some of our machines. Each new software release places heavier demands on the hardware resources and causes the system to appear to run more slowly. Our plan is to begin replacing systems when they become three years old with new systems having three year warranties. Fortunately, the decreasing price of computers means that we can replace a system for around $2,200 if the monitor is still usable. Beginning In September 1999, we expect to replace about 100 systems a year. In the coming years, our instructional computer labs will face an increased demand from courses with titles such as Computational Physics and Computational Microbiology. More departments are adding such courses to their curricula and requiring them of their majors. These courses often use special-purpose software that students would not be expected to have on their home and dorm computers.

Course Development. To take advantage of our instructional computer labs, our servers, and our high-tech classrooms, our faculty must enhance their courses to include information technology. We are committed to allocating a portion of our funding to faculty projects that involve curriculum innovations. This past year Natural Sciences ranked first in the university in our support of such projects. Proposals for curriculum development projects often include requests for part-time students to help in organizing teaching materials and for special hardware and software to support course development. Such projects will be an important part of our vision plan for years to come.

Facilities and Staffing

A list of our college's instructional computer labs can be found in the "College of Natural Sciences Vision Plan for Instructional Computer Labs". This spreadsheet includes the number and type of computers in each lab, its hours of operations, and the students who may use the lab. A summary of the auditoriums located in College of Natural Sciences buildings can be found in the "College of Natural Sciences Vision Plan for Auditorium Modernization". These auditoriums are all being considered for modernization over the next five years. The spreadsheet shows the current technologies available in each room. The College of Natural Sciences does not have a comprehensive accounting of its networking facilities. This is due, in part, to the fact that we do not even have access to all our own telecommunications closets. Each department now has a professional staff of full-time and part-time system administrators to operate and maintain their labs, network, and servers. These personnel are supported from college IT fee money.