MICHIGAN STATE
UNIVERSITY

Date: September 27, 1998

To: University Committee on Academic Policy
University Graduate Council

From: Dr. Lou Anna K. Simon, Provost LAKS

Re: Student Laptop Proposal

I write to request your deliberations on a proposal to require all students matriculating at MSU in 2001 to possess an Internet-compatible laptop computer or equivalent technology for mobile, networked computing.

This proposal has clear relevance to the MSU Guidance Principles, the MSU Technology Guarantee, and the currently developing MSU Promise. It offers an opportunity for MSU to encourage the use of technology by serious students in a distinctive form, providing national leadership in the enhancement of instruction. Completing the review and refinement of this proposal in the academic governance system will be a significant goal of the Office of the Provost during the 1998-99 academic year.

Three documents relating to this student laptop proposal are attached for your review.

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Attachment A is the proposal itself. This document was drafted by Dr. Paul M. Hunt, Vice Provost for Libraries, Computing & Technology, following his consultation with faculty, staff, and students on the Instructional Technology Computing Committee (ICTC) and the Network Communications Committee (NCC) of the Communications and Computing Systems Advisory Committee (CCSAC). The document was subsequently approved by ICTC and NCC, and then by the parent structure, "full group" CCSAC. Attachment A is a policy recommendation that draws on the coalescence of several technology efforts now in progress. If approved, the policy recommendation will spawn additional implementation efforts between now and Fall 2001.

CCSAC recognized that many cogent academic rationales for such a proposal may co-exist, reflecting the different realities in instruction and subsequent professional employment of MSU students across the academic disciplines. A

joint writing committee from ICTC and NCC prepared one such rationale, which may be found in Attachment B.

Establishment of an academic requirement for students to possess a network-compatible laptop will make the cost of such technology a component of student's financial aid packaging. The importance of such eligibility for aid may be discerned in Attachment C, which contains selected tables from "Falling Through the Net II", a report released by the National Telecommunications and Information Administration (NTIA) in July, 1998. The NTIA data reflect differential access to information technology in American households on the basis of income, race stratified by income, rural versus urban household settings, and related factors such as parental education or single versus dual parent presence. Moreover, the data trends from 1994 to 1997 show a widening of several existing gaps in access to technology. The Office of the Provost believes that social equity must be considered carefully in institutional planning, within the context of MSU's land-grant philosophy and commitment to access. Through the connection with financial aid, the universality of the proposed student laptop requirement is intended to ensure that continuing advances in campus information technology are supportive of equity and access across all segments of society.

The land-grant tradition also stresses applicable knowledge and productive enterprise, and information technology utilization is now clearly key to both. According to "Michigan in Brief 1998" from Public Sector Consultants,

> *"Michigan business spending alone on information technology is about $8 billion annually—roughly equal to the state's annual General Fund budget."*

The policy now proposed would promote ubiquitous use of computers and networked resources by MSU students, with the electronic library resources of the Internet available across residence hall rooms, classrooms, laboratories, libraries, field work, co-curricular activity, and weekend or vacation trips home or elsewhere. Whether viewed as providing an important tool for teaching and learning or a marketable skill for students' subsequent employment, the proposed policy seeks to recognize and add value to information technology's societal role, consistent with academic values and MSU's land-grant mission.

Please accept my thanks in advice for your timely and engaged advice on this matter. Dr. Hunt, other members of my staff, and I will all be happy to respond to your questions.

Cc: P. M. Hunt

September 14, 1998

Summary:

CCSAC joins the Vice Provost for Libraries, Computing & Technology in recommending to Provost Simon that MSU establish and publicize a requirement that all students matriculating in or after Fall Semester, 2001, shall equip themselves with a Web-compatible laptop, palmtop, or other mobile computer capable of accessing the then-current Internet with at least Ethernet speed. This recommendation is made in the expectation that it will be shared for review by the University Committee on Academic Policy, the Graduate Council, and the Academic Council. The details enumerated below are considered significant components of the recommendation.

Details:

1. CCSAC anticipates that MSU will complete the networking of all student rooms in residence halls by Fall Semester 2001, in accord with current plans.

2. CCSAC anticipates that the current efforts to provide network ports in classrooms, libraries, laboratories, and conference/recitation rooms will be continued and expanded.

3. CCSAC anticipates that current experimental efforts to equip graduate students and undergraduates with DHCP-capable laptops will be continued, and evaluation results from those efforts will assist the implementation of this recommendation. In addition, continuing central support for regular upgrades of faculty members' own computers, as well as unit-level technical support, will be essential.

4. CCSAC anticipates that recent growth in faculty and student technology training efforts (such as the four-day faculty seminars and the CBT on-line training library) will be continued, to support effective utilization of the student computers in both faculty-led classes and private study.

5. CCSAC anticipates that students will be able to equip themselves in accord with the recommended policy for amounts less than $1000, and that the acquisition of such systems will be recognized as part of the cost of attendance for purposes of financial aid awards.

6. CCSAC anticipates that implementation of this recommendation will make provision for maintenance of the students' systems, and their insurance against loss through accidental damage or theft.

7. CCSAC reaffirms the continuing policy of exposing students to multiple operating platforms, as a means of both broadening students' skill sets and emphasizing the

generic principles of information technology use. Thus CCSAC anticipates that a diverse set of platforms will be acceptable as student choices to comply with the recommended policy.

8. CCSAC recognizes that students will typically acquire only one operating platform for their personal use. CCSAC also anticipates that the optimal choice of platform will likely vary from major to major, and that a significant number of students will continue to enter MSU as "no-preference" and/or change majors once here. CCSAC further believes that faculty must be able to select freely from among operating platforms in crafting optimal course delivery strategies, and the possibility to utilize unusual software and performance capabilities must also exist. Faculty must be able to provide uniform experiences for all students within a course, when such uniformity of experience is justified on curricular grounds. To accommodate all of these considerations, CCSAC sees the continued support of the University's microcomputer laboratories as an essential component of this plan, in so much as they ensure a diverse and continually evolving campus computing environment.

9. CCSAC believes that the timing of computer acquisition by individual students may be left to their individual judgment, provided compliance with the recommended policy is achieved prior to matriculation. CCSAC anticipates that the motivation for students to equip themselves with computers during high school will increase. Moreover, CCSAC believes that some students who obtain computers in the junior or senior year of high school might advantageously replace them in the midst of their undergraduate years, after firm major choices can guide selections. Thus CCSAC anticipates that an institutional policy that stresses functionality (including mobility and high speed network access in diverse settings) without mandating specific models or purchase timing, may result in a competitive advantage for MSU, relative to institutions with less flexible policies. Early notice to prospective students and their parents is key to such an approach, suggesting that formal approval of this recommendation before Fall 1999 is important in order for the policy to be implemented fully in Fall 2001.

10. CCSAC believes that graduate programs may properly desire to implement a parallel expectation for entering graduate students at an earlier date. Hence CCSAC believes that a blanket policy authorization should be put in place to permit graduate program faculties to adopt such local policies as quickly as adequate provision for corresponding financial assistance can be made, subject to appropriate administrative review.

11. CCSAC anticipates that implementation planning for this recommendation will address issues of assistive or accommodating technologies, with the advice of the CCSAC ATC and other campus entities with responsibilities in this area.

12. CCSAC recognizes the possibility of significant differences in networking access between on- and off-campus housing venues, and anticipates that avenues to ensure

adequate network bandwidth to off-campus students will be explored during the implementation period.

Approvals:

August 28, 1998	Instructional Computing & Technology Committee of CCSAC
August 31, 1998	Network Communications Committee of CCSAC
September 14, 1998	Communications & Computer Systems Advisory Committee (full group)

B.

Rationale for Universal Mobile Computing at MSU

Joint Writing Committee
Instructional Computing and Technology and Network Communication Committees
Communications and Computer System Advisory Committee
Prepared for the Vice-Provost for Libraries, Computing, and Technology
Michigan State University, East Lansing, MI 48824

This ancillary document presents a supporting rationale for the prospectus on universal mobile computing forwarded by the Vice-Provost for Libraries, Computing, and Technology and approved by the Instructional Computing and Technology Committee, the Network Computing Committee, and the Communications and Computer Systems Advisory Committee.

Soon, students across the nation will routinely encounter educational experiences similar to the following:

Kendra sits down for her first class of the day, pulls out her laptop, and plugs it in. During the lecture, Dr. Smith discusses web sites with detailed drawings similar to the images they are preparing in their CAD labs. Instead of squinting at the faraway projector, Kendra looks at her own computer screen, following links being explored in the class. She bookmarks two sites for later review. Later, her economics class begins with the students accessing a stock market database. They use the current data to continue plotting the daily fluctuations of the market as well as their individual investments. Market trends seem much more relevant with this data than with the textbook's graphs, thinks Kendra. As class finishes, Kendra receives an electronic reminder that her lab report is due by midnight. Stopping by her room after lunch, she gets a message from her parents that there is a family emergency and she and her sister LaKeisha are needed at home for the weekend. Grabbing her laptop and one textbook, Kendra picks up LaKeisha and heads home. That evening, Kendra emails her lab report to her TA. Using her own laptop, LaKeisha accesses the library databases, getting not only a few good references but also a few electronic books for her IAH paper. Sunday afternoon, she has a virtual meeting with her IAH 201 group.

Elsewhere at MSU, Rob and his sister Emily are both enrolled in the College of Nursing. Rob is a junior, having completed all his pre-nursing requirements, and Emily is starting her graduate studies. Both are following a long family tradition in the field. They chose MSU for its advanced use of technology to support nursing and nursing education.

In the past, Rob made extensive use of his laptop computer in completing the pre-nursing requirements. He routinely electronically connected to the MSU library to research the topics in his tier I writing requirement. Then there were many web sites he was referred to in Human Anatomy that permitted him to get detailed images of anatomical systems—and from perspectives not readily available in texts. He downloaded these images into papers and class presentations for which this "artistically challenged" young man was quite grateful.

Meanwhile, his older sister, Emily, is completing her practicum at a community hospital in northern Indiana. She spends a substantial portion of her shift making home visits in support of patients and their families who have recently been released from the hospital. The experience she gained from her nursing courses in the use of mobile communications has been immensely helpful delivering the best nursing care possible to her patients. She is able to connect both to up-to-date nursing resources as well as to records and charts no matter where the patient may be. When she is finished with her shift, she goes home and works on her graduate Web-based course.

Many departments at MSU are already making use of computers in instruction. These uses can be expanded with the availability of mobile computing as suggested in the following two examples.

Sophomores from a number of different majors take a course in quantitative analysis, the determination of the amount of particular species present in a given sample of material. . In a number of the experiments, the student prepares a set of standard solutions of carefully controlled composition. A measurement is then made of a particular physical property, such as pH or adsorption of light of a particular wavelength, for each solution. The resultant set of data is analyzed to produce titration curves, calibration curves, etc depending on the experiment.

For this course, the mobile computing environment would allow each student to enter data into his or her computer immediately and tentatively observe the final results. The student can then make additional measurements to correct any deficiencies in the observed data while still in the lab. Before leaving the lab, the student would connect

Rationales for Mobile Computing

to the network and submit the raw data from the day's exercises to the staff of the course. This diminishes the temptation to "cook" the data at a later time for better results (and a better grade). This also facilitates sharing of data among the entire class for meta-analysis. With the network connection, students can also access material safety data sheets at the MSU Office of Radiation and Chemical Biological Safety. They can examine the safety aspects and other physical properties of the chemical compounds being used in the experiment. Further analysis and report writing takes place at a later time in another place.

In the chemistry lab, this teaching approach would promote efficient and flexible learning. It increases student awareness of what is happening. Professors have more flexibility in what they have students do. More extensive data analysis can be reasonably accomplished in the available time.

The use of computing in the School of Music has grown over the last decade. Ear training makes use of computers and keyboard in a lab setting. The instructor directs the class from a central workstation and records results of individual students as the class proceeds. Electronic music manuscript editors are used in orchestration, composition, and other classes. Analysis of atonal music is conducted using "set theory" programs in an advanced class. In addition, music majors training to be marching band directors could use mobile computers. The layout of formations and movements of half-time shows is part of the curriculum. The ability to take the computer into the field and make adjustment as the band is practicing would be valuable.

At Michigan State University, this transition is already beginning. What are some of these activities occurring in the professional and teaching environment?

The computing revolution has also had an impact on the professional working environment. For example, in criminal justice, not only have computers and technology extensively permeated all facets of the system including policing, courts, corrections, security and forensic science, but the trend in some areas is unmistakably in the direction of mobile computing. In recent years, the School of Criminal Justice at MSU has undertaken several surveys of likely employers of criminal justice graduates. One of the most commonly expressed requirements from employers is that prospective employees possess excellent computing skills and, increasingly, that they are familiar with mobile computing environments for gathering and disseminating data, communications, and the Internet.

Today many police vehicles are equipped with on-board computers that can be used to check license plates and drivers licenses and request information from local and national databases. In a few years, it will be possible to scan a fingerprint into these computers and send them to a repository for checking. Within minutes, officers on the street will be able to determine if the driver of the suspect car is wanted for a crime in the local area or elsewhere in the country.

Many professors and students are imagining these approaches in their classrooms. The mobile computing environment—integrated with teachers, professionals, students, and other computers—across the curriculum and the planet enhances the educational experience at Michigan State University. We believe all students will be better equipped to move into their professions and disciplines after using technology throughout their MSU career. The mobile computer environment cuts across all colleges, sciences, arts, and humanities.

Joint Writing Committee:

Jay Siegel (NCC/Criminal Justice), Ann Marie Paulukonis (ICTC/COGS), Pete Marvin (NCC/Student Services), Lew Greenberg (ICTC/NCC/CSE), Jon Burley (ICTC/Geography), Tom Atkinson (NCC/Chemistry)

C.

FALLING THROUGH THE NET II: NEW DATA ON THE DIGITAL DIVIDE NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION

July 28, 1998

Selected graphs and charts

Chart 5: Percent of U.S. Households with a Telephone by Income, By Race/Origin

1997

	Under $15,000	15,000-34,999	35,000-74,999	75,000+
White-Not Hispanic	90.3	96.3	98.6	98.8
Black-Not Hispanic	76.3	91.3	96.4	99.5
Other-Not Hispanic	81.8	94.6	96.4	98.6
Hispanic	78.4	90.4	95.7	98.0

Chart 11: Percent of U.S. Households with a Computer by Income By U.S., Rural, Urban, and Central City Areas

1997

	U.S.	Rural	Urban	Central City
Under $5,000	16.5	15.0	16.9	16.4
5,000-9,999	9.9	7.9	10.5	11.0
10,000-14,999	12.9	11.0	13.5	13.2
15,000-19,999	17.4	17.0	17.5	17.8
20,000-24,999	23.0	20.9	23.7	24.4
25,000-34,999	31.7	31.7	31.7	31.0
35,000-49,999	45.6	45.0	45.9	46.4
50,000-74,999	60.6	59.6	60.9	60.0
75,000+	75.9	75.3	76.0	73.9

Chart 13: Percent of U.S. Households with a Computer
By Income
By Race/Origin

1997

	Under $15,000	15,000-34,999	35,000-74,999	75,000+
White Not Hispanic	15.4	28.0	55.1	76.3
Black Not Hispanic	6.3	18.2	40.2	64.1
Other Not Hispanic	19.1	38.5	62.6	81.0
Hispanic	7.8	16.6	36.8	72.8

Chart 15a: U.S. Household Computer Penetration Gap
By Income

1994 vs. 1997

Under $15,000

	White-Not Hispanic	Black-Not Hispanic	Hispanic
1994	9.2	2.9	3.6
1997	15.4	6.3	7.8

$15,000 – 34,999

	White-Not Hispanic	Black-Not Hispanic	Hispanic
1994	18.1	10	9.4
1997	28	18.2	16.6

$35,000 – 74,999

	White-Not Hispanic	Black-Not Hispanic	Hispanic
1994	40.5	24.8	30.6
1997	55.1	40.2	36.8

$75,000+

	White-Not Hispanic	Black-Not Hispanic	Hispanic
1994	61	52.6	60.7
1997	76.3	64.1	72.8

Chart 18: Percent of U.S. Households with a Computer by Household Type By U.S., Rural, Urban, and Central City Areas

1997

	U.S.	Rural	Urban	Central City
Married Couple w/ Children <18	57.2	53.9	58.6	52.0
Male Householder w/ Children <18	30.5	30.2	30.6	28.0
Female Householder w/ Children <18	25.0	28.1	24.5	20.2
Family Households w/o Children	36.4	32.0	38.2	34.1
Non-family Households	23.5	17.0	25.0	26.1

Chart 20: Percent of U.S. Households with Online Service by Income By U.S., Rural, Urban, and Central City Areas

1997

	U.S.	Rural	Urban	Central City
Under $5,000	7.2	5.6	7.7	6.6
5,000-9,999	3.9	2.3	4.4	4.6
10,000-14,999	4.9	2.8	5.6	5.7
15,000-19,999	7.0	4.5	7.8	9.6
20,000-24,999	9.0	6.5	9.9	10.0
25,000-34,999	13.9	11.6	14.7	13.3
35,000-49,999	20.8	16.0	22.6	23.0
50,000-74,999	32.4	27.6	33.9	35.1
75,000+	49.2	44.4	50.3	49.4

Chart 21: Percent of U.S. Households with Online Service by Race/Origin By U.S., Rural, Urban, and Central City Areas

1997

	U.S.	Rural	Urban	Central City
White Not Hispanic	21.2	15.6	23.5	23.3
Black Not Hispanic	7.7	5.5	7.9	5.8
Other Not Hispanic	25.2	16.1	26.4	23.5
Hispanic	8.7	7.3	8.9	7.0

Chart 23: Percent of U.S. Households with Online Service by Educational Attainment By U.S., Rural, Urban, and Central City Areas

1997

	U.S.	Rural	Urban	Central City
Elementary	1.8	1.2	2.1	2.2
Some H.S.	3.1	2.5	3.4	2.5
H.S. Diploma or GED	9.6	9.2	9.8	7.9
Some College	21.9	20.5	22.3	19.7
B.A. or more	38.4	35.6	39.0	36.1

Table 25: Percent of U.S. Households with a Telephone By State

1997

State	Percent of Households	90% Confidence Interval
Iowa	97.8	0.87
Minnesota	97.2	0.97
Maryland	97.1	1.06
New Hampshire	97.1	1.13
Pennsylvania	96.9	0.59
Maine	96.8	1.14
Nebraska	96.6	1.1

North Dakota	96.5	1.12
Utah	96.3	1.16
Wisconsin	96.1	1.13
Colorado	95.7	1.19
Oregon	95.5	1.27
Washington	95.5	1.27
Delaware	95.3	1.41
Massachusetts	95.2	0.93
Alaska	95.0	1.39
Michigan	95.0	0.82
Tennessee	95.0	1.29
California	94.8	0.55
Ohio	94.4	0.83
Rhode Island	94.4	1.52
Virginia	94.4	1.31
New York	94.3	0.62
Nevada	94.2	1.44
New Jersey	94.2	0.92
Hawaii	94.1	1.67
Vermont	94.0	1.55
Kansas	93.9	1.44
West Virginia	93.9	1.29
Households Total US	*93.8*	*0.21*
Indiana	93.8	4.68
South Dakota	93.6	0.95
Montana	93.4	0.68
South Carolina	93.4	2.74
Missouri	93.1	4.56
Florida	92.7	1.29
North Carolina	92.7	2.86
Idaho	92.5	0.64
Wyoming	92.3	1.37
Kentucky	92.3	0.2
Connecticut	92.1	2.02
Oklahoma	91.6	1.57
Washington, DC	91.5	0.59
Alabama	91.4	1.6
Arizona	91.4	4.7
Georgia	91.4	1.44
Texas	91.1	1.75
Louisiana	90.9	1.35
Illinois	90.5	2.7
Arkansas	88.9	1.23
Mississippi	88.3	3.66

New Mexico	87.9	1.94

Table 26: Percent of U.S. Households with a Computer By State

1997

State	Percent of Households	90% Confidence Interval
Alaska	55.3	3.2
Utah	52.6	3.1
Colorado	52.2	2.9
New Hampshire	50.1	3.4
Vermont	47.1	3.3
Washington	46.4	3
Idaho	44.4	2.9
Virginia	44.0	2.8
Maryland	43.8	3.1
California	43.2	1.2
Kansas	41.7	3
Oregon	40.9	3
Wisconsin	39.9	2.9
Arizona	39.8	2.7
Wyoming	39.7	2.9
New Jersey	39.4	1.9
Minnesota	39.3	2.9
Massachusetts	39.2	2.1
New Mexico	38.2	2.8
Missouri	38.1	2.9
Delaware	37.3	3.2
Nebraska	36.8	2.9
Maine	36.6	3.1
Households Total US	*36.6*	*0.4*
Ohio	36.4	1.7
Connecticut	36.4	3.2
Texas	36.4	1.5
Montana	36.1	2.7
Illinois	35.6	1.7
Georgia	35.2	2.5
Michigan	35.1	1.8
Washington, DC	34.8	2.9
Hawaii	34.6	3.4

Rhode Island	34.5	3.1
Nevada	34.0	2.9
Indiana	33.9	2.8
Iowa	33.9	2.8
South Dakota	33.6	2.8
North Dakota	33.0	2.9
Tennessee	32.9	2.8
Florida	32.9	1.4
New York	32.4	1.2
Pennsylvania	32.2	1.6
South Carolina	31.0	2.9
Kentucky	30.3	2.6
North Carolina	29.9	2
Oklahoma	29.6	2.5
Alabama	29.3	2.7
Louisiana	25.2	2.5
West Virginia	23.9	2.3
Arkansas	23.5	2.4
Mississippi	20.6	2.1