

HB

402

HOUSE COMMITTEE REPORT 71e

(11)

Date Referred: March 14, 1990

FURTHER REFERRALS:

Date of Committee Action: 4/19/90

The FINANCE Committee considered:

HB 402

HOUSE BILL NO. 402

APPLIED TELECOMMUNICATIONS CENTER

"An Act relating to a center for information technology at the University of Alaska Anchorage."

RECOMMENDATIONS:

- [] be replaced with CS HB 402 (SA) [] the same title
- [] have attached amendment(s) [] a new title
- [] do pass
- [] do not pass
- [] no recommendation
- [] individual recommendations
- [] additional referral to the _____ Committee

ADOPTS: _____ letter of intent

ATTACHES NEW FISCAL NOTE(s):
(Dept)

APPROVES PREVIOUS: (Date/Dept)

- [] fiscal impact AFC
- [] zero fiscal note _____
- [] zero with analysis _____

- [] fiscal note(s) _____
- [] zero fiscal note(s) Admin 3/2/90
- [] zero fn/analysis _____

SIGNING DO PASS:

[Signature] Swackhamm
[Signature] Brown
[Signature] Koponen

SIGNING:
(Check approp. column)

	Do Not Pass	No Rec	Amend
<u>[Signature]</u> Phillips		<input checked="" type="checkbox"/>	
<u>[Signature]</u> Larson		<input checked="" type="checkbox"/>	
<u>[Signature]</u> Shultz		<input checked="" type="checkbox"/>	
<u>[Signature]</u> Rieger		<input checked="" type="checkbox"/>	
<u>[Signature]</u> (No fiscal note) <u>WALUS</u>		<input checked="" type="checkbox"/>	
<u>[Signature]</u> Hoffman		<input checked="" type="checkbox"/>	

[Signature] Larson
 CO Chairman's Signature
[Signature] Hoffman

FISCAL NOTE

CC

REQUEST:

Revision Date: _____
Title : Applied Telecommunications Center

Agency Affected : Administration
BRU : Information Services

Sponsor : Rep. Boucher
Requestor : State Affairs

Components : _____

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0

CAPITAL	0	0	0	0	0	0
---------	---	---	---	---	---	---

REVENUE	0	0	0	0	0	0
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FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
TOTAL	0	0	0	0	0	0

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS : (Attach a separate page if necessary)

See Attached.

Prepared by : Paul Monette, Director

Division : Information Services

Phone : 465-2220

Date : 01/22/90

Approved by Commissioner : Frank S. Baxter

Agency : Administration

Date : 1/25/90

Distribution (by preparer) :

Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

Adopted

FISCAL NOTE

REQUEST:

Revision Date: _____
Title: Applied Telecommunications Center

Agency Affected: University of Alaska
BRU: _____

Sponsor: Red Boucher
Requestor: House Finance Committee

Components: _____

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES	440.8	544.3	544.3	544.3	544.3	544.3
TRAVEL	25.0	25.0	25.0	25.0	25.0	25.0
CONTRACTUAL	98.0	288.0	288.0	288.0	288.0	288.0
SUPPLIES	43.0	43.0	43.0	43.0	43.0	43.0
EQUIPMENT	333.5	40.0	40.0	40.0	40.0	40.0
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	940.3	940.3	940.3	940.3	940.3	940.3
CAPITAL	-0-	-0-	-0-	-0-	-0-	-0-
REVENUE	-0-	-0-	-0-	-0-	-0-	-0-

FUNDING: (Thousands of Dollars)

GENERAL FUND	940.3	940.3	940.3	940.3	940.3	940.3
FEDERAL FUNDS	59.7	59.7	59.7	59.7	59.7	59.7
OTHER						
TOTAL	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0

POSITIONS:

FULL-TIME	-0-	-0-	-0-	-0-	-0-	-0-
PART-TIME						
TEMPORARY						

ANALYSIS : (Attach a separate page if necessary)

See attached.

Prepared by: House Finance Committee

Phone: 465 - 3757

Division: Co-Chairman Ron Larson

Date: _____

Approved by Co-Chairman Lyman Hoffman
Commissioner: _____

Date: _____

Agency: _____

Distribution (by preparer):

- Legislative Finance
- Legislative Sponsor
- Requestor
- Office of Management and Budget
- Impacted Agency(ies)

Adopted

<u>GIS(UAF)</u>	<u>YEAR 1</u>	<u>YEAR 2 & THEREAFTER</u>
1 Faculty	66.0	66.0
1/2 Time Technician	15.0	15.0
Equipment Maintenance	10.0	10.0
Start-up GIS Equipment (2 GIS workstations)	-	-
Commodities	<u>5.0</u>	<u>5.0</u>
Subtotal GIS-UAF	146.0	96.0
 <u>GIS(UAA)</u>		
1 Faculty/Analyst	59.0	59.0
Faculty Support Staff	50.0	50.0
Equipment Maintenance	25.0	25.0
Commodities	<u>5.0</u>	<u>5.0</u>
Subtotal GIS-UAA	139.0	139.0
 TOTAL	 940.3	 940.3

GIS components for both UAF and UAA will be transferred into and accounted for as part of departmental budgets and not as part of the continuing center operations.

HB 402 BUDGETS

<u>ITEM</u>	<u>YEAR 1</u>	<u>YEAR 2 & THEREAFTER</u>
A. Center Staff (UAA)		
Director	85.0	85.0
Administrative Assistant	36.0	36.0
Info. Resources Manager	50.0	50.0
Secretary	24.0	24.0
B. Research Fellows		
Visiting Research Fellow	55.8	70.0
Jr. Research Fellows	-0-	60.0
Student Assistants	-0-	4.3
Interviewers for Special Projects	-0-	25.0
C. Equipment		
Office Equipment	150.0	-0-
9 Station LAN System	13.5	-0-
Remote CAD/GIS Workstation	25.0	-0-
D. Maintenance		
Computer Equip. Maintenance	15.0	15.0
E. Contract Research		
Funds to target specific studies	-0-	100.0
F. Commodities	33.0	33.0
G. Travel	25.0	25.0
H. Space Rental	48.0	48.0
I. Software Development/Equipment	<u>95.0</u>	<u>40.0</u>
 Subtotal CIT (UAA)	 655.3	 705.3

Original sponsor(s): REP. BOUCHER, Brown, Ellis

1 IN THE HOUSE BY THE STATE AFFAIRS COMMITTEE
2 CS FOR HOUSE BILL NO. 402 (State Affairs)
3 IN THE LEGISLATURE OF THE STATE OF ALASKA
4 SIXTEENTH LEGISLATURE - SECOND SESSION
5 A BILL

6 For an Act entitled: "An Act relating to a center for information tech-
7 nology at the University of Alaska Anchorage and to
8 enhanced geographic information systems within the
9 University of Alaska system."

10 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

11 * Section 1. FINDINGS. The legislature finds that

12 (1) the state has an enormous investment in information systems
13 including telecommunications, geographic information, information manage-
14 ment, and software development;

15 (2) telecommunication systems are crucial to the state's pros-
16 perity and well-being;

17 (3) in implementing information systems, the state has not
18 ensured that the development is most responsive to the needs and wishes of
19 the people and best able to enhance the state's economy;

20 (4) the telecommunication system in the state has not kept pace
21 with recent technological developments;

22 (5) several University of Alaska departments have been active in
23 exploring information issues of importance to the state;

24 (6) geographic information systems are useful tools for managing
25 vast quantities of geographic data essential to natural resources develop-
26 ment, environmental assessment, urban and regional planning, engineering
27 design and drafting, land records management, and other activities of the
28 state and local governments;

29 (7) the effective use of geographic information technology has

1 the potential to provide substantial benefits to the state and local gov-
2 ernments through efficiencies from automation, increased capabilities for
3 analysis, and the provision of better data for decision making;

4 (8) the state and local governments have made major financial
5 investments in geographic information systems and data bases, but these
6 efforts have not been coordinated for maximum utility;

7 (9) a demand exists in state and local agencies and private
8 industry for trained technicians and professionals in the field of geo-
9 graphic information technology; and

10 (10) a statewide center for information technology that would
11 draw on the expertise and resources of the university system, attract
12 scholars of international reputation, provide leadership in information
13 planning, policy, and management, offer outreach programs, offer a continu-
14 ing program of applied research, and make expert advice available to the
15 university, state government, and private industry should be established.

16 * Sec. 2. PURPOSE. The purpose of the center for information tech-
17 nology is to foster and facilitate, through the various schools and col-
18 leges, multidisciplinary efforts in education and to engage in research in
19 information management, applied telecommunications, geographic information
20 systems, and software development, and to develop ways of making electron-
21 ically stored information more accessible to users. The center will pro-
22 vide a mechanism for cooperation between university programs and faculty
23 and a variety of users, including students, government agencies, research-
24 ers, professionals in related disciplines, and the general public. The
25 center will be able to conduct applied research, provide support for educa-
26 tion and training in information technology, conduct conferences and semi-
27 nars, work closely with private industry to foster cooperative programs
28 leading to economic development in both rural and urban areas of the state,
29 and assist state and local governments in policy development, management,

1 and planning.

2 * Sec. 3. AS 14.40 is amended by adding a new section to read:

3 Sec. 14.40.095. ESTABLISHMENT OF A CENTER FOR INFORMATION TECH-
4 NOLOGY AT UNIVERSITY OF ALASKA ANCHORAGE. (a) The University of
5 Alaska may establish a center for information technology at the
6 University of Alaska Anchorage with major components at the University
7 of Alaska Fairbanks and the University of Alaska Southeast. The
8 center may charge fees for the services it provides. The university
9 shall account for all fees collected under this section. The annual
10 estimated balance in the account may be used by the legislature to
11 make appropriations to the university to carry out the purposes of
12 this section.

13 (b) The center may

14 (1) provide support for education, training, and research
15 in information technologies to students, professionals, and the gen-
16 eral public;

17 (2) support research on the applications, effects, and
18 management of information technologies and provide research results to
19 the general public;

20 (3) maintain an inventory of telecommunication research in
21 the state;

22 (4) develop and maintain a collection that includes state
23 documents, research reports, and other telecommunication applications
24 materials including videotapes, software, lesson plans, and scripts;

25 (5) support the development and expansion of the geographic
26 information system curriculum of the University of Alaska, including
27 the possible establishment of undergraduate and masters programs;

28 (6) develop and sponsor land record and geographic informa-
29 tion system training workshops and continuing education seminars in

1 cooperation with the appropriate departments of the university;

2 (7) support or undertake research projects that apply geo-
3 graphic information technology to state issues and problems;

4 (8) provide information on the availability of federal,
5 state, municipal, and other sources of geographic information, includ-
6 ing aerial photography and digital data bases related to surveying and
7 land records, natural resource inventories, and related data;

8 (9) prepare and publish on a regular basis research find-
9 ings and periodicals relating to the center's activities;

10 (10) assist state agencies and municipalities in the devel-
11 opment of policies, procedures, and capabilities for public access to
12 automated geographic information;

13 (11) recommend, in consultation with the Telecommunications
14 Information Council and affected state and local agencies and advisory
15 boards, model standards and strategies relating to the implementation,
16 indexing, documentation, mapping, data exchange, and other aspects of
17 land records management and geographic information system development.

18 (c) The university shall include in its annual report to the
19 legislature a summary of the center's revenue and expenditures during
20 the preceding two years.

21 * Sec. 4. The University of Alaska shall submit a report to the legis-
22 lature before February 15, 1991, concerning the progress made in establish-
23 ing the center for information technology at the University of Alaska
24 Anchorage.

**Department of Administration
Division of Information Services**

HB 402 - - FISCAL NOTE

*An Act Relating to Center For Information Technology
at the University of Alaska, Anchorage*

HB 402 is not expected to have any fiscal impact on the Division of Information Services, either during FY 90 or in succeeding fiscal years.



Alaska State Legislature

HOUSE OF REPRESENTATIVES

Official Business

P.O. Box V
State Capitol
Juneau, Alaska 99811

DATE: March 28, 1990

TO: Representative Ron Larson, Co-Chairman
Representative Lyman Hoffman, Co-Chairman

FROM: Representative Kay Brown *Kay*

RE: CS HB 402 (State Affairs) / CS HB 403 (State Affairs)

I would appreciate your scheduling a hearing in House Finance Committee for CS HB 402 (State Affairs), an act relating to a center for information technology at the University of Alaska Anchorage and to enhanced geographic information systems within the University of Alaska system and CS HB 403 (State Affairs), a companion appropriation bill.

It has been demonstrated that there is a critical need for an educational program to maintain pace with expanding information technology. Designating and funding a center for information technology would:

- o facilitate University of Alaska efforts to develop timely curricula and training programs in all aspects of information technology;
- o promote research in information management;
- o authorize seeking alternative funding sources for research in information technologies;
- o maintain an inventory of telecommunication research in the state; and
- o support the development and expansion of the geographic information system curriculum of the University of Alaska.

The State of Alaska relies heavily on the management and exchange of information. Telecommunication systems, computer data bases, and geographic information systems are integral to the way we do business. We need a research and educational component to sustain our technological dependency.



Alaska State Legislature

House of Representatives
COMMITTEE ON STATE AFFAIRS

MEMORANDUM

TO: Representative Ron Larson, Chair
House Finance Committee

FROM: Representative H.A. *Red* Boucher

DATE: March 27, 1990

RE: HB 402 and 403

I would appreciate your consideration in scheduling HB 402 and HB 403.

HB 402 establishes a Center for Information Technology at the University of Alaska Anchorage. The purpose of the Center is to foster and facilitate, through the various schools and colleges, multidisciplinary efforts in education and research in information management, applied telecommunications, geographic information systems, and software development, and to develop ways of making electronically stored information more accessible to users.

As noted above, the location of the Center will be in Anchorage. However, this is a university wide program drawing on the expertise of all the major components of the university system.

HB 403 provides funding for the Center.

Again, thank you for your consideration.



Donald D. O'Dowd
President

UNIVERSITY OF ALASKA STATEWIDE SYSTEM

202 BUTROVICH BLDG
FAIRBANKS, ALASKA 99775-5560
PHONE: 474-7311
FAX: 474-7570

March 5, 1990

RECEIVED

MAR 8 1990

Representative Kay Brown
Representative Red Boucher
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Representatives Brown and Boucher:

Thank you for communicating with me in late December of 1989 concerning legislation that would establish a Center for Information Technology at the University of Alaska.

As soon as possible after receiving the material, I shared it with the Chancellors of our three universities and obtained their thoughts on how this legislation would serve the University as well as the State. Chancellor O'Rourke was designated to take responsibility for reviewing the legislation with representatives from the communications and information faculty on our several campuses and to suggest possible changes in the legislation. A meeting was held by that group in February and the results have been communicated to you in a memorandum from Chancellor O'Rourke dated February 20.

The effort of the group was to honor the spirit of the legislation and at the same time find ways of adapting it so that it would complement ongoing programs as well as add a new dimension of coordination and organization that would speed our ability to make contributions in the information technology fields.

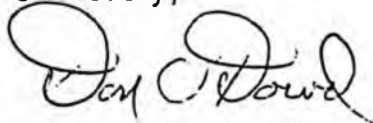
UNIVERSITY OF ALASKA

I hope that these suggestions are helpful and indicate ways in which the legislation could be adapted more closely to specific features already in place in the University. As you know, we have a relatively sizeable investment in information technology education and research at this time and it is certainly not in our interest to downplay that effort while establishing a new coordinating entity. I believe that all of the values that you incorporated in your draft legislation are preserved in the context of the suggested changes and that this amended version, if the changes can be included, would strengthen the concept and benefit the University's ongoing enterprise.

Best wishes for every success in advancing this proposal for legislative approval. Please let me know if there is any way that we can assist in the process or further refine the legislation.

Thank you for your interest in the University and your willingness to spend time, energy and political capital advancing one important aspect of its program.

Sincerely,



Donald D. O'Dowd
President

DDO:dm

cc: Pat O'Rourke
Wendy Redman



UNIVERSITY OF ALASKA FAIRBANKS

Fairbanks, Alaska 99775-0500

MEMORANDUM

TO: Representative Kay Brown
Representative H.A. "Red" Boucher

FROM: Patrick J. O'Rourke, Chancellor
University of Alaska Fairbanks *PJO*

DATE: February 20, 1990

RE: HB402/HB403

At the request of President O'Dowd and on behalf of the entire University of Alaska Statewide System, I convened a group of faculty from both the University of Alaska Anchorage and the University of Alaska Fairbanks to review and recommend suggested changes to House Bill 402 and its companion Appropriations Bill HB403. Attached you will find our recommendations for changes in these pieces of legislation.

It was the feeling of all concerned that proposals for centers, such as the Center for Information Technology, should first go through the appropriate processes within the University of Alaska Statewide System. There is sensitivity regarding the protecting of the Board of Regents' role to organize and establish operating parameters for the University. However, at the same time, we recognize your desire to provide assistance in an area that you believe needs addressing. In general, we concur with the philosophic intent behind the purposes, and we hope our recommendations achieve a balance between the Board's role and that of the legislature.

The individuals convened as a working group included the following:

From the University of Alaska Anchorage: Mr. Larry Pearson, Associate Professor of Journalism and Communications; Mr. Lin Bauer, Associate Professor of Architectural and Engineering Technology; Mr. Vern Oremus, Dean of the School of Career Education (representing Chancellor Behrend).

From the University of Alaska Fairbanks: Mr. Bill Stringer, Associate Professor of Geophysics; Mr. Ken Dean, Remote Sensing Geologist; Mr. Tom Hassler, Director of Administrative Computing; Patrick J. O'Rourke, Committee Chairman, Chancellor--UAF.

UNIVERSITY OF ALASKA FAIRBANKS

Representative Kay Brown
Representative H.A. "Red" Boucher
February 20, 1990
Page 2 of 2

In addressing the bill, the following desired outcomes were addressed by the committee:

1. Support for on-going research in information and communications technology.
2. Enhancement of GIS course offerings including faculty, hardware, software, and maintenance.
3. An opportunity for the UAF and UAA faculty, as well as the faculty at UAS, to work together on common projects and goals utilizing the best expertise from each University.

Throughout our discussions, we tried to minimize any internal University system conflicts, and we believe we were able to achieve a strong consensus position. In the attached paper, we reference specific lines within the bill with recommended changes, and we provide a short rationale for each. If you desire additional information, please feel free to call upon me or, if there is a need, I can meet with you in Juneau to discuss the recommendations at greater length.

Although we address it later in the report, we do have concerns regarding the continuing funding mechanism of this bill. The language of the bill implies that such a center could be a self-supporting operation and that a one-time only appropriation would lapse to the general fund on June 30, 1991. This is a cause of concern to all because it is our belief that it would need continuing general fund support. Additionally, in the finance area, although it is not a specific detail in the bill, the accompanying back-up document, which created the appropriation, has some problems, and we are submitting as part of this report a recommended solution to address what we see as a shortage of hardware contained within the bill. In essence, certain facets of the ongoing center would require some time to start up and, thus, we see the ability in the first year to take care of the needed equipment enhancements while in the second year these funds could be devoted more directly toward the continuing operations of the center.

I would like to express my appreciation to both of you for your continuing interest in these needs and for your efforts on behalf of the University of Alaska.

PJO'R/clb
Attachments

RECOMMENDATIONS FOR MODIFICATIONS TO HOUSE BILL 402/403
An Act relating to a center for information technology

Submitted by: UA System Working Group

Patrick J. O'Rourke, Chair
Larry Pearson, UAA
Lin Bauer, UAA
Vern Oremus, UAA
Bill Stringer, UAF
Ken Dean, UAF
Tom Hassler, UAF

In addressing HB402 and HB403, the working group was sensitive to trying to balance the existing needs of both the University of Alaska Anchorage and the University of Alaska Fairbanks as well as acknowledging the need for enhanced research in the whole area of information technology. Additionally, we were sensitive to the role of the Board of Regents in establishing the organization of the University as well as the role of the legislature in expressing its desire for activity in a particular area as well as its role in the appropriations process. Hopefully, the recommended suggestions contained in this report achieve a reasonable balance.

Certainly, the establishment of a center for information technology is not the only way to bring about a focused effort in this regard, but we acknowledge that it is a way of addressing such a goal. Thus, it does not seem inappropriate to us that such a center be established. Furthermore, given the fact that Anchorage is, in a way, the communications hub of the state, it seems appropriate that this center would be housed at the University of Alaska Anchorage. However, in noting so, there is a need to assure that the instructional programs at both UAA and UAF have the freedom to meet their specific needs. Under the proposed language changes, this will be possible.

The following comments specifically reference HB402 by line.

LINE 6-7

Change to "An Act relating to a center for information technology at the University of Alaska Anchorage and enhanced GIS programs within the University of Alaska System."

Rationale: The Act is broader than just the creation for a center for information technology at UAA. Concern was expressed that the GIS component could be dropped at either or both UAA and UAF if the bill ran into difficulty.

No changes are recommended for Section 1, "Findings of the Legislature." It was the working committee's belief that the legislature had the right to express its findings as it saw fit.

RECOMMENDATIONS FOR MODIFICATIONS TO HB402/403
FEBRUARY 20, 1990
PAGE 2 OF 5

PAGE 2/LINE 14-17

Change to *"The purpose of the center for information technology is to foster and facilitate, through the various schools and colleges, multidisciplinary efforts in education and to engage in research in information management, applied telecommunications, geographic information systems, and to develop ways of making electronically stored information more accessible to users."*

Rationale: There are already various efforts occurring in information technology at both UAA and UAF. It was believed by the working group that the addition of a center should be to foster and facilitate these efforts rather than to establish them. Additionally, it is noted that instructional programs are offered through the various schools and colleges, and it seemed inappropriate to provide this as a purpose for the center. Thus, the working group tried to arrive at language which would preserve the prerogative of the schools and colleges to deliver their instructional programs but to give a clear role to the center in engaging in research in the areas identified. There was much discussion regarding the last point, and it was generally agreed that there was a service function to be provided by assisting in making electronically stored information more accessible to users but that the center would not be the only place involved in software development.

PAGE 2/LINE 21

Change *"... provide education and training, ..."* to *"... provide support for education and training in information technology, ..."*

Rationale: This is in keeping with the concept expressed above that education and training are actually provided through schools and colleges and that the center, while having a predominate research function, could also support such efforts. However, this would have to be through the schools and colleges. Also, by the addition of the words *"in information technology"* we are further clarifying the purposes of the center.

PAGE 2/LINE 29

Change the word *"shall"* to *"may."*

Rationale: This is our attempt at compromise between protecting the right of the Board of Regents to establish the organization of the University and protecting the right of the legislature to indicate areas that it believes the University should address. Clearly, for the Board of Regents to take advantage of the appropriation accompanying this bill, they would have to take appropriate action to establish a center in accordance with the language of the bill. In our minds, it avoids an unnecessary battle in an attempt to get something positive in place. Other alternatives to this language could include: *"is requested to establish"* or some similar language which acknowledges the Board of Regents' role in this process.

PAGE 3/LINES 1-2

Change *"... Fairbanks and Southeast University campuses."* to *"... University of Alaska Fairbanks and University of Alaska Southeast."*

RECOMMENDATIONS FOR MODIFICATION TO HB 402/403
FEBRUARY 20, 1990
PAGE 3 OF 5

PAGE 3/LINES 3-7

Delete both existing sentences and replace with "*The University of Alaska shall account for all fees collected under this section.*"

Rationale: The working committee is concerned with isolating and reporting these separate fees outside of the regular budgetary structure. We believe that the existing laws of the legislature, which require all sources of income to be appropriated by the legislature, is sufficient to cover this section. We recommend that the accounting for fees achieved under this structure be in accord with normal budgetary processes. Additionally, because the language of the bill talks about a number of instructional programs from three different universities within the system, it is unworkable and has a tendency to pull appropriations from one segment of the University in a way that would not provide reasonable flexibility to those charged with carrying out the functions. For instance, tuition fees are collected for instructional purposes, and these will be collected as part of the tuition of the University of Alaska Anchorage, the University of Alaska Southeast, and the University of Alaska Fairbanks in different programs. Each University currently has a different means of recording these fees, and flexibility needs to be retained in this section.

PAGE 3/LINES 9-10

Change Section (b) (1) to read "*provide support for education and training in information technologies to students, professionals, and the general public. . .*"

Rationale: The original language was somewhat awkward, and there was a strong belief by the committee that the word "*information technologies*" rather than "*communication technologies*" was more specific than what was being sought.

PAGE 3/LINES 12-13

Change to read "*support research on the applications, effects, and management of information technologies; and to provide research results to the general public.*"

Rationale: Again, we are trying to clarify language and to indicate that the center has a role in supporting education and training, direct research, and dissemination of results.

PAGE 3/LINE 14

Change "*. . . a database on . . .*" to "*. . . an inventory of. . .*"

Rationale: The committee was concerned that the use of the term "*database*" implied key word indices and major management systems which it did not think the appropriation could back-up. Rather, the committee believes that what is needed is an information source (that is, an inventory of telecommunications research).

RECOMMENDATION FOR MODIFICATION TO HB402/403
FEBRUARY 20, 1990
PAGE 4 OF 5

PAGE 3/LINE 16

Change "*library*" to "*collection*."

PAGE 3/LINE 17

Insert the word "*other*" between "*and*" and "*telecommunication*."

Rationale: The committee believed that a "*library*" had implications beyond what was intended and felt more comfortable with the word "*collection*." By inserting the word "*other*" on Line 17, it maintains the flow when we are talking about state documents and research reports relative to telecommunications.

PAGE 3/LINE 18

Add the words "*using the GNOSIS access as appropriate*."

PAGE 3/LINE 19

Change "*develop and expand . . .*" to "*support the development and expansion of . . .*"

Rationale: Again, the committee is trying to preserve the prerogatives of departments in various schools and colleges who have responsibilities for direct instruction.

PAGE 3/LINE 23

Change "*seminars*;" to "*seminars in cooperation with cognizant departments*;"

Rationale: Continues to acknowledge the role of departments in instruction.

PAGE 3/LINE 24

Change "*undertake applied research . . .*" to "*support or undertake research . . .*"

Rationale: The committee wished to acknowledge that the center could sponsor research through other organizations as well as undertake it itself. Additionally, it deleted the word "*applied*" as an adjective from research because of subsequent language in that sentence which talks about "*apply geographic information technology, . . .*" It was a redundancy.

PAGE 3/LINE 26 (8)

While the committee had no language change to suggest regarding this section, we would like to express a belief that, while it may be appropriate for the University and this center to provide information on the availability of geographic information, it is not the purpose of the center to collect and maintain geographic information data that appropriately belongs with the federal, state, or municipal agencies. If this is the understanding of this section, then the committee has no problem with it.

RECOMMENDATION FOR MODIFICATION TO HB 402/403
FEBRUARY 20, 1990
PAGE 5 OF 5

PAGE 4/LINES 1-3

Recommend broadening this language to "*prepare and publish on a regular basis research findings and periodicals relating to the center's activities.*"

Rationale: The committee felt a broader charge would be in the best interests of the legislation and that the bill contained a broader role than that which was contained here. We believe this very specific item came about through the meshing of two separate approaches (GIS and information technology) into a single vehicle.

PAGE 4/LINES 12-14

Recommend deletion. The University submits an annual report and an annual budget request to the legislature which are appropriate vehicles for reporting on these activities.

PJOR/clb

Item 3

Office of the Chancellor
(907) 474-7112



UNIVERSITY OF ALASKA FAIRBANKS

Fairbanks, Alaska 99775-0500

JAN 18 1990

January 15, 1990

Representative Kay Brown
Alaska State Legislature
P.O. Box V (MS 3100)
Juneau, Alaska 99811

Dear Representative Brown:

Thank you for sending me a copy of your, and Representative Boucher's, draft bill on Information Technology and Geographic Information Systems. The president scheduled this bill for a review with the chancellors at a meeting held in Anchorage on January 9, 1990. There were concerns from each of the three campuses as well as a concern by the statewide administration regarding establishing organizational elements of the University of Alaska Statewide System in legislation.

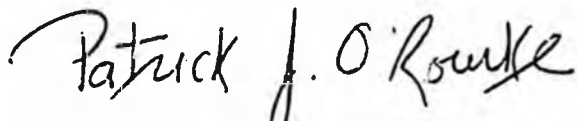
From the campus perspective, we find ourselves supportive of many of the sub-elements contained within the bill but feel that the Center for Information Technology, as proposed, is too broad and unworkable. Further, there were concerns voiced by the University of Alaska Anchorage, with which I concur, that instruction be predominantly the purview of the departments and their various schools and colleges. This is the way it is at virtually all universities, and centers are normally established to perform certain research or service components.

Because I have had previous dealings regarding this issue, I was asked by President O'Dowd to chair a small group from both UAA and UAF to formulate a systemwide response to the proposed legislation and to express any concerns which might exist as well as to proffer alternatives which we might see.

Representative Kay Brown
January 15, 1990
Page 2 of 2

As a result, I shall be convening a group within the next few weeks, and we shall submit a formal response to you as soon as possible. Thank you for your continuing interest and support of these issues.

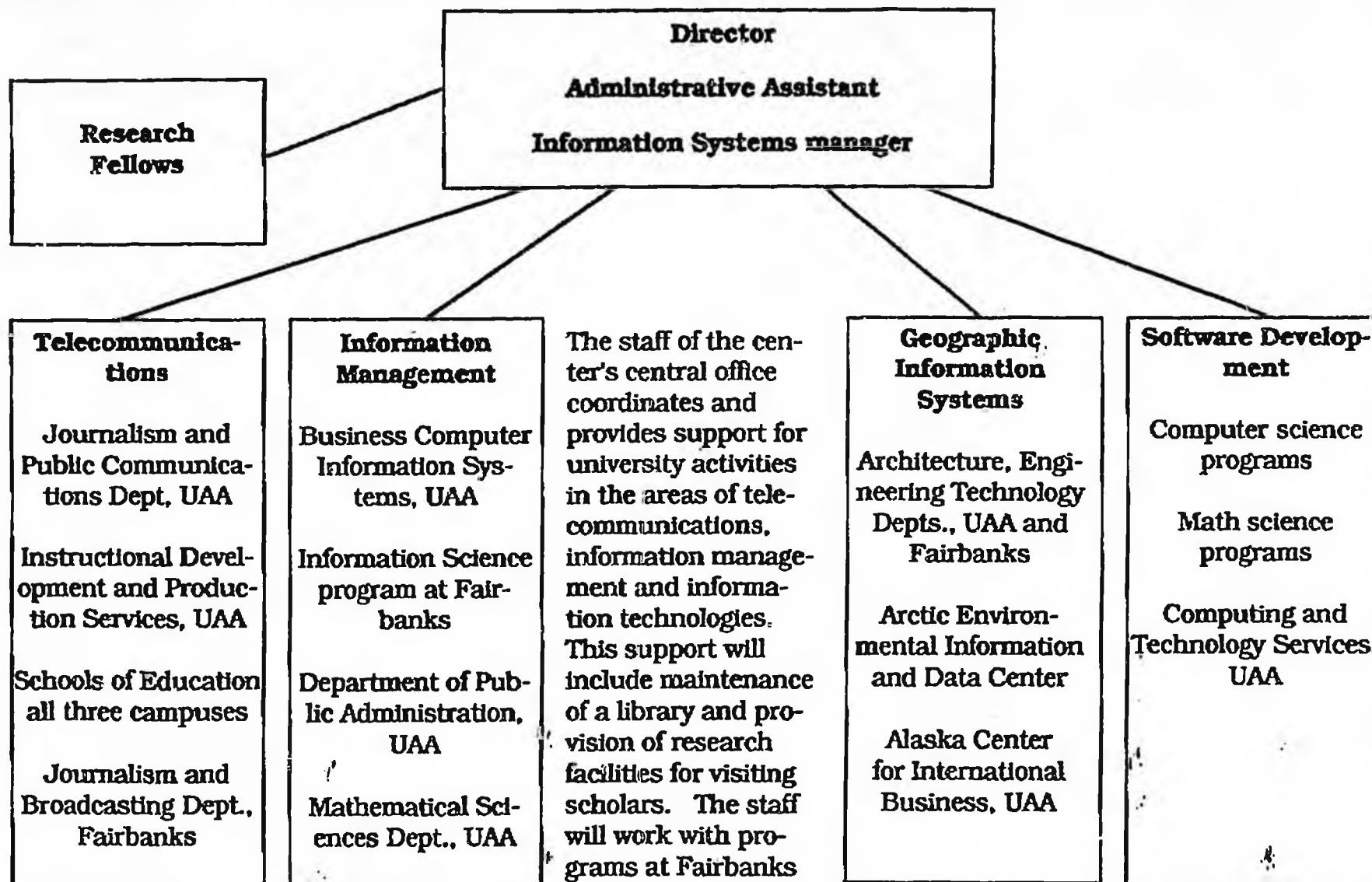
Sincerely yours,



Patrick J. O'Rourke, Chancellor
University of Alaska Fairbanks

PJO'R/db

University of Alaska Center for Information Technology



Note: Other programs such as the Institute for Social and Economic Research might also work with this center.

Regarding a House Bill affecting UAA

The Legislation

- *A bill establishing a center for information technology at UAA
- *An appropriation for the center, either in the form of a bill or a fiscal note

Sponsors

Anchorage Representative H.A. "Red" Boucher
Anchorage Representative Kay Brown

The context

This bill is a piece of a larger package of legislation that these legislators believe is important to the economic development of the state.

They will also introduce bills that

- *set policy on access to information
- *establish a cabinet-level department of information services

What the center would do

- *Support existing activities in various departments of UAA, at Fairbanks and in Juneau.
- *Provide leadership on information and information technology issues for the community, for private industry and for government.
- *Attract scholars of international reputation to help investigate Alaskan information issues.
- *Provide training for workers in Alaska's emerging information industries.

The first deadline

They intend to prefile legislation similar to the attached draft Dec. 14 or 15.

MIT'S FAR-OUT COMPUTER LAB

Backed by more than 40 big corporations, the new Media Lab at the high-tech mecca on the Charles River is trying to make computers more useful for businesses and consumers. Some of its machines talk, some make music, and some create electronic newspapers. ■ by *Brian Dumaine*

IN A DIMLY LIT ROOM crammed with piles of black boxes and tangles of colored wires, a young scientist is talking to his computer screen in a loud voice as if it were a slightly deaf friend. Into his headset microphone he says, "Schedule a meeting with Walter." The computer stays silent. The scientist repeats the command. Finally

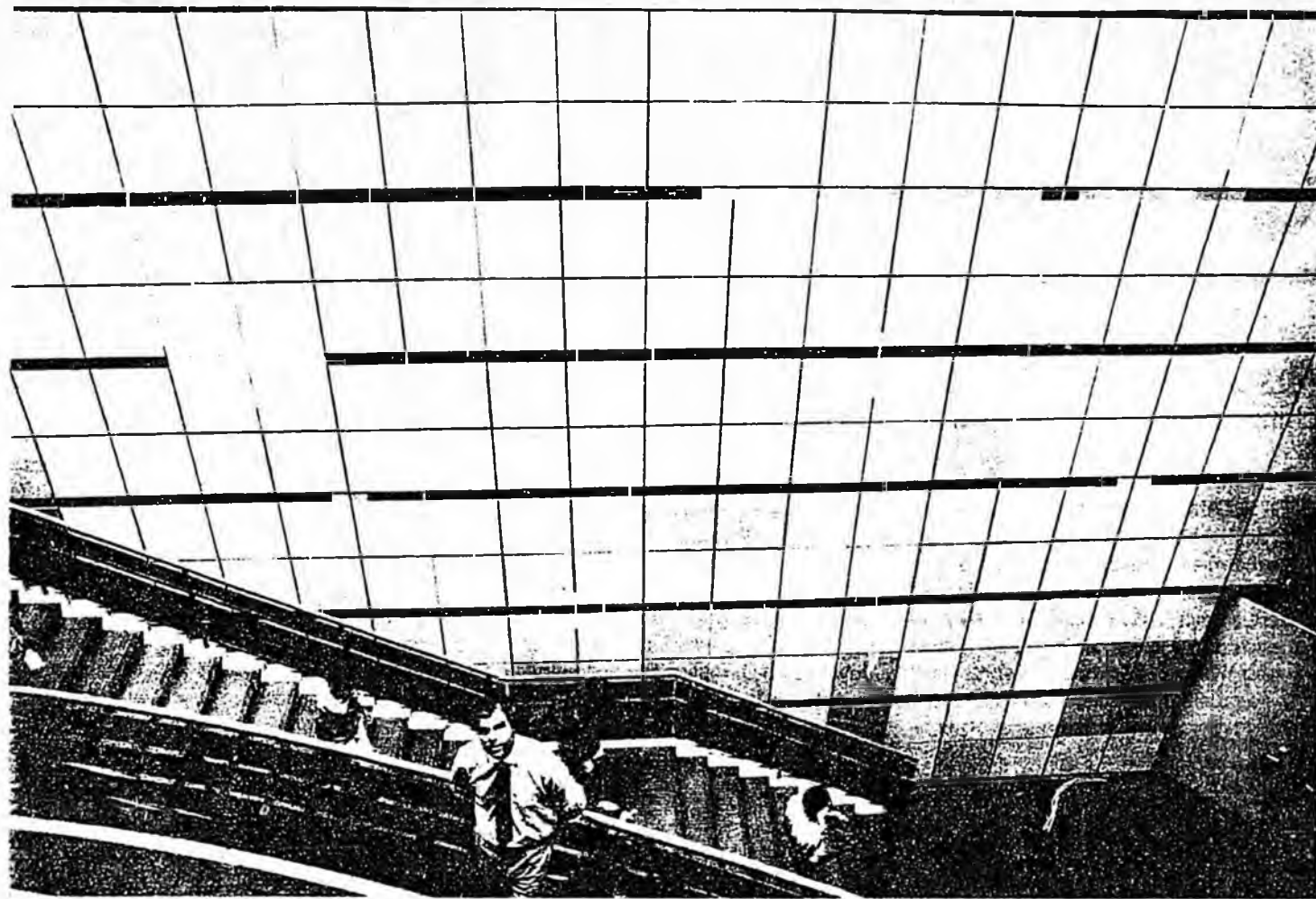
the computer blurts out in a mechanical monotone, "When ... do ... you ... want ... to ... meet ... with ... Walter?" The scientist answers crisply, "On Tuesday morning." The computer then telephones Walter's computer, which is sitting in an office down the hall, makes the appointment, and reports back, "All right. It's ... scheduled

... for ... 11 o'clock." The computer never schedules early-morning meetings. It knows the boss likes to sleep late.

This man and his talking computer are part of the Media Laboratory, an exciting new experiment at the Massachusetts Institute of Technology. The Media Lab, which opened its doors in January, is a gleaming computer



As the conductor waves his baton, a sensor follows his hand and keeps a computer-operated synthesizer in time with the two musicians.



In the sunny atrium of the new Media Lab building, director Nicholas Negroponte pauses between hosting sponsors and pursuing his research.

research center whose mission is to explore what computers could be doing ten or 20 years from now. Its 120 professors, graduate students, and administrators have two goals: to create new ways for people to use computers and to make them as easy to talk to as a good friend. And it has come along none too soon. The computer industry is in a serious slump. Many people feel they don't know what to do with computers, or if they do, they find them difficult if not downright hostile.

Founders Nicholas Negroponte, an MIT professor of media technology, and Jerome Wiesner, president emeritus of MIT and science adviser to President Kennedy, envisioned a lab completely different from places like AT&T's legendary Bell Labs, where the emphasis is on designing faster and smarter computers. At the Media Lab, researchers buy off-the-shelf equipment and program it for new uses in creative fields such as broadcasting, publishing, motion pictures, music, and theater. "This is an effort to enhance hu-

RESEARCH ASSOCIATE *Brett Daval Fromson*

man creative power through computers," says Wiesner. "A person whose only interest is in a deep technological problem doesn't belong here."

WIESNER and Negroponte cashed in on their connections to sell more than 40 heavy-weight corporations—including CBS, Digital Equipment, Japan's NEC Corp., Apple Computer, and Time Inc., which publishes *FORTUNE*—on their vision. Since 1978 the two have raised \$40 million from these corporations for the Media Lab's building and computer equipment, and \$4 million a year for operating expenses. "We support them precisely because they are working on such far-out stuff," says Jerome S. Rubin, a group vice president of the Times Mirror Co., a sponsor. "The Media Lab is on the cutting edge of the electronic future." Some backers like the creative atmosphere. Says Gerald M. Levin, executive vice president for strategic planning at Time Inc., "It's worthwhile just to send our people there and

have their minds expanded. There aren't many places you can do that."

Of the dozen major projects under way now, some are new; others have been taken over from other MIT departments. It's a diverse and mind-boggling lot that ranges from talking computers to electronic newspapers, from computer programs for kids to computers that make music. The point of each is to show what computers can do, not to create finished, marketable products. Negroponte doesn't worry much about whether the average customer will soon be able to afford the lab's inventions. He assumes that the price of computing power will continue to drop dramatically, making today's expensive prototype tomorrow's bargain.

To make the lab a success, the corporate sponsors have to figure out how to capitalize on its inventions. For their money they get a five-year key to the lab. None of the work is proprietary. Sponsors can wander around and ask questions about the different projects. Negroponte wants to avoid the fate of Xerox PARC, a lab that failed to find ways to

TECHNOLOGY

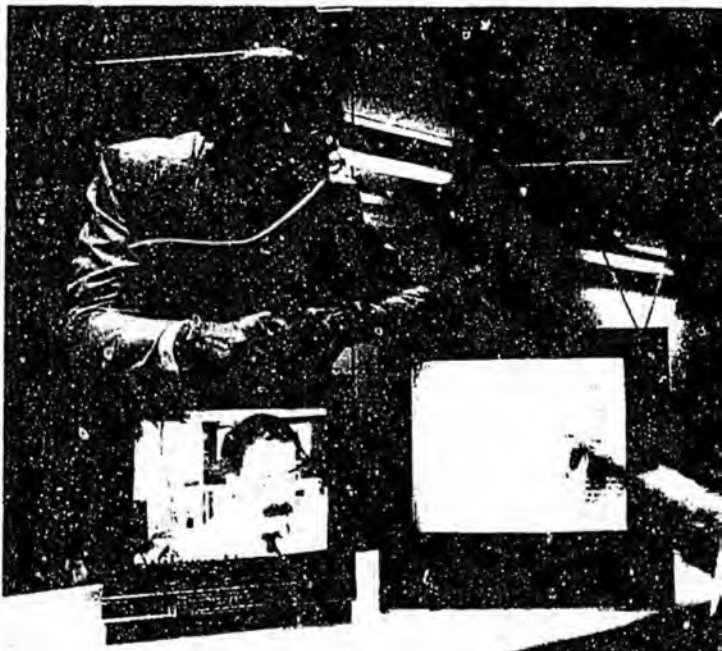
communicate its inventions to its parent company, Xerox, and get them onto the market (FORTUNE, September 5, 1983). So far Negroponte has succeeded, but at a price. He says he spends half his time demonstrating projects for the sponsors, and the staff gets distracted as well. One good-natured but hassled researcher programmed his computer to flash, "What are *you* staring at, Bozo?" whenever sponsors linger too long over his shoulder.

The lab's roster of researchers reads like an all-star cast of computer talent. The staff

includes MIT's Minsky, known as the dean of the field that uses computers to emulate human thought. He developed Logo, a programming language used by schoolchildren around the world. At least of the stars is Seymour Papert, who looks more like a mad scientist than a paradigm of the state of the art. An architect and a pioneer in design technology, he has used electronic mail to talking



With infrared signals the glove and sleeve generate a computer picture of



An electronic newspaper, Newspeek picks stories daily that fit its own

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try to emu-
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hone, never

travels without his portable computer, and even keeps in touch with his staff by computer from his retreat on the Greek island of Patmos. "We want to make the computer a sensory-rich experience rather than the sensory-deprived one it is right now," he says. "If we can do that, the computer will become a commonplace part of people's lives." He intends to speed the day when exciting and rewarding creative uses for computers abound in music, art, publishing, film, theater, education, and business. Among the possibilities the Media Lab is exploring:

► **THE OFFICE.** The Media Lab believes executives will find computers a lot friendlier in the office of the future. Rather than constantly wrestling with keyboards and obscure codes, the businessman will be able to run his computer by talking to it, pointing at it, or even glancing at it.

The Conversational Desktop is the Media Lab's talking computer. It can perform such secretarial tasks as making phone calls and reminding the boss of that important meeting. Christopher Schmandt, a principal research scientist and the man who was talking to the computer about scheduling a meeting with Walter, admits there are limitations to his system, which includes a \$5,000 NEC voice recognizer and a \$10,000 Sun desktop work station: "If you ask it to order a pizza, it won't know what to do." He insists that he's not trying to put secretaries out of business.

Along with his voice, the executive of the future may be able to use a glance or point a finger to communicate with his computer, says Richard A. Bolt, a principal research scientist in the Human Interface Group. As part of his splendidly named Gaze-Orchestrated Dynamic Windows project, Bolt, wearing special glasses, sits facing as many as 40 television pictures, all running simultaneously on a giant screen. Sensors on the glasses track where his eyes are looking; that information goes by cable to a central computer. If his gaze rests on a single picture, the other 39 recede and that one fills the screen.

Bolt also has a wristband with a magnetic sensor that can move an image from one location on a computer screen to another. He simply points at the image with his finger, says, "Put that . . ."—indicates where he wants it placed, and adds—". . . there." As Bolt's hand moves through a magnetic field, sensors on the wristband send signals by cable to the computer, relaying where on the screen he's pointing. His eye, hand, and voice systems could allow a busy executive to glance at a screen and have it display a report while he talks on the phone.

continued



TECHNOLOGY

► **THE HOME.** Finding a useful place in the home for the computer is one of the toughest challenges the Media Lab faces. A recent national survey found that only about half of the ten million computers in U.S. homes are used more than once or twice a week. People need better reasons than storing recipes or balancing checkbooks to buy a home computer. Andrew Lippman, associate professor of media technology at MIT, and Walter Bender, a research scientist at the Media Lab, think they have one: an electronic newspaper called *Newspeek*, meaning a peek at the news—not to be confused with the sinister double-talk Newspeak language of George Orwell's novel *Nineteen Eighty-Four*.

If the subscriber of the year 2000 is interested, say, in foreign affairs and sports, during the night *Newspeek* would scan and collect the relevant stories from publications such as the *New York Times* and the *Washington Post*. These newspapers would be stored in computers and updated daily. In the morning a front page with crystal-clear graphics and color headlines would pop onto the home computer screen with articles on the latest hijacking to Beirut and the New York Mets' latest six-game slump. To read the story on terrorism, the reader touches the headline or the first paragraph and the full text comes into view. As he reads, related articles that the computer has chosen appear to the side.

What *Newspeek* can't yet do is show photographs and television film clips alongside the articles, but Lippman and Bender are working on that. An article on terrorism, for example, could include a TV interview with one of the hostages. Lippman says *Newspeek* could be printed out in the home. He adds that as mail and delivery costs continue to rise, it could soon be cheaper to transmit newspapers and magazines electronically.

► **THE CLASSROOM.** The school is yet another place where the computer has failed to fulfill its promise. There's only one computer for every 70 U.S. public school students. Computers have failed to spread more widely, Seymour Papert says, because "they've basically done more harm than good." Rather than using computers to explore ideas in language, math, and art, most students are forced to learn computer programming as an end in itself—a real turn-off.

Over the past two years, Papert has been getting students high on computers at a largely black and Hispanic junior high school in New York City. They're encouraged to use Papert's Logo computer language in any way they want, for as long as they want; there's one computer for every three stu-

dents, and they average two hours a day on it. If a student decides to draw a flower, he can tell the computer to sketch lines and curves. Typing "RT 45" and "FD 10," for instance, instructs the machine to draw a line ten units long at a 45-degree angle to the right. While having fun drawing, the student learns a lot about angles. Says Tessa R. Harvey, a deputy New York City school superintendent, "This is a terrific way to get kids excited about thinking." So far Papert's school has better attendance and higher

The computer of the future could have helped George Gershwin, who wrote brilliant melodies but had trouble orchestrating them.

math and reading scores than similar schools elsewhere in Manhattan. With an IBM grant, he will take his project into a tough elementary school in Boston this fall.

► **THE CONCERT HALL.** In another corner of the Media Lab, Barry Vercoe, a professor of music and technology, and his colleagues have programmed a computer to play the harpsichord part of a Handel trio sonata on a synthesizer and to follow the tempo set by a conductor. When the conductor slows his baton, a sonar sensor following his hands tells the computer to have the synthesizer play more slowly. The synthesizer can react as quickly as a live musician and plays in nearly perfect sync with a violinist and flutist. Yamaha, a maker of synthesizers and electronic pianos, and a potential sponsor of the Media Lab, is interested in the technology.

In the world envisioned by the Media Lab many musicians and composers will use computers to play and write music more creatively. Marvin Minsky, the artificial intelligence guru, who is also a respectable pianist, wants to study what goes on in the mind when someone writes music or listens to it; he believes that understanding how people think about music will ultimately lead to smarter machines. "After all," says Minsky, "the mind is just a hundred big computers with programs." The computer of the future could have helped George Gershwin, for instance, who wrote brilliant melodies but had difficulty orchestrating them.

► **THE STAGE.** Marvin Denicoff, an artificial intelligence expert and an award-winning

playwright, thinks a computer could help a dramatist write plays. In his vision, still very much on paper, the playwright would draft a scene and then set up a stage on his computer screen by drawing on a rich database of stock characters, sets, and costumes. He would then instruct his electronic actors to speak and move in any way he wished until he was satisfied with the scene. The playwright could also use a computer to show his finished play to potential investors.

The Media Lab is already working on the technology that could make Denicoff's electronic actors a reality. Patrick Purcell, an associate professor of computer graphics, is developing a suit that emits infrared signals to be read by four light sensors connected to a computer—which then generates a stick figure on its screen that copies every movement. With the help of computer graphics, the stick figure could be dressed up to look like anyone from William Shakespeare to Elizabeth Taylor. NHK, the Japanese counterpart of the British Broadcasting Corporation, has already picked up this technology and created a computer-animated host for a new show on the 21st century.

HOW SOON any of the other Media Lab projects will become commercial realities is anyone's guess, though Alan Kay of Apple Computer, whose research helped lead to the micro-computer, observes that getting a product from the lab to the market at a price under \$10,000 usually takes ten years or so. But he thinks it auspicious that dozens of America's largest corporations have done something they rarely do: pool their resources for long-range research.

Typically, Kay argues, American corporations miss big opportunities to develop and perfect new technologies because they insist on tackling the projects singlehandedly. As he puts it, "They tend to be aggressive and act like members of a hunter-gatherer society, stripping the land and killing off any strangers." Japanese corporations, by contrast, can be likened to members of an agricultural society who cultivate their own gardens during the week and then help a neighbor raise his barn on the weekend. "That's the way big ideas are born and big breakthroughs happen," says Kay. The Media Lab, with its "friendly rivalry and openness where everyone wins," he says, is more like the Japanese model—and should greatly help the U.S. compete with Japan in one of the most important markets of the future. ■

Dreaming the Impossible at M.I.T.

In the Media Lab, the goal is to put the audience in control

What if television sets were equipped with knobs that let viewers customize the shows they watch? If they could adjust the sex content, for example, or regulate the violence, or shift the political orientation to the left or right? What if motion pictures were able to monitor the attention level of audiences and modify their content accordingly, lengthening some scenes while cutting others short if they evoke yawns. What if the newspapers that reach subscribers' homes every morning could be edited with each particular reader in mind—filled with stories selected because they affected his neighborhood, or had an impact on his personal business interests, or

sponsors, he has filled his \$45 million facility with a group of 120 gifted researchers that includes some of the brightest and quirkiest minds in computer science: Marvin Minsky, dean of artificial-intelligence research; Seymour Papert, disciple of Child Psychologist Jean Piaget and a leading advocate of computerized education; Alan Kay, one of the most influential designers of personal computers.

Some of the projects are still in the visionary stage, but several investigative teams have come up with working products and prototypes. In many cases, research relating to electronic media has led to spin-offs that could have wide applications for both individuals and

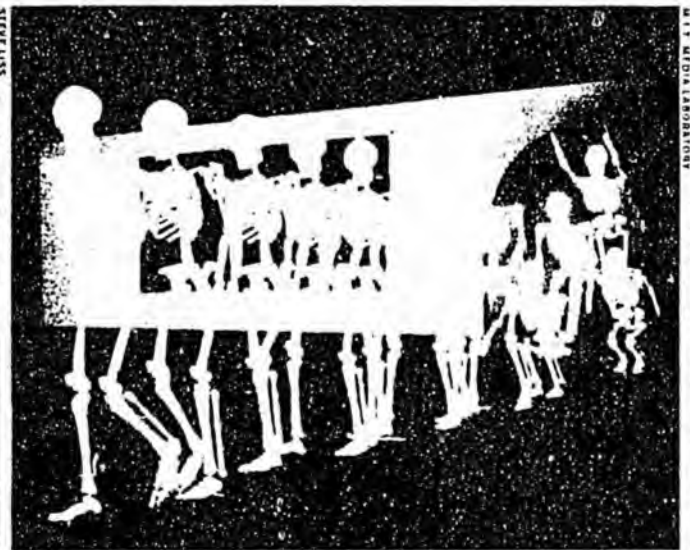
businesses. Consider the following:

► The lab's Conversational Desktop is a voice-controlled computer system that acts like an automatic receptionist, personal secretary and travel agent—screening calls, taking messages, making airline reservations. "Get me two seats to the Bahamas," says Research Scientist Chris Schmandt to his computer. "When do you want to go?" replies the machine.

► NewsPeek is a selective electronic newspaper made of material culled daily from news services and television broadcasts. By sliding their fingers across the screen of a computer terminal, viewers can ask to see lengthier versions of particular stories, roll selected videotapes or call up related articles. The computer remembers what it has been asked to show and the next day tailors its news gathering to search for similar stories. Says Associate Director Andrew Lippman: "It's a newspaper that grows to know you."



Synthetic accompanist: responding to the slightest change in tempo



Automated actor: trying out a scene without hiring a cast

mentioned his friends and associates?

There are a lot of "what ifs," but none of these is mere futuristic fantasy. All of them, in fact, are the goals of research projects now under way at the Media Laboratory, a dazzling new academic facility at the Massachusetts Institute of Technology. The lab's unique mission is to transform today's passive mass media, particularly TV, into flexible technologies that can respond to individual tastes. Because of advances in computers, says Nicholas Negroponte, 43, the co-founder and director, "all media are poised for redefinition. Our purpose is to enhance the quality of life in an electronic age."

Two years ago, when the lab first opened its doors in Cambridge, Mass., the announced intention of "inventing the future" seemed like an impossibly vague undertaking. But Negroponte has made believers of much of the corporate and academic establishment. Bankrolled by more than 100 business and government



Talking head: next best thing to being there
Creating TV that may be too seductive.

► The lab has developed the world's first computer-generated freestanding hologram—a three-dimensional image of a green Camaro sedan suspended in midair. Unlike most holographic images, which are put onto flat photographic plates, the Camaro is recorded on a concave plate and projected into the air by laser beams. The hologram was designed with funding from General Motors, which still painstakingly builds scale models of new car designs out of clay. In the future, GM and other automakers may be able to use holograms to see what a car will look like before it is actually manufactured. Eventually, such images may be made by laser-age copying machines for a few dollars apiece.

► In the field of fine arts, the world-class music research center in the lab has already produced the Synthetic Performer, a computerized piano-playing accompanist. The system not only plays along with soloists but also adapts to changes in their

tempo and cadence without losing a beat. The project is part of an ongoing effort to explore the mysteries of harmony and composition by teaching music appreciation to computers.

Negroponte began raising funds for the Media Lab in 1980 with the help of Jerome Wiesner, former M.I.T. president. The two men sought out publishers, broadcasters and electronics manufacturers whose businesses were being transformed by the advent of VCRs, cable television and personal computers. Then they hinted broadly that the faculty at M.I.T. knew precisely where all this was headed. Money came in from such leading sponsors as IBM, CBS, Warner Communications, 20th Century Fox, Mitsubishi, Time Inc. and the *Washington Post*. Sponsors can send scientists and other observers to the Media Lab and make commercial use of any of the facility's research. Though many of the projects may never yield commercial or educational applications, only one company, Toshiba, has failed to renew its funding.

Visitors to the lab, a sleek four-story maze of gadget-filled work areas, are assaulted by strange sights. In a 64-ft.-high atrium, 7-ft.-long computer-controlled blimps may be flying overhead—part of a project to develop stimulating science activities for elementary and high schools. In another area visitors encounter computers that can read lips. After spending three months at M.I.T. last year, Stewart Brand, the counterculture guru who originated the *Whole Earth Catalog*, was impressed enough to write a flattering book titled *The Media Lab*, which will be published next month by Viking Press.

But the lab's high-tech razzle-dazzle masks plenty of serious business. Investigators are experimenting with new forms of teleconferencing. One idea involved projecting video images of individuals onto plaster casts of their faces. The resulting "talking heads" were so lifelike that people using the system felt they were "meeting" with colleagues who were actually in another city. A major effort is also being made to enhance computer animation. Assistant Professor David Zeltzer, building on research he started at Ohio State, is developing new ways of simulating human figures and movement. One application would allow playwrights to see just how scenes would look without having to hire live actors to try them out.

Within the Media Lab there is a lurking fear that the research might prove too successful. Some of the scientists, who point to TV's mesmerizing impact, worry about creating new media so powerfully seductive that they might keep many viewers from venturing into the real world. Minsky, for one, has given that a lot of thought. "Imagine what it would be like if TV actually were good," he told Brand. "It would be the end of everything we know." Yet he and his groundbreaking colleagues seem more than willing to take that risk.

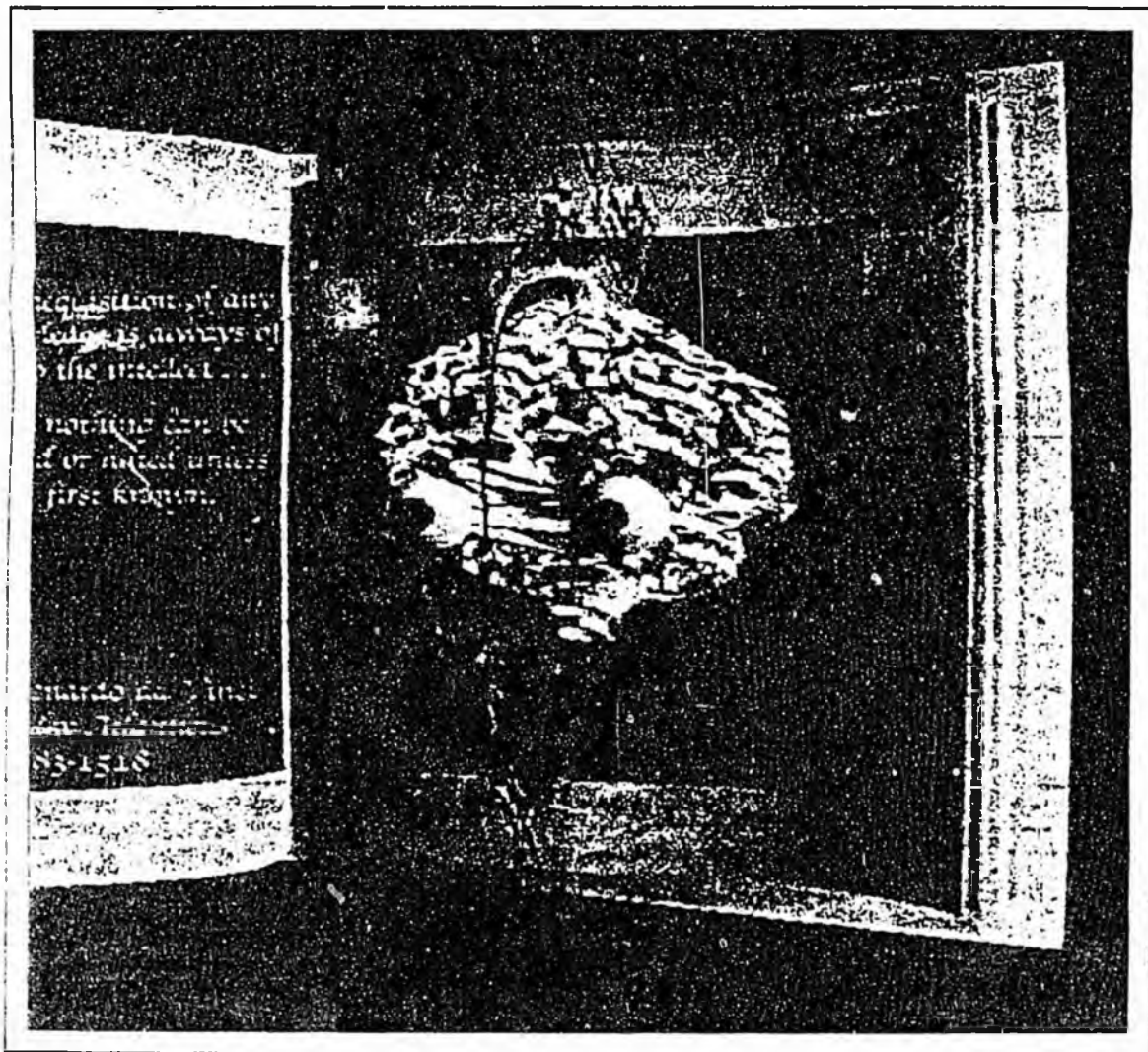
—By Philip Elmer-DeWitt.
Reported by Robert Buderl/Cambridge

The Boston Globe Magazine

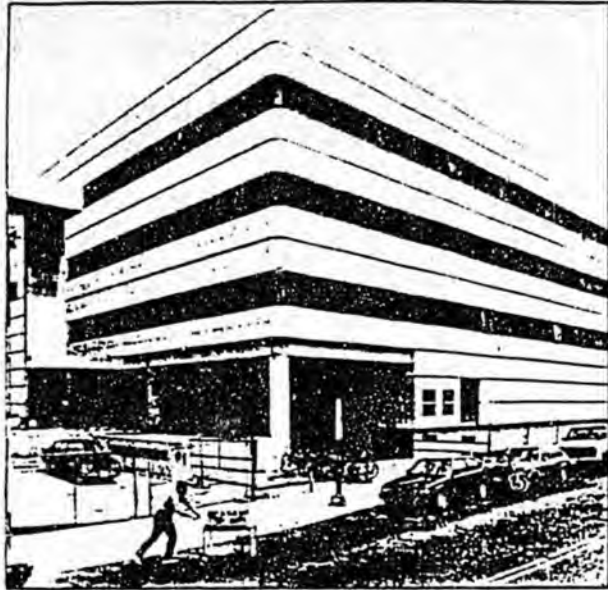
JUN 23, 1985

Stalking the future

By D.C. Denison



An alien creature faces down the past in the world's first large-scale multi-media project. The project is a collaboration between the Boston Globe and the Massachusetts Institute of Technology. It is a multi-media project that will be the first of its kind. It is a collaboration between the Boston Globe and the Massachusetts Institute of Technology. It is a multi-media project that will be the first of its kind.



The home of the Media Lab—"a world center of art and emerging technology."



Nicholas Negroponte, director of the Media Lab: "Our image of the future is that computers will be easier to talk to than people."

The human brains at MIT's spanking new Arts and Media Technology facility are thinking big: What the Harvard Business School is to corporate America is what they want their Media Lab to be to modern information technology. BY D. C. DENISON

Greetings from the 1990s

Predicting the future
by inventing it

Three designers, consultants to a large Italian automotive firm, have finally arrived, half an hour late, at the new offices of Massachusetts Institute of Technology's Media Laboratory. The designers, who are very stylishly dressed, look slightly confused — and no wonder. The brand-new building that houses the Media Laboratory, a crisp, I. M. Pei-designed structure a block from the Charles River on MIT's east campus, resembles a college dormitory on the first day of school: The corridors are cluttered with boxes, temporary paper signs are taped onto doors, and there is a serious shortage of furniture. The Media Laboratory's administrative office is relatively neat by comparison, however, and the guests are ushered in to meet the director, Nicholas Negroponte.

"We're interested in electronic images and man-machine interaction," explains one designer as she pours herself a cup of coffee and lights a cigarette. Negroponte, in his 40s, is dressed in a dark, conservatively tailored suit. He has the tense, tightly wound demeanor of someone who is always slightly over-committed. This morning, he is already late for a flight, so he quickly launches into an explanation of the laboratory projects the designers will see on their visit: synthetic holograms, electronic re-

pair manuals, speech synthesizers, and "intelligent" phone-answering machines, among others.

The designers seem impressed — eager to see each of these projects, but it is obvious that at least one of the visitors is still trying to figure out what all these research subjects have in common. "What exactly is the philosophy of the Media Laboratory?" he finally asks, bluntly. "To improve the quality of life, or is that boring to you? Do you just want to make things more efficient?"

Negroponte holds up a hand. "You were getting very warm and then you got cold. Improving the quality of life is probably the single driving force here. Our image of the future is that computers will be easier to talk to than people. And we intend to predict the future by inventing it."

Understatement does not come easily to Negroponte, especially on the topic of the Media Laboratory. A professor of

D. C. DENISON WRITES THE "TWENTY-ONE" COLUMN FOR THIS MAGAZINE. HIS ARTICLE ON DISNEYLAND APPEARED IN THE MAY 26 GLOBE MAGAZINE.

Greetings

CONTINUED FROM PAGE 10

and exciting. Three groups make up the mix: The Albert and Vera List Visual Arts Center is on the first floor and includes three art galleries presided over by curator Kathy Halbreich, who has a knack for pulling together slightly oblique, sophisticated, New York-style exhibits. A portion of the second floor houses the Council for the Arts at MIT, which supervises a surprising amount of art-related activity on campus. The rest of the building — the top two floors, a large below-ground area, and a 48-foot-high "experimental media" facility — belongs to the Media Laboratory.

The central area of the Arts and Media Technology facility is open and spacious, with more Kenneth Noland multi-colored tiles, and a skylight ceiling that lets in bright afternoon sunlight. It looks like a high-tech atrium without greenery, or a taller, slightly starker Copley Place atrium.

The hallway floors are of industrial rubber, with patterns of small circles like those in a hospital or in, well, a laboratory. The overall color scheme is gray, brick red, and off-white, but each academic division and workshop in the building has its own atmosphere. The Learning Technologies section on the third floor, which frequently conducts learning experiments with young children, is filled with a brightly colored jungle gym and littered with large plastic toys. The art on the walls is of a grammar-school, finger-painting variety. The Film-Video section, on the other side of the building, consists of closed-off editing suites and small offices. The only common denominator throughout is the presence of large plastic "whiteboards" (the high-tech replacement for old-fashioned blackboards), covered with diagrams and calculations.

The two most comfortable places in the building, surprisingly, are the computer sections, or "terminal gardens." These two areas, designed by Negroponte, are the antithesis of the traditional white-tile-floor computer room. Carpeted, softly lit, and unaggressively air-conditioned, the rooms even have large, well-maintained indoor plants. Significantly, only

the terminals are visible; most of the large, boxy, dreary-looking computer hardware is out of sight. To the visitor, and to the staff, the environment is an obvious indication of how serious-

ly the lab takes its intention to "humanize computers." Another indication is the lab's computer policy: Faculty, staff, and students are issued one computer for the office and an additional one for the home. The users are encouraged to integrate the home computer into their family's daily life, expose it to relatives and acquaintances, and learn from the interaction.

Demo or die

The demonstration is the lifeblood of the new Media Laboratory. "We don't write papers," Negroponte says, "we don't do studies. Everybody here builds things, makes things." That is, the researchers make things and demonstrate them to sponsors and visiting researchers. These demonstrations serve a number of purposes: They give a sponsor, or a potential sponsor, a vivid picture of what he is getting, or can expect to get, for his money. The demos also allow researchers to see working prototypes in the development stages, thereby stimulating new insights into the practicality of a project.

"The demo is part of our philosophy," says Stephen A.

Benton, an associate professor of media technology. "You should be able to communicate your research in a short demonstration. We're in the business of communications, after all."

The importance of the demo is something young researchers learn early at the Media Laboratory. "There is definitely pressure here to work up a good demo of your project," another researcher says. "It's like 'publish or perish,' except it's 'demo or die.'"

This morning, Negroponte has scheduled a few demos for the visiting Italian designers. The first stop is for an explanation of an electronic publishing project by Walter Bender, a young, enthusiastic, principal research scientist at the lab. Bender switches on a terminal, and a photograph of an automobile transmission comes on the screen. "This is a repair manual," he says, "and this picture of the transmission is the table of contents. Say I want to repair the oil pump; I just touch

the pump on the picture." As he touches the screen, a page of text appears that details the repair of the pump. References to tools and technical terms are highlighted. "If I don't understand a term, I just touch it," Bender says, touching "socket wrench." A definition immediately flashes on the screen.

In the corner of the page is a photograph of a mechanic working on an oil pump. "The illustration is actually a movie," Bender says, and as he touches it with his finger, the mechanic starts working on the oil pump. "Now we can watch him do the repair," Bender says. "If we want, we can speed it up, slow it down, stop it in a freeze frame, or enlarge it."

"Let's turn the page," Bender continues as his small audience of designers watches, mouths open. "This is basically the same idea, except that as we read the paragraphs in the text, the mechanic tells us what he's doing. The text and the film are in sync, so as we touch a paragraph, we get the relevant film of the mechanic doing the repair."

"On the next page we even have a segment on how not to make the repair," Bender adds, touching the screen again. Sure enough, a block of text appears that says, "Do not loosen the screws on the oil pan too quickly." At the same time, a mechanic in one corner of the screen is loosening the nuts at a fairly fast clip. Suddenly, one side of the pan drops down, and oil spills all over the place.

Next on the demo tour is the Visible Language Workshop, where the designers are shown an "Interactive Dynamic Brush Editor and Paint System," a computerized painting system. The Visible Language Workshop has been in the facility since March. "We see nothing but wonderfully symbiotic possibilities in the new building," says Muriel Cooper, a graphic designer and co-founder of the workshop. "I hope there will be a lot of arguments, and I hope they'll be fruitful." The workshop, which Cooper started in 1976 with photographer, multimedia artist, and inventor Ronald MacNeil, aims to expand the static-print disciplines of photography, printmaking, and graphic design into the new media technologies.

Cooper and MacNeil are seated in front of the workshop's prototype research-graphic workstation, a rambling

collection of video screens, computer keyboards, and cameras. MacNeil turns on one of the machines and presses a few keys on a keyboard. A bright,

electronic collage appears, containing, among other things, a portrait of mathematician-logician Kurt Goedel, a large brain, and various mathematical formulas. MacNeil hits a few more keys, and a new image comes on the screen that looks like a group of slightly oblong billiard balls. "This is an entirely computer-generated image," Cooper says. "You could see it as an attempt to express mathematical entities. It's all algorithms and programming. Eventually, we hope to get into three-dimensional modeling, something you could walk around and examine from different angles."

"The people in this lab really have the chance to forge ahead as technologists," MacNeil adds. "My career, for example, has been an attempt to come to grips with the 'how' at the same time as the 'what.' Unfortunately, artists — with a capital 'A' — typically don't try to push the technology ahead. Most of the time, they use it and go to something else."

"I came into the arts on the tail end of the Bauhaus era," says Cooper. "To me, the Bauhaus flowered by responding to the Industrial Revolution. My fondest hope for the Media

Laboratory is that we can encourage this same sort of flowering for the information society."

Up from the Architecture Machine Group

Two computers glow on a desk in Nicholas Negroponte's office as he relaxes over a cup of coffee and recalls the genesis of the Media Laboratory. "As an idea it started in the summer of 1978," he says. "It began with a planned \$8 million facility for the arts, but then the center of mass of the project moved toward the bloodlines of MIT."

Those bloodlines, according to Negroponte, stem from MIT's tradition of forward-looking research. Certainly Negroponte himself is an enthusiastic believer in the liberating effects of technology. Our first interview, significantly, was conducted via computer technology that spanned 7000 miles and a 14-hour time difference.

computer graphics, he has been stalking the future at MIT since 1966, but the Media Laboratory is the most ambitious project of his career to date. The lab, which began moving into the new Arts and Media Technology facility in January, will bring together 10 MIT research groups in what Negroponte claims will be "a world center of art and emerging technology."

Certainly, the Media Laboratory has an internationally renowned lineup of faculty and staff, including former MIT president Jerome B. Wiesner. Financial support from US and Japanese corporations — particularly in the computer, broadcasting, and publishing fields — has also been enthusiastic. But what exactly goes on in a media laboratory? As the Italian designers learned, that is difficult to explain. According to a recent MIT prospectus, the lab "brings together research on new media for learning, telecommunications, publishing, broadcasting, cinema, visual arts, and music." Another MIT publication describes the lab as "an environment devoted to advanced research in broadcasting, publishing, and computing, and their overlapping uses in education, entertainment, and scientific pursuits." Suffice it to say, however, that what the Harvard Business School is to corporate America, what Johns Hopkins is to medicine, and what Los Alamos is to nuclear research, the Media Laboratory would like to be to modern information technology.

Public art and terminal gardens

From the street, the new four-story Arts and Media Technology facility looks clean and Bauhaus-modern, with neat, square tiles wrapping around the exterior. Artist Kenneth Noland has brightened up many of the tiles with muted colors. Two other artists, Richard Fleischner and Scott Burton, have also contributed to the project in an ambitious attempt by MIT to involve artists in the architectural process. The total price tag is expected to reach \$40 million by the time the facility is officially dedicated in October. The student body, however, has already passed judgment with typical flippant irreverence. "It looks like an inside-out bathroom," one student pronounced in the elevator, citing the most popular student simile.

Other students have expressed their feelings in more creative ways. On the front facade, near where artist Noland has painted three patches of color, student pranksters have added a fourth patch, a sickly green. "We've cleaned it off three times, but they keep doing it over during the night," says Deborah Hoover, executive director of the Council for the Arts at MIT. "We're starting to accept it as public art."

But even the most cynical observers must admit that the Arts and Media Technology building brings together a mixture of first-class talent that is unique, original. *Continued on page 36*

Checking a computer hookup at the Media Lab. "We don't do studies," director Negroponte says. "Everybody here builds things, makes things."

Negroponete was fund-raising in Japan at the time, but his assistant told me that that didn't present a problem. I simply had to type my questions on a computer terminal at MIT and Negroponete would pick them up on his computer in Japan. Sure enough, within 24 hours the answers came back, and they had been written, according to a note, on a small computer while flying "somewhere over Kyushu Island" and transmitted, upon landing, back to MIT.

Today's interview is conducted in old-fashioned, face-to-face style. "Previously, MIT considered the arts to be strictly extracurricular, like occupational therapy," Negroponete says. "The arts are for the mind what the athletic department is for the body. The institute needed the arts to make well-rounded human beings. But that doesn't carry with it great professional ambition. We have people here who are the best of their kind in fields like holography, image processing, computers, and education — this was no longer an extracurricular activity. We had the

talent to produce not only new creative forms, but also technical advances in publishing, broadcasting, and computer industries. That's what the Media Lab hopes to do."

Jerome Wiesner, MIT president emeritus, science adviser to Presidents Kennedy and Johnson, and the other driving force behind the planning and fund-raising for the Media Lab and the Arts and Media Technology facility, confirms that the enterprise began with rather humble aims. "I would like to say that I had a grand vision when we began this, but I didn't," he says. "There was no master plan. I was just trying to be helpful to a group of people who I felt were poorly housed and poorly supported. It was only when they began to work together to plan the facility that they discovered how much they had in common. Our initial motivation was simply more space and better support."

Negroponete's and Wiesner's vision was fueled by the increasing amount of institute research in art and media technology that had begun to attract

corporate interest and funding. Negroponete's own research team, the Architecture Machine Group, which worked on projects in computer-aided design and optical videodisc, was preeminent among these, attracting funds from the Ford Foundation, the National Science Foundation, and the Department of Defense. (Although the Media Laboratory, like most MIT research groups, accepts funds from the Department of Defense, it cannot — according to institute policy — do classified research or work on weapons projects.)

Perhaps the Architecture Machine Group's most impressive project was the Movie Maps, completed in 1979. The group filmed every street in Aspen, Colorado, and stored the film on a videodisc in a way that allowed the viewer to construct his own tour of the city by simply touching the screen to indicate the direction he wanted to go in. The Movie Maps attracted not only attention, but major funding from the Department of Defense, which foresaw a number of applications for the proj-

ect, "Remember the raid on Entebbe?" Negroponete asks. "The Movie Map was funded just after that, because one reason why the Israelis were so successful in that commando raid was they built a physical model of the Entebbe airport in the desert, and they practiced on it. So that when they arrived, they knew the place. This was at the beginning of the optical videodisc technology, and we came up with the idea of being able to visit a place without building it. Could you give somebody that kind of experience with a Movie Map? That's what we were trying to accomplish."

In many ways, the Architecture Machine Group, with its use of new technology and its success in attracting funds, was a model for the current Media Lab. "The Architecture Machine Group was certainly a microcosm in my mind of what the Media Lab will be," Negroponete says. "It was a damn good model."

The friendly frontier

Perfecting computers that will move objects on command, make small talk, and read lips

The most-studied problem at MIT's Media Laboratory by far is "the human-machine interface": How can computers be made easier for nonspecialists to use? There is widespread respect within the laboratory for the user-friendly advances of Apple's Macintosh computer, but the consensus seems to be that there is a lot left to do. Here are a few of the lab's projected improvements:

● **Gesture recognition.** Can a computer respond to where you are pointing? Several years ago, Richard Bolt, a principal research scientist in the Media Laboratory, demonstrated that it could, with an exercise called "Put-That-There." In the exercise, a subject wearing a wrist-watch-sized band sat in the middle of a room and was able to instruct a computer to create and move objects on a large display screen, just by speaking and pointing. The computer,

which contained a speech recognizer with a vocabulary of 120 words and a gesture sensor that picked up signals from the wrist band, could respond to commands such as: "Create a large green circle — there," or "Now make that red," or "Now move the circle over — there." One user of the system told *Psychology Today* that it was "like dealing with a friendly, slightly deaf butler."

● **Lip reading.** The Media Laboratory is currently working on a vision system for computers that reads the user's lips. "As you're talking, the vision system will look at your lips," explains director Nicholas Negroponete, "and if the speech-recognition system hears the word 'lunch' and wasn't sure if you said 'lunch' or 'brunch,' the speech recognizer will ask the vision system, 'Was it a 'lu' or a 'bru'?' The computer will be able to resolve these questions without making you repeat the

word, which will make the whole system run smoother."

● **Eye tracking.** Eye-tracking systems, which provide a constant measure of where someone is looking, are already being used in research labs around the country. But Media Laboratory researchers think that computers could, incorporate this technology to better respond to the user's visual attention. In one experiment, called "Gaze-Orchestrated Dynamic Windows," a subject was fitted with eye-tracking glasses and seated in front of up to 40 simultaneously running television programs, with the soundtracks providing a cocktail-party melange of voices and sounds. When the system found that the viewer was looking steadily at one particular image, it turned off the soundtracks of all other programs. If the viewer continued looking at this episode for a few seconds, the system filled the screen with that one image. To access the deleted images, the user moved a joystick on the arm of the chair. Says Richard Bolt, "We think this offers a way to exploit people's natural processes of selective visual attention."

● **Voice recognition and speech synthesis.** Both of these technologies have been in development for a number of years, but recently Christopher Schmandt, a principal research scientist at the Media Laboratory, and Barry Arons, a research associate, combined both capabilities with a number of other innovations to create a prototype of a superhuman answering machine. Called the Phone Slave, this "personalized, integrated telecommunications management system" can recognize frequent callers, engage them in simple conversations, relay personal messages to many different callers, send and receive voice or text electronic mail, and perform a variety of other telecommunications tasks.

Will the Phone Slave eventually replace the receptionist? "I don't think so," Schmandt says, "but we are looking at the receptionist as the human model for the work we're doing. We're watching the kind of behaviors that happen with people and secretaries, and we're trying to build a machine that models more of those things."

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Research without a proprietary position

"We're looking for new ideas, and there's no doubt that the leading research in media, electronic publishing, and broadcasting is going on in the Media Laboratory at MIT," says Sam Fuller, vice president in charge of research and architecture at Digital Equipment Corporation. Digital, headquartered in Maynard, gave a large grant of equipment to the Media Laboratory.

"The stuff at the Media Lab epitomizes research work that is further out, higher risk, and more speculative than we can justify spending internally,"

Fuller continues. "Our internal research and development is focused on DEC's products in the next three to five years. The

Digital is one of many corporations that have given money or equipment, or both, to the laboratory in exchange for the

Media Lab is looking at ideas that won't be applicable for the next 10 to 12 years, but they will be important to us then."

right to participate in the various research projects. According to one official at MIT, donors include almost every major company in the motion-picture industry, a very large percentage of the American publishing industry, a handful of Japanese corporations, and almost every major personal-computer company. In addition, the lab gets another \$3.5 million to \$6 million a year from organizations such as IBM, the National Science Foundation, and the Department of Defense, to work on specific research and discretionary projects. A year ago, for example, the lab received a grant of \$1 million a year for three years, to research high-definition television; the grant came from a consortium that consisted of all three networks and virtually every American manufacturer of television and broadcast equipment.

The largest single donor to the building was an American paper company. "The reason they became a sponsor," Negroponte explains, "was to hedge their bets against paper, to have a continuous peek into the future. There's no formal arrangement. They'll call and say, 'We'd like to send five people to MIT for two days and learn everything there is about

flat, solid-state television display technology.' So then I would arrange that. We have about five or six companies a week coming through for that kind of thing; that's how we pay the piper."

Surprisingly, these corporations fund the research without securing the right to patent the results. "You can't be proprietary," Negroponte says. "All our research is open. If you try to protect certain projects, it changes the flavor of the laboratory. All of a sudden, if I'm walking through with somebody, I have to say, 'I'm sorry, I can't take you into this room.' Besides, the real way that technology gets transferred is through people and through interaction, not through patents and licenses. I've directed a research group of one size or another since 1967 at MIT, and I've never taken out a patent. The truth is that with the things that we do, it's the spinoffs and side effects that are the money makers, not the research."

Elastic movies

According to one Media Lab researcher, most of the work gets done at night. And sure enough, at 11:30 p.m. one Tuesday, the Arts and Media Technology center appears to have settled into quiet productivity, lit by the soft glow of computer and video screens. In an editing suite in the film-video section on the fourth floor, graduate student Russ Sasnett is sitting in front of several TV monitors and computer terminals, working on an interactive videodisc program he calls Dance Haiku. "There are 13 different dance segments, and you can put them together any way you want," he explains. On the screen, two-second images from a variety of dancers flash by — a woman in a leotard in a vacant room, a dancer on a beach, a woman dancing on a staircase.

Programmed news

MIT's computerized newspaper "knows" its audience

"This is a daily newspaper designed for a readership of one," research scientist Walter Bender says as he sits down to demonstrate one of the MIT Media Laboratory's most interesting prototypes: the personal electronic newspaper of the future.

Bender clicks on a computer, and a newspaper-style layout appears on the screen. Most of the stories concern high-tech topics. "I'm interested in technology, and the newspaper program knows it," Bender says. "So it sorts through thousands of news-service stories overnight and puts together a collection of stories that I'm likely to want to read."

The newspaper "knows" Bender by referring to a programmed profile of his interests, which it updates daily by keeping track of the stories he

pursues past the front page, the words and phrases the institute searches for, and even the subjects of his electronic mail.

One of the columns in this morning's paper contains a piece of electronic mail that was sent late the previous night. "My electronic mail is not news to you, but it's news to me," Bender explains. "The Russians could have invaded Afghanistan yesterday, but the most important headline this morning could be that Nicholas Negroponte sent a message that he's had to cancel our lunch."

One story, on the right-hand side of the page, catches Bender's attention: "Boob Tube Gets a Brain," about the development of computerized TV sets. To read the rest of the story, Bender touches the screen, and a new page appears with the rest of the story.

"Then, as he reads the story, other related stories begin to appear around it. 'In a real newspaper, editors assemble related stories on the jump page,' he says. "This program does that, too."

In one of the stories, MIT is mentioned. "Let's see if there are any more MIT stories in the news," Bender says. "If you touch a word, it will search out any other stories on that topic." He touches "MIT" on the screen, and two stories appear, one about an MIT professor who plans to demonstrate a method to prevent video piracy among home viewers, another on an institute fund-raising drive. A photo of the professor accompanies the first story, while the second piece appears against a faded yellow background. "That means it's an old story," Bender explains.

One of the stories mentions Washington, D.C., and Bender touches "Washington" on the screen. A wire-service report on a meeting between President Reagan and a visiting dip-

omat in Washington appears. At the same time, a photo of Reagan appears. "We have 20,000 images from the UPI color slide collection on the videodisc," Bender says. "The computer calls up photos, maps, and logos when it's relevant."

"We're also working on another newspaper project that will use videotape images instead of photos," Bender continues. "So you could be reading about a great play in last night's Red Sox game and see it on videotape on another part of the screen. But we still have a ways to go on that."

Bender also admits that the current prototype has a ways to go before subscribers are likely to begin lining up. "It's still not really satisfactory to read your newspaper off a 100-watt bulb," he says. "Also, people tend to do something else while they're reading a newspaper: eat breakfast, ride the trolley, and so on. And you can't wrap fish in it. So I don't think paper is going to go away for quite a while." — D.C.D.

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MIT MEDIA LABORATORY NEWS PAPER ...

"Choose one," Sasnett says, and at the stroke of a key, the two-second image expands into an entire dance, with accompanying music, and fills the screen. "Choose another one," he says, and an entirely different dance segment appears. During the next few minutes, Sasnett arranges and rearranges these two segments with a variety of others, as if they were pieces of a moving jigsaw puzzle.

This kind of visual jumbling is possible because of advances made in the optical videodisc, a major focus of research at the Media Laboratory. The videodisc, originally marketed as a medium for old movies for home viewing, interests the researchers at the Media Lab for a number of reasons. Among them are its tremendous capacity for storing information and its ability to re-

spond quickly to viewer commands. Many researchers at the Media Lab, for example, believe that videodisc technology will transform encyclopedias. When a user looks up "Paris" in the videodisc encyclopedia of the future, for example, he will not only get the usual short descriptive paragraph, but because of the huge quantity of information that the videodisc can store in a small space, the user will have the option to go deeper and deeper into the topic — into the city's culture, geography, architecture — just by touching the screen.

Another videodisc project at MIT is elastic movies. "Let's say you're watching a documentary of the New Orleans World's Fair," Sasnett says, "and there's a 45-second interview with a banker on the financing of the fair. If you're interested in that, you could press the screen and suddenly be transferred into a 15-minute interview with him. And there are similar opportunities to get more information throughout the documentary. So you could expand a 20-minute documentary into a two-hour show, depending on your interests."

Before moving into the new center in February, Sasnett and the rest of the film-video researchers were isolated in drab, cramped quarters on Massachusetts Avenue. Now that they are in new facilities with other like-minded research groups, has it made a difference? "I've been pleasantly surprised," Sasnett says. "There's a proximity effect: I see the people in spatial imaging around the building, and we talk about our projects. Right now, in fact, I'm working on a piece with someone from the Visible Language Workshop. And we all act like vultures: 'Can I borrow that . . .?' Overall, I think it's working."

The head of the film-video section is Richard Leacock, an accomplished filmmaker (he co-produced and helped photograph the '60s rock documentary *Monterey Pop*) who is also credited with making a number of technical improvements to various filmmaking systems. As a result, Leacock is often held up as the kind of artist-technologist that the new Media Lab will attempt to train.

Asked about the relationship between artistic impulse and technical research, Leacock responds, "I hate to make that distinction. I'm a moviemaker, and technology provides tools to do things that we couldn't otherwise have done. But the major thing is to make the kinds of movies you want to look at."

Will the film-video group's new affiliation with the Media Laboratory make it easier to produce better movies? "Well, some people are worried that the Media Laboratory will be too interested in technical concerns," Sasnett says. "But it may work out the other way. Because we're part of a large, prestigious research group, it might be easier to get funding. It will be easier for a corporation to give us money for non-research-type projects. It will be — what should I say? — safer."

How things click

How much art will be produced in MIT's new Arts and Media Technology facility? Some artists in the MIT community have charged that at the Media Laboratory there is too much emphasis on research-oriented technology at the expense of artistic expression. The charges increased a few years ago when MIT's most prominent art

group, the Center for Advanced Visual Studies, canceled its planned move into the Media Laboratory in the new building and elected to stay in its low-tech, one-story concrete building on Massachusetts Avenue. The director of the center, Otto Piene, a German-born artist who is internationally known for his huge, inflatable sculptures and large-scale public art works, claims to have philosophical differences with the project. "The idea over there is that art will serve technology," he says. "We're not interested in that. We're interested in free expression, free association, and the choice of purpose and ideals. Technical perfection is uninteresting to us. I think it's dangerous for artists to get too proud of how things click."

Many of the 26 fellows and 10 graduate students who work at the Center for Advanced Visual Studies also have ambivalent feelings about the influence of technology on art. Media artist Vin Grabill has been working with media technology since he came to MIT as a graduate student in 1979, yet he does not consider himself a technology enthusiast. "You can really drown yourself in technology, especially around here," he says. "If you're not a strong enough artist, you'll just float from one development to another. Fooling around with computer graphics is not an end, it's a means to an end."

Negroponte, however, does not see a conflict between art and technology. "Historically, new media were invented by the users," he says. "Photography was invented by photographers, and film was invented by filmmakers. This tight coupling between creative user and inventor has dissipated, if not disappeared, with television, and again with computers. My goal is to rejoin the creative user with the inventor, first in one place; maybe in one head."

Yet whether Piene's position has any justification, it is not without consequences. "This definitely makes our fund-raising situation more difficult, more strenuous," he admits. "Industry, which has replaced government as the primary target of fund-raising efforts, is often interested in the advancement of technology, or results that will at least feed back into industry. But there's a dilemma: If you serve specific sponsors for specific purposes, your art may end up serving the interests of the sponsors more than art itself. That's a problem."

Julie Walker and Mark Holzbach are graduate students in MIT's visual studies program. In many respects, they and their colleagues in this program are the focus of the Media Lab — the artistic talent, the raw material from which the future artist-technicians will emerge. "It was really funny," Walker says, "at the orientation meeting this year. There was this edge on Negroponte's voice. It was like, 'I just put my neck out for you guys, so you better produce.' I think they're going to want some results right away."

Both Walker and Holzbach work in the Spatial Imaging Laboratory, which has just recently moved into the new Arts and Media Technology facility.

The field of spatial imaging includes all kinds of three-dimensional imaging systems, "but basically we're doing holography," says Holzbach as he sets up a simple stand. "It's a very flexible medium." After placing a glass plate on the stand, he turns on a small light mounted on the wall, and a three-dimensional architect's model of an urban office building appears. "This is one of the practical applications," Holzbach says. "You could bring a model to the site, hold it up, look through the hologram, and see the representation of the building on the site, in three dimensions. That's a big advantage."

Asked about other applications, Walker mentions noninvasive medical testing, engineering, advertising, and design. "But the lab is definitely committed to the development of holography as an artistic medium as well," Holzbach adds. "I think that art and technology go together naturally in holography. When you understand the technical aspects, you can be more creative. You know what's possible."

And how will holography fit in when the lab moves into the new facility? "The emphasis will be on research and development, most definitely," Walker says. "The Media Laboratory will be trying to get departmental status over the next few years, and productive research is important for that. Most of the other new staff positions have been given to technically minded people rather than artists. But on the other hand, they've been taking in more art students than they used to. So there will be a technical staff and visually creative students. The idea, I think, is that you can learn the technology, but you can't learn visual creativity." •

The New York Times Magazine

August 23, 1987

INVENTING THE FUTURE

By Edward Dolnick

DAVIDZELTZER rolls the tape, and on the television screen a torrent of pyramids and balls and cubes begins raining from the sky, ricocheting off the ground. The modest film is only a few minutes long, but it is a first step on the way to an audacious goal. Zeltzer, a computer scientist with expertise in animation, wants to build computers that "know" how balls bounce and people walk, so that playwrights and screenwriters with no technological knowledge can see their stories acted out on the screen.

He is showing his film in one corner of a huge, plushly appointed room called the Terminal Garden. All around him, other scientists are shepherding along their own fledgling projects. One group, for instance, talks of creating three-dimensional movies, a kind of "live" theater in your living room. That is a long way off; in the meantime, they show off a hologram, a three-dimensional picture floating in mid-air, of a young woman staring into space

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while red, green, blue and orange snakes hover about her head.

We are at the Massachusetts Institute of Technology, in the center of a sleek, two-year-old, \$45 million building housing the Media Laboratory. The lab's purpose — as its faculty proclaims with startling brashness — is to invent the future of newspapers, cinema, television and music.

Media Lab researchers include some of the most prominent figures in computer science, including Marvin Minsky, one of the founders of the field of artificial intelligence, whose research at the lab currently focuses on teaching computers the principles underlying music composition; and Seymour Papert, the inventor of LOGO, a computer language for children, who is directing a Media Lab pilot program in which elementary-school students explore new uses for computers.

Minsky, Papert and some 120 other researchers are working on a series of projects they hope will transform the texture of everyday life. They are building musical instruments able to follow the nuances and pacing of a

live performer; holograms that will enable physicians to "see" a medical problem before an operation; and a "personalized newspaper" with stories automatically drawn from various electronic news services and printed on the computer terminal according to a reader's particular interests. These projects, and a kaleidoscope of others, are intentionally far-out, impossible or impractical with today's technology.

Radical change is the essence of the Media Lab's philosophy. Nicholas P. Negroponte, the lab's 43-year-old director, casually dismisses many futurists' technological forecasts — more vivid television pictures, concert-hall quality sound at home, and so on — as "a little banal." "We're looking to make fundamental changes," he says, with a bravado that has brought him notoriety.

Seventy-five corporations, as well as the Federal Government, sponsor \$5 million worth of research at the lab each year, and have contributed a total of \$60 million to Negroponte's vision of fundamental change since he began raising money for the lab in 1982. The National Sci-

ence Foundation and the Defense Department's Advanced Research Projects Agency provide more than 12 percent of the financing, primarily for research in artificial intelligence. ABC and NBC, among many others, finance research on advanced television. Warner Brothers, Columbia and Paramount finance a Movies of the Future project. The International Business Machines Corporation and Apple Computers are sponsors, as are Sanyo, Hitachi, Fujitsu and Sony. The New York Times Company is not a sponsor. Time Inc. is. The lab has attracted financing from the private sector, explains Michael P. Schulhof, chairman of strategic planning for Sony Corporation of America, because "we couldn't even begin to look at the range of topics Negroponte looks at."

Yet none of the Media Lab's research is proprietary and no products are developed. For their money, the companies simply get the opportunity to visit the laboratory and to send their scientists for extended stays.

"I'm sure there may be folks in the controller's department who wonder about

it, but nobody at any senior level questions this kind of expenditure," says Jerome S. Rubin, a group vice president of the Times Mirror Company, the newspaper publishing group. "Being in touch with new ideas and being exposed to people having the new ideas is worth any investment we make. We don't expect any direct return."

The lack of a direct return on investment has caused some skeptics to question the quality of the lab's work. "The stuff they do is like a movie set," says a computer scientist in a Federal agency. "It looks great, it looks real, but you open the door and you see there's nothing but prairie behind it."

Others' criticism is stronger: "It's dazzle and a good deal of bull," is the curt summary of a prominent computer scientist familiar with the lab's activities.

Negroponte welcomes the skepticism. "Can you think of

anything in the history of science, or for that matter in the history of art, that wasn't controversial at the outset?" he asks.

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lab's I. M. Pei-designed building stands alone, silvery-white and cool, on a street of nondescript M.I.T. offices and shabby-looking factories. Inside, some 80 graduate students and 40 research scientists and faculty members work in fields ranging from music to film animation, from education to graphic design.

Each group occupies its own niche at the lab, which gives the building the flavor

of a high-tech funhouse. Music research takes place in a cluster of soundproofed rooms piled high with tape recorders, synthesizers and speakers emitting sounds never heard from conventional instruments. In a different area, designers developing new graphics techniques for commercial products are hunched over their computer terminals, fine-tuning the purple hues of the creature on a box of Monster Munch cereal.

Negroponte, an M.I.T.-trained architect who is considered a pioneer in the field of computer-aided design, directs it all. Along with Jerome B. Wiesner, a past president of M.I.T. and science adviser to Presidents John F. Kennedy and Lyndon B. Johnson, Negroponte spent seven years pulling together a dozen or so scattered M.I.T. research labs before opening the Media Laboratory in 1984. The lab's building is named

for Wiesner, an emeritus professor at M.I.T., who still helps to woo corporate sponsors. And although Negroponte himself speaks somewhat wistfully of returning to research, he is a full-time administrator, fund-raiser for and promoter of the lab.

At M.I.T., reverse chic prevails: most buildings are designated by number rather than name, for example; there is an annual contest to choose the Ugliest Man on Campus. Negroponte — an impeccably tailored fellow, with fashionably long hair cut just so, wary, worldly, tense, the son of a Greek shipowner and a self-described member of the international set — appears out of place here. "I seem to get into 'W' or 'M' or one of those magazines once a year," he says, with mingled amusement and irritation.

Squeezed into a corner table at a crowded, noisy seafood restaurant a short walk

from the lab, Negroponte holds forth on a favorite subject: "Inventing the future." He speaks in well-punctuated paragraphs, his sentences as carefully composed and arranged as the slices of sashimi on his plate.

"Newspapers as we know them, won't exist," he asserts. "The whole concept of newsworthiness will change. Newspapers will be printed for a readership of one."

Television, he adds, won't simply have sharper pictures and better sound. "My view of the future of television sets is that on these hand-held controllers you won't just have channel knobs, but you will have one button that says 'Tell me more' and another button that says 'Tell me less.'"

Perhaps because of the boldness of such pronouncements, the mention of Negroponte's name in computer circles invites whiplash: visionary, charlatan; academic star, lightweight; back and forth, with few observers taking a middle view. "Even within M.I.T.," says one corporate executive, "he is both loved and loathed."

Ask a simple question: Is Negroponte a well-respected intellectual figure? "If you ask 40 people in this department, they'll laugh," scoffs one prominent computer scientist.

Yet Alan Kay, one of the inventors of the personal computer and a lecturer at the M.I.T. lab, is almost deferential. "Negroponte," he says, "is one of the true visionaries."

The split over Negroponte is significant, because judgments of the man tend to spill over into judgments of the lab itself. Those who admire Negroponte like the Media Lab; he's "intellectually stimulating and opens our eyes to things we might not have thought of on our own," and the lab is "exciting, more than just a plain vanilla university," says the Sony Corporation's Michael Schulhof. Those who dismiss Negroponte write off the Media Lab, too — he's a carny barker and the lab is just razzle-dazzle.

Negroponte has heard it all before. "If you really care if people see you as controversial, or don't trust you, or

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don't like you, it becomes all-consuming," he says.

On three points, his admirers and detractors come together. Negroponte is a formidable showman and salesman; he is a gifted administrator; and, his personal flair notwithstanding, he is no dilettante. In his large but plain office, a row of clocks above the blackboard — set to show the time in Tokyo, San Francisco, Boston and Athens (Negroponte has a house on the Greek island of Patmos) — testify to his schedule. He covers more than 200,000 miles a year, raising money and the profile of the lab. One of his primary functions, he says, is acting as a "matchmaker" between sponsors and his scientists, coordinating the needs of the lab's corporate and government providers with the interests and expertise of his staff.

Negroponte has been a member of the M.I.T. faculty since 1966. He was trained not as a computer scientist, but as an architect, a source of some of the grumbling from the computer-science community. He made his academic reputation by founding and directing a remarkably successful M.I.T. research project on computer-aided design called the Architecture Machine Group.

The architecture group's greatest coup, in 1979, was a computer-controlled video disk of Aspen, Colo. It showed every street, every intersection, every building so realistically that, without ever leaving home, a "visitor" could "drive" through the city by any route he chose, and could instantly see all the appropriate Aspen sights. The work brought publicity and funds, notably from the Pentagon. The map, in effect, put Negroponte on the map.

His only major non-M.I.T. venture was a brief, unhappy stint as executive director of a grandiose project called the World Center for Personal Computation and Human Development, founded by the French Government in 1982 and based in Paris. The center's mission was to devise educational strategies for the third world, based on computer technology — a magic carpet that would swoop undeveloped nations directly from poverty to the Information Age, altogether bypassing

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ing the belching smokesacks of the Industrial Age.

Negroponete's appointment helped to give the center instant credibility. He quit within a year. "The French thing was all hype," he says.

His criticism is intentionally ironic, for hype and style have not been slighted at the Media Lab. The place seems designed to dazzle, to convince the constant stream of visitors that they're not in Kansas anymore.

Still, Negroponete insists that the lab's style does not mean it lacks for substance. "Come here at midnight any time you want and, believe me, you'll find the building full of people working on what they believe in," he says.

THE SCIENTISTS' pet projects already include a host of technological breakthroughs in fields that have stubbornly resisted commercial development.

Holography, for example, has long been a solution in search of a problem, a snazzy technology of limited applicability. But in July 1986, in work sponsored by General Motors, Stephen Benton of the Media Lab showed a hologram of a new version of the Camaro poised in space. For G.M., the excitement was that the car had never existed as a model — Benton's new technique took the Camaro directly from the designers' computer screens to midair, bypassing the slow, costly process of fashioning a clay model.

Benton also transformed a CT-scan into a hologram of a patient's broken hip joint. Within a few years, he believes that surgeons will be able to use the technique to produce a realistic image of a medical problem they are about to tackle.

The Media Lab's animation projects also reveal its char-

acteristic focus on putting computer power to unexpected use. "Suppose you're a playwright and you'd like to see your story animated," says David Zeltzer, who directs the lab's Computer Graphics and Animation Group. "You'd probably have to pay someone to do it for you, and that's an awful waste." Zeltzer's work in-

volves giving the computer a built-in "understanding" of how objects in the world move and fall and interact, so a playwright can easily visualize his characters' movements and still concentrate on his writing.

But of all the Media Lab projects, one called Newspeek may be most emblematic of the future that Negroponete has in mind. The idea behind this "personalized newspaper" is that computers will make it possible for each of us to read a journal shaped to our own particular interests. A "mass medium" will be tailored to the individual.

Newspeek's name derives from the system's ability to enable viewers to "peek" at the news. It currently exists as a demonstration model. Sitting down to a computer terminal, a reader is greeted by the day's front page. The stories — plucked from computer databanks operated by such companies as Dow Jones (the publisher of The Wall Street Journal), The New York Times, and Mead Data Central's Nexis, among others — are packaged on the video terminal in familiar newspaper form, with eight or nine stories that span a wide range of topics. Headlines are in large type, photographs are in color, stories are in columns.

But touch a word that interests you in a story, such as "Reagan" or "I.B.M.," and the same word will appear highlighted in all other stories that happen to mention

it. Move your finger sideways across a front-page story, and you jump inside to the story's continuation, and then to any related stories that Newspeek has gathered. Maps, photographs and old stories are all on file and immediately accessible. Touch "Nixon" and a file photo of the former President will appear at once. (In a neat graphic touch, old news stories appear on a yellow background, to show the clips have aged.)

Media Lab researchers are working on ways to print Newspeek on paper, but for now the reader is tied to the computer. The scientists also are attempting to give the system the automatic ability to reflect a reader's interests.

"If you dwell on some articles, then the emphasis in tomorrow's edition changes," explains Andrew Lippman, director of the lab's Electronic Publishing Group. Reading a story on Iran beyond the front page and on to its continuation, for example, may indicate a subscriber's desire to have more stories on the Middle East in his newspaper. Newspeek will thus retrieve more of those stories from its databanks and arrange them to match that reader's concerns. But a subscriber who spends time perusing book reviews will gradually find a Newspeek front page with more pieces on cultural topics.

Already, in its demonstration form, Newspeek incorporates news from untraditional sources. "The computer knows about my electronic mail," explains Walter Bender, 31-year-old head of the Newspeek project. "If I get mail from Nicholas telling me the Aga Khan is coming to the lab, it's front-page news to me. It means I've got to be here at such and such a time and be presentable." What is more, Bender's own version of Newspeek will buttress the Aga Khan message with other stories about him culled from the various databanks.

Publishing executives seem intrigued with Newspeek, but dubious. "I still find books and newspapers to be more congenial than cathode ray tubes, or any other kind of electronic display," says Jerome Rubin of the Times Mirror Company. "People prefer paper for lots of reasons — it's portable, it's flexible."

Nevertheless, Rubin endorses the project. "A customized newspaper isn't necessarily ever going to mature in the form Negroponete envisions," he says, "but in the

course of playing with the concept, an awful lot of interesting ideas are going to be generated, and some of those ideas may in fact turn into products with commercial possibilities."

THE NEWSPAPER executive's cheery ambivalence characterizes the attitude of many of the Media Lab's sponsors. The lab is in the business of putting many of them out of business, or at least of transforming the businesses they are in. Negroponete's pitch to prospective sponsors capitalizes on their uncertainty about the future by carrying two different messages at once. To cautious companies, the lab is an insurance policy against a fearsome future. To bolder firms, it is a gateway that will give them access to an enticing new world.

"Let's face it, we're in a volatile industry," says J. Richard Munro, the chairman and chief executive officer of Time Inc. "Any way we can protect our flanks is a prudent investment."

Sponsors get an annual written report on work they support, and two to three presentations each year. They get early access to preliminary or yet-to-be-published research papers called "technical memos." And they can send their scientists to the Media Lab for up to a year or more.

Even enthusiastic sponsors do not cite specific ways their support has paid off so far. What they are hoping for are more general technological breakthroughs, for broad innovations that will lead them to new areas of product development. "We don't need the Media Lab to do applications," says Schulhof. "We can do the applications ourselves."

Within a few years, it should become clear if the Media Lab's "new ideas" will indeed reshape our daily lives, or if they are impractical, pie-in-the-sky notions. But Nicholas Negroponete evinces little doubt that his center will help to transform the future:

"Ten years from now you might see synthetic holograms in every doctor's office in the U.S., or composer's work stations in the home of every music-loving child, or feature-length, high-definition films delivered on optical platters for 25 cents. I don't know whether it will all come to fruition, but a measure of our success will be how many of these things do come." ■

FISCAL NOTE

REQUEST:

Revision Date: _____
Title: Applied Telecommunications Center
Sponsor: Boucher
Requestor: _____

Agency Affected: _____
BRU: _____
Components: _____

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-

CAPITAL	-0-	-0-	-0-	-0-	-0-	-0-
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REVENUE	-0-	-0-	-0-	-0-	-0-	-0-
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FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	-0-	-0-	-0-	-0-	-0-
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS : (Attach a separate page if necessary)

Please refer to HB 403, which is an appropriation bill for an Applied Telecommunications Center.

Prepared by: House State Affairs Committee
Division: _____

Phone: 465-4963
Date: Feb 02, 1990

Approved by Commissioner: H. A. "Fed" Boucher, Chair
Agency: _____

Date: Feb 02, 1990

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