

## Medical Center Information Technology

### Introduction

Apologize for having to leave...

MITN:

Michigan Information Technology Network

Satellite & fiber optics-based

television network

Expansion of MERIT computer system...

Will provide access to every community,

every company, school,...and,

of course, every hospital in the

state...

UM, MSU, MTU, WSU with uplinks...

Initially: economic development...

Engineering

Business administration

Later: knowledge resources...

K-12

Agriculture

Medicine

Only an example...

### Background

Always a hacker...

Insatiable appetite for computational cycles...

a "number cruncher"...

Nuclear systems simulation...

Very large systems...

Nuclear reactors...

Nuclear rockets...

Nuclear explosions...

Very complex...

Some of our codes ran 24 hours

a day on the fastest machines

available....

Using "supercomputers" even before

the word was coined...

IBM Stretch

CDC Star

When Apple-II first appeared in 1979,

was lured by a colleague, Dick Phillips,

into developing a introductory course

on computer for freshmen...

Hence, this perspective had a major impact  
on the strategic directions I have taken  
since...

### **UM experience...**

.heyd 2 + In 1960s UM was clearly a leader in time-sharing...

MTS was then...and continues today...to be  
one of the most powerful operating systems

### **UM involvement with IBM, then Amdahl, kept us**

at the lead in the use of large, time-shared  
mainframes...

### **But...UM fell rapidly behind in the quality of**

computing environment it could provide  
as the new generation of minicomputers  
(VAX, Primes, ...) took root.

### **UM Engineering**

Some of us were convinced that the computer  
would rapidly evolve from simply a tool for  
scientific computation or information  
processing into an information technology  
infrastructure absolutely essential to all  
of our activities...from research to instruction  
to administration

I was also convinced that to build a leading  
Engineering college, it would be necessary to  
become a leader in information technology.

But, as with all such efforts to achieve leadership,  
the key is with people.

Fortunately, we were already blessed with some  
individuals of extraordinary vision...

Dan Atkins, whom I convinced to accept  
an appointment as Associate Dean

Dick Phillips, whom I took over first as  
the head of our Computer Aided  
Engineering Network and then as the  
first head of the Center for Information  
Technology Integration

Another key player was Lynn Conway, who was  
at that time head of AI at PARC (and later  
head of the Advanced Computer Program  
at DARPA)

With these people pushing hard, we set a rather ambitious goal: To build the most sophisticated information technology environment of any Engineering college in the nation...an environment that would continually push the limits of what could be delivered in terms of power, ease of use, and reliability to our students, faculty, and staff.

## **CAEN:**

Computer Aided Engineering Network

Sophisticated information technology network integrating the College's instruction, research, and administrative activities together with both oncampus users (students, faculty, staff) and off campus participants (industry, government)

CAEN was a distributed intelligence, hierarchical computing system linking personal computer workstations, superminicomputers (and, more recently, minisupercomputers) mainframe computers, function specific machines (CAD, simulation, AIA) and gateway machines to national networks.

The network was designed to support non only general scientific computing, but computer aided instruction, administration services and provide access to technical and bibliographical databases.

It was also designed to be a test bed for R&D in computer and communication engineering.

First steps:

1. Provided very faculty member with workstation
2. Built large clusters of state-of-the-art workstations for students (Apple Lisas, IBM, Apollos, Suns, Silicon Graphics, ...what's NeXT...)
3. Networking...
4. Servers...
  - MOSIS
  - Flexible manufacturing cells
  - Supercomputers (Alliant, Hypercubes, NSF centers...)
5. Corporate relationships
  - DEC
  - Apollo
  - Sun
  - AT&T

Apple  
"Jobs-Poduska" announcement  
"Jobs-Scully" invitation

Today

Workstations

350 top-end workstations (Apollo s, Suns,...)

Well over 1,000 Macs, PCs, ...

Clusters

Roughly 20 to 30, ranging from large facilities  
with a hundred or so workstations, to small  
local facilities with a dozen or so machines at  
the department level

Servers

Alliant minisupercomputers

Harris UNIX servers

Sun file servers

Networking

Ethernet

Appletalk

Domain rings

Proteon Fiberoptic Ring

Some measures:

Storage: 50 gigabytes on the network servers alone...

(not counting workstations themselves)

Roughly 100 times the processing power of MTS

20 full-time staff...100s of students

Philosophy

- i) Determined to stay always at the cutting edge...  
but with very strong service focus
- ii) Determined to remove all constraints...no limits  
whatsoever on student and faculty use...
- iii) Multivendor environment
- iv) Move with whatever technology was the most  
powerful...e.g., CAEN is based on a UNIX kernel...  
MTS is really only used as a communication channel

**University Level**

Early 1980s...

Also apparent that the University could benefit from a  
similar commitment...

Hence, many of us pushed very hard to achieve a  
major University commitment to regain its leadership

in information technology...and, indeed, to use this  
as an important component in building the  
distinction of the University...

Persuaded HTS and BEF to let Engineering and Bus Admin  
set the pace...

Engineering CAEN

Bus Admin Burroughs Network (Alan Merten)

But also persuaded UM to recruit people with the vision  
and energy to make this a reality...

Key people

Greg Marks

Doug Van Houweling...

Lynn Conway...

Randy Frank...

Carolyn Autry-Hunley

Initial Efforts

i) Student access program

Computer fee...1500 workstations

ii) Networking

Northern Telecom wireplant

iii) Mainframe

IBM connection

iv) Supercomputer Center

Fujitsu...

Structures...

CITI

Center for Information Technology Integration

CMI

Center for Machine Intelligence

Cognitive Science and Machine Intelligence Lab

EXPRES

NSFnet (IBM, MCI)

NSF Supercomputer centers

NASA, Internet,...

MITN

Today...

i) roughly 2400 public student workstations

(including exciting programs like RESCOMP)

ii) roughly 20,000 workstations

iii) world networking center...

Last year 25% of Telenet through UM

- iv) access to supercomputers throughout the nation (SDSC and PSC charter members)

Tomorrow...

Personal computing to "interpersonal computing"

As the result of the rapid spread of personal computers and computer networks, and the development of new insights into human cognition and group behavior, we are at the threshold of a major shift in the underlying paradigms and uses of information technology.

The shift will be from solo use of personal computers to group use of collaboration technology.

Group process underpin all human activity and work.

Past research in computing technology has focused on the solo user.

But groups activities such as brainstorming, planning, and making decisions in group settings will require new technology.

Center for Collaborative Science and Technology

UM, MIT, PARC

Organization theory, cognitive psychology, anthropology, human-computer interaction, artificial intelligence, and multi-media information technology

### **Goal**

To make Michigan the world leader in the development and application of information technology

### **Status**

1. Engineering and Bus Admin are clear national leaders in this technology
2. UM has not only the most ambitious, but also the most effective program of any large university in nation
3. UM has become the focal point in efforts to build the "interstate highway system" of information exchange...with EXPRES, NSFnet, internet, MITN,...
4. Now riding the "fourth wave" of the use of information technology...where the computer becomes not simply just an information processing

tool, but rather a medium of communication, cooperation, and collaboration...an entirely new intellectual endeavor

**What is the implication for the Medical Center?**

I am convinced that this technology is having...and will continue to have...the most profound impact on all human endeavor...

Furthermore, I am convinced that it will revolutionize the way that health care is developed and delivered.

Several years ago the rest of the University set its course to become the world leader in this important area...and I believe we can now make the case that we have achieved that.

Let me suggest that it is time that our health sciences and the Medical Center pick up the pace to join the rest of us in this exhilarating race...

Let me suggest that you, too, set a goal of true leadership in a technology, I believe, will play a critical role in determining your capacity to achieve excellence in teaching, research, and health care in the years to come...

And let me leave you with three short words of advice...  
"GO FOR IT"...