DATE: January 17, 1979

To: Task Force on the Future of Computing at Stanford

FROM: Jon Sandelin

SUBJECT: Notes from Meeting on Research Computing held January 10, 1979

Reminder:

Next meeting is Monday night, January 29, 7-10 p.m., in the Lang Room. Topic is computer-based communications and networking. The consulting firm of Booz, Allen and Hamilton will describe briefly their "phase I" study regarding potential replacement of our CENTREX telephone system, and also the potential benefits from a "wired campus" providing integrated voice and non-voice communications.

Booz, Allen will be followed by presentations from Stanford computer facility representatives describing current status of networking efforts and plans for the future.

Meeting Notes:

SLAC - Copies of the foils used by Wayne Bartlett in his presentations are attached--with some amplifying comments.

Campus Facility -- Research usage represents about 15% of current utilization. An Ed Williams' handout provided a distribution of research usage by school and also some trend information. Expectations are that research usage will remain relatively constant for the foreseeable future. A special "L" job class was recently introduced to provide low cost (about 25% of the normal CPU rate) alternative for large (over 15 minute) CPU intensive batch "production" research work. Ed also mentioned that EDUNET use is starting to grow and could be a significant future source of research oriented computing.

IMSSS -- Robert Laddaga described some research work not directly connected with their CAI efforts (the CAI related research had been mentioned in his talk on instructional computing). They are doing experiments with some eye tracking equipment obtained via NASA. IMSSS has been very active in text generation tools, including interfaces to composition equipment for book publication. A lively discussion ensued concerning the amount of time researchers spend attempting to communicate--normally via technical papers, etc.--the results of their research, and the importance of computer based tools to assist in this effort.

A/I Lab -- John McCarthy reviewed some of the work going on at the lab. Their efforts in the design of a new computer system raised some discussion from Task Force members. A/I would like to get such a system to replace their current CPU, which is aging gracefully. They have had the problem (shared by other Stanford facilities) of losing talented systems programmers due in part to the inability to remain at the forefront of operating systems evolution. That market demand for programmers of all types is very strong, but especially for systems programmers, is not helping the situation.
Summex -- Tom Rindfleisch reviewed the birth and growth of Sumex. They are unique in that 50% of their available capacity is assigned to research in artificial intelligence techniques applied to medicine outside of Stanford. They connect to ARPANET, TYMNET, and TELENET. They restrict the amount of work allowed on the system so that human interaction time is reasonably productive. Applications to use the Sumex facility are carefully screened to ensure the "quality" of the work is high and that the specialized features of Sumex are required. Tom mentioned that central facilities at Sumex are an important resource for nurturing new ideas and testing concepts.

A short general discussion period followed the presentations, which focused on digital communications/networking. Ed Feigenbaum proposed that this area will be the most significant service offering provided by computer facilities in the next decade.

csr

cc: Computer Facility Directors
OUTLINE

High Energy Physics
HEP COMPUTING CHARACTERISTICS

CURRENT SYSTEM
CENTRAL FACILITY HARDWARE
VAX - COMPUTERS FOR EXP. REGIONS
SOFTWARE

USER PROFILE

WORKLOAD PROFILE

TERMINAL USAGE

FUTURE PLANS
VM & NETWORK DEVELOPMENT
CAPACITY EXTENSION

SNAC is national research facility - however computer center is dedicated to SNAC usage only (with a few minor exceptions)

WDB
1/9/79
COMPUTING CHARACTERISTICS

PLAN & PREPARE EXPERIMENT

EXPERIMENTAL RUNS

DATA REDUCTIONS*

ANALYSIS*

PHYSICS RESULTS

SEVERAL COLLABORATORS

20 - 50 PEOPLE

*PRIMARY PRODUCTION WORKLOAD

- Experiments can run from 6 months to 3 years.

The process of data management becomes a major part of the experiment.

WDB
1/9/79
CENTRAL FACILITY HARDWARE

MULTIPLE CPU'S

2 - 370/168'S & 1 - 360/91

SHARED PERIPHERALS

DISK DRIVES - 3.6 G.B.

TAPES - 12 @ 6250 + 6 LOW SPEED

PRINTERS - 5/1403'S

VERSATEC/MICROFILM/FICHE

TERMINAL WORK

2 - 3705'S

2 - PDP 11'S

REAL TIME NETWORK

SBCU'S & SYSTEM 7'S

Sensor Based Control Unit - Support
large (megabit) data rates between
System 7's and triplex

VAX'S - PEP EXP. REGIONS

↑ new equipment
- for PEP
- will get a total of 7
- collect data for experiments

WDB
1/9/79
SOFTWARE

SYSTEMS

SVS - R1.6

MVT - R21.8

ASP

MIL TEN/ W YLBUR/ORVYL/ SPIRES

LANGUAGES

FORTRAN/MORTRAN

PL1

ASSEMBLER

SPEAKEASY

OTHER

NUMERICAL ANALYSIS LIBRARY

UNIFIED GRAPHICS SYSTEM

TOP DRAWER
**USER PROFILE**

<table>
<thead>
<tr>
<th>USER TYPE</th>
<th>% USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLAC &amp; SLAC COLLABORATORS</td>
<td>95</td>
</tr>
<tr>
<td>OTHERS</td>
<td>5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100</td>
</tr>
</tbody>
</table>

**CURRENT OTHER USERS**

- Stanford
  - Operations Research
  - Civil Engineering
  - Mechanical Engineering
- SSRL
- SEL
- Hansen Labs
- Others
  - Fermi Lab
  - General Electric
  - USGS

(Opensilicon 8.0, about 25)

Gov. Funded

WDB

1/9/79
# SLAC Workload Profile

<table>
<thead>
<tr>
<th>Class</th>
<th>No. of Jobs Per Month</th>
<th>% of Total CPU Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARGE BATCH</td>
<td>3,000</td>
<td>75</td>
</tr>
<tr>
<td>SMALL BATCH</td>
<td>26,000</td>
<td>21</td>
</tr>
<tr>
<td>EXPRESS</td>
<td>25,000</td>
<td>1</td>
</tr>
<tr>
<td>INTERACTIVE/REAL TIME</td>
<td>1,000</td>
<td>3</td>
</tr>
<tr>
<td>OTHER</td>
<td>1,000</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>56,000</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

*Typical job usually over 1000 lines of FORTRAN code.*
TERMINAL USAGE

NOVEMBER, 1978

NO. USER ID'S 1,262

NO. SESSIONS 32,995

CONNECT HOURS 16,148 : 100 FTE'S

MEAN SESSION TIME - MINUTES 29.4

TYPICAL MAX. CONCURRENT

NO. TERMINALS 75

This area is growing rapidly

Cost of manhours at terminals is rapidly surpassing the total cost of the central facility.
FUTURE SYSTEM PLANS

VM/370 OPERATING SYSTEM

RUNNING NOW FOR DEVELOPMENT PURPOSES

GENERAL PLANS & PROBLEMS

NETWORK DEVELOPMENTS

RSX-11

DECNET

UNCERTAINTIES

NEED FOR LOCAL NETWORK

PREPARE FOR ADDED CAPACITY

SOLVE THE 360/91 REPLACEMENT PROBLEM
SLAC COMPUTING FACILITY (load & capacity curves)