DATE:

To : Joshua Lederberg, Elliott Levinthal, Ed Feigenbaum, Tom Rindfleisch

FROM : Ron Jamtgaard

SUBJECT: Some Thoughts on Follow-On ACME Proposal

Following a telephone conversation with Bill Raub and his staff plus Feigenbaum and Rindfleisch, we have discussed some of the potential tasks to be included in a grant proposal. A number of interesting "engineering type" tasks have been identified; however, no new tasks with high scientific content has been suggested to date. A condensation of ideas put forth during the past few weeks is presented below.

The theme of a follow-on proposal could be the integration of computing services in a medical center. Specifically, the problem of the 1970's is to plan and implement a more global system design. In the 1960's, a number of individual applications were designed and implemented. A problem experienced nationwide in Medical Center settings has been the development along totally independent lines of the following elements:

1. Hospital Administrative Data Processing.

2. Interactive computing for research support.

3. Realtime data acquisition and control.

4. Small machine support (language, assemblers, simulators, store and forward mechanisms, and communications).

5. Networking to computers and terminals remote from the Medical Center installation.

6. Data Base Management Systems (like Hospital Information).

7. Development and incorporation of new hardware and software techniques in computing.

Each of these areas has been treated autonomously in the past by most organizations. To build highly integrated and highly sophisticated computing systems in the future, we must provide mechanisms which can produce global planning and coordination. The current environment promotes acquisition of small systems dedicated to a specific task performed according to the wishes of individual groups. Future integration will call for development of intercommunication among machines, super organized file structures, and a relatively high degree of management and coordination.

The network thinking entails the acquisition of hardware similar to the T.I.P. as produced by Honeywell for the ARPA Network. Services from other computer centers around the country would be used through the T.I.P. In addition, PL/ACME services would be offered to medical users throughout this region or some broader

geographic area. Bill Raub has expressed specific interest in determining the feasibility of offering ACME realtime support and small machine support to remote users on a network basis.

Realtime data acquisition and control constitutes an integral part of the small machine support plans as viewed by ACME staff. The current ACME realtime support is too slow, insufficiently supported, and unable to provide responses to demands at predictable time intervals. These problems reflect both hardware and software shortcommings. A front end processor is envisioned which could handle a considerable amount of communications activity in addition to store and forward mechanisms and improved process control functions.

Of the elements listed on Page 1 of this memorandum, Item 6, Data Base Management Systems, is the least well defined. Although the Hospital desires to move in the direction of transaction handlers and file manipulation routines, the specific needs and desires of the Hospital are not well documented. Furthermore, I am not aware of any faculty member who has expressed strong interest in working on this problem. I have however observed a number of faculty persons creating data bases in their clinical laboratories and outpatient clinics. Each of these is developing systems which bear little if any relationship to any other system within the Medical Center. Integration of the overall computing resources could provide very specific guidelines for Data Base Management Systems. In this manner, individual sub-systems could continue to be developed so long as the constraints of the overall global management system design were met. To proceed along any other path at this time will result in a very major conversion job in the future when we attempt to combine a host of independent sub-systems into one workable Hospital Information and Medical School Information System.

The seventh element in the list on Page 1 involved development and incorporation of new hardware and software techniques in computing. This ambiguous statement relates to computing techniques such as continuous system modeling programs. Interactive modeling of physiological systems is an example of the work contemplated here. Another example would be better use of alphanumeric cathode ray tube devices for medical applications. The third example would be improved use of the analog data collection feature of the Loma Linda Graphics Terminals.

I've listed above some of the ideas which could be incorporated into a new proposal. The key to the proposal must be the global planning of computing at the Medical Center, strong small machine support, and network capability. Perhaps some additional items will come up in our discussion with Bill Raub on April 3.

RDJ/ma

cc: Chuck Dickens

P.S. A sizable effort has been proposed by Gio Wiederhold titled "Beyond LISP" which is attached.