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Computers and Interdisciplinary Research

Faculty at the University of Illinois at Urbana-Champaign say that their university is on a roll. During the past year their institution has received a combination of large-scale support. The National Science Foundation selected this Illinois campus to be the site of one of four National Centers for Supercomputing Applications and will supply \$43 million over a 5-year period. Arnold O. and Mabel M. Beckman have given \$40 million for a building to house a Beckman Institute. The state of Illinois has made a number of commitments in support of the National Center for Supercomputing Applications, the Beckman Institute, a Center for Supercomputing Research and Development, a Microelectronics Center, and additions to the Digital Computer Laboratory. Immediate new state commitments and appropriations for these purposes total about \$50 million, and more support has been pledged.

The Microelectronics Center will ultimately be housed in a new building. However, it is already a leading university laboratory for research on compound semiconductors such as gallium arsenide and other 3-5 combinations. It has been successful in the epitaxial growth of gallium arsenide on silicon substrates. Efforts at the Center for Supercomputing Research and Development are devoted to the development of supercomputers with novel architectures and operating systems. This activity, directed by David Kuck, is regarded as one of the best efforts of its kind.

The National Center for Supercomputing Applications (NCSA) is rapidly becoming operational. A Cray X-MP24 has been received and will soon be fully operational. Time on it will be made available to users nationally. The Illinois campus will get its share of time, and already work stations with good computer graphics have been installed as well as connections to other buildings on campus. Supercomputer capabilities will be upgraded every year or two. The sequence of Cray X-MP machines will have two, four, eight, and finally sixteen processors in 1990. By then, the intent is to have a machine 50 to 100 times as fast as a current Cray-1 supercomputer. Larry Smarr, director of the NCSA, has established an Intellectual Center that will bring together some of the nation's best physical and natural scientists and computer engineers, social scientists, and computer professionals.

The Beckman Institute will be housed in a building that is expected to be ready in 1988. Many decisions must still be made concerning design of facilities and governance of this Institute. However, some of the essential decisions have been made and were part of the basis on which the Beckman gift was made. A key objective of the Institute is to foster interdisciplinary research. And it will consist of two centers: a Center for Materials Science, Computers, and Computation and a Center for Biology, Neuroscience, and Cognition. It is contemplated that in each center there will be a continuous transition from research on the atomic and molecular levels to systems of increasing complexity and higher levels of organization. Efforts will be made to ensure that the investigators at the two centers will interact. Indeed, in its proposal to the Beckmans the university stated, "We pledge ourselves at the outset to the creation within a state-of-the-art facility of an integrated array of research efforts that will make the Beckman Institute a model for forefront interdisciplinary research in the world...."

On the basis of a history at other universities where efforts to maintain interdisciplinary research often failed, it would be easy to scoff at the plans at Illinois. However, the university has a good record in interdisciplinary activities, and many of the future opportunities in research lie in complex phenomena requiring an interdisciplinary approach. In addition, members of the Beckman Institute will find common ground in their mutual use of excellent computational facilities. Finally, there is the morale factor. When you are on a roll, success breeds success.—PHILIP H. ABELSON