IAIMS: an overview from the National Library of Medicine

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The Integrated Academic Information Management System (IAIMS) Program was, and is, the right thing to do. It has been a significant initiative and notable success in developing organizational mechanisms to manage the knowledge of medicine. It has placed health science institutions in the forefront of information systems integration and communications networking. Results to date are starting to have a positive and observable impact on research, patient care, and education. It is catalyzing important changes in basic institutional behavior. IAIMS institutions are models for furthering the spread of planning, designing, and managing large-scale, institution-wide integrated information networking programs. These institutions are now well positioned to utilize new technological advances and to meet the challenges of developing regional and national IAIMS programs. It is remarkable how much our ideas about what can be done to improve health science information management have changed in only ten years.

The concept of integrated academic information management was originally described in a 1982 study report developed by the Association of American Medical Colleges (AAMC) and sponsored by the National Library of Medicine (NLM). The study united NLM's questions about how to meet the information needs of health professionals with the emerging reality of the potential benefits of computer and communication technologies and with the value of strategic planning for the better management of health science centers. The report recommended that the libraries should be leaders by supporting the development of prototype information network systems, programs that encourage the rapid integration of information technologies in health professions, education, and practice, and programs that attract and retain qualified people in medical information and knowledge-base development in academic centers.

In response to AAMC's recommendations, NLM requested proposals to begin IAIMS planning, and four institutions received contracts in the fall of 1983. Shortly thereafter, in 1984, NLM initiated the IAIMS grant program and announced the availability of awards as a part of its extramural programs activity. Grants provided assistance for three sequential phases of IAIMS activity: 1) institution-wide IAIMS planning, 2) IAIMS model development and testing, and 3) full-scale institutional implementation of IAIMS projects. In general, planning awards were for two years in a total amount of about $250,000, and model development awards were for three in a total amount of $1,200,000. Full implementation awards have been for five years; the dollar level has been capped at $750,000 for each year.

Interest in the IAIMS concept and grant program has been high since the beginning. Through the end of 1991, seventy applications from forty institutions have been reviewed for funding of one or another phase of activity. From among these, thirty-one awards were made to seventeen institutions and organizations, and five of these recipients are currently engaged in Phase III full implementation (Table 1). Unfortunately, grant resource levels have been less than projected; not all worthy applications have received support, and some institutions have not applied because they know that limited funds make for a low probability of a grant award.

Although NLM has been able to fund fewer programs than had been anticipated, the stated IAIMS program goals to have operating programs have been largely achieved. As described in the other IAIMS articles in this issue of the Bulletin, IAIMS are in operation at a number of sites and have evolved along significantly different lines, although there appears to be a trend toward a convergence of objectives and types of solutions as the various systems mature. In a larger context, what is happening at these institutions and at other IAIMS sites has been extremely influential. It appears that the majority of health science centers are beginning to examine the role of information in their institutions, and many are investing resources in systems development and networking. The term IAIMS is becoming a generic acronym for the carefully planned information system.

Table 1
IAIMS awards made through fiscal year 1991

	Phase I planning	Phase II model- ing	Phase III imple- menta- tion
Columbia University, New York, NY	+	+	+
Georgetown University, Washington, DC	+	+	+
University of Maryland, Baltimore, MD	+	+	
Baylor College of Medicine, Houston, TX	+	+	+
University of Cincinnati, Cincinnati, OH	+	+	
Duke University, Durham, NC		+	+
University of Utah, Salt Lake City, UT	+	+	
American College of Obstetricians and Gynecologists, Washington, DC	+	+	
Johns Hopkins University, Baltimore, MD	+		
University of Pittsburgh, Pittsburgh, PA	+	+*	
Dartmouth University, Hanover, NH	+		
Harvard University, Boston, MA	+		
University of Michigan, Ann Arbor, MI	+	+*	
Rhode Island Hospital, Providence, RI	+		
Oregon Health Sciences University, Portland, OR	+	(active contract)	
University of Washington, Seattle, WA	+		
Tufts University, Boston, MA	+		

* Partially funded.

That the original intent of placing the libraries at the center of IAIMS operations has been realized in only some of the programs is hardly surprising in light of the huge cultural diversities among the various IAIMS institutions. Access to reference material and other information traditionally associated with libraries, however, is a constant feature of all the programs.

Since 1982, much has been learned about designing and operating integrated information systems, and much has changed in available technologies. The IAIMS Program needs to be adjusted to reflect the experiences learned, to take advantage of accomplishments made, and to permit continued progress in meeting the new opportunities and challenges that are arising. Discussions over the past year with IAIMS grantees and advisors to NLM suggest that the three phases of grant support are no longer required. As the idea of institutional information networking is no longer new, the need for a separate introduction and demonstration period no longer makes sense. Indeed, recent applicants have typically more advanced levels of preparation at both the Phase I and Phase II levels. Given these higher levels of preparation and the ability of institutions to move more quickly in developing what are no longer new ideas about information systems, a two-phase support program now appears to be a better design. The first phase of a revised IAIMS program might, perhaps, support planning and also initial systems operation

to show institutional readiness for full IAIMS deployment. The second phase would support institution-wide implementation as previously supported in Phase III.

For some years now it has been observed that creating an IAIMS activity within an institution causes a unification, or at least an association, of diverse efforts to address information issues. Particularly useful has been the affiliation of projects with IAIMS development. Certain research, such as NLM's Unified Medical Language System studies, is an obvious companion to integrated information systems development. Other kinds of research, from innovative educational programs development to investigations of computerizing the patient record, also benefit IAIMS activity, and such relationships should be encouraged.

Another exciting relationship deserving of attention and encouragement is the beginning of collaborative efforts by a number of the IAIMS grantees. Initiated in 1989, the IAIMS consortium now has a dozen members who explore ways to improve intellectual and technical exchanges between the member sites. The consortium promises to accelerate greatly the developmental efforts at each cooperating IAIMS site and may provide a mechanism for increasing the transfer of IAIMS experiences to nonparticipating health science institutions. Certainly the exchange of personnel on limited internship programs would address a continuing and critical deficiency in attempts to expand the IAIMS initiative to other health science institutions.

As has been noted almost from the beginning of the program, a major hindrance to IAIMS progress is the critical shortage of experienced personnel at all levels of IAIMS activity. Knowledge is being gained on-the-job, but this is an inadequate way to meet the increasing demand for IAIMS staff. One AAMC recommendation was to support programs that will attract and retain personnel in working for IAIMS sites, but that has not especially helped other institutions who needed help in developing IAIMS projects.

There is another AAMC recommendation that has not been acted upon with any real effort that, if begun now, may provide new opportunities for advancements in networking and information integration. It was recommended that the federal government and industry should work together to support the application of state-of-the-art information technologies in the health sciences. Now that IAIMS programs are established, such collaborative arrangements with industry could be highly productive.

The future for the IAIMS concept will be one of growth. First, the power of computers and telecommunications to provide facile access to the myriad sources of information essential to decision making is much more widely appreciated by administrators,

health care workers, and researchers in 1992 than in the dawn of the IAIMS initiative. Integration of information systems is becoming widely recognized as essential infrastructure for the level of information processing demanded by today's health care system. Initially the hobby of a few futurists, IAIMS projects are now important agenda items for chief executives, deans, and hospital administrators at a number of medical centers.

Second, the stirrings of nationwide interest in the computerized patient record have enormous implications for IAIMS. Although a computerized patient record system per se is not institutional IAIMS, the integration of multiple databases necessary to create a computerized patient record inevitably requires creation of a mini-IAIMS for hospital and clinic. This particular form of IAIMS has fascinating potential for addressing otherwise unmanageable issues of quality control and health care costs.

Linkage of such a hospital-funded system into library, medical school, and administration information systems is a natural evolution, which will produce IAIMS de facto at centers that seize the opportunity.

Third, the potential importance of the federal government's High Performance Computing and Communications (HPCC) initiative to IAIMS can hardly be overestimated. The ability to transmit huge amounts of information at extraordinary speed, and the related upgrading of Internet to NREN (National Research and Education Network) will enable the eventual creation of a nationwide IAIMS, a system of information access that can transcend the borders of the medical centers to reach out to all engaged in health care activities. In the near future, it will be a practical matter for medical libraries, no matter how small, no matter how remote, to enjoy the same access to information now available only to our largest medical institutions.

NLM is designated as the lead biomedical organization in HPCC and has plans for a host of intramural and extramural HPCC programs as funds are made available. The opportunities provided by HPCC for fructifying biomedical information are fascinating: on the horizon are remarkable developments in molecular biology computing, digital imaging, rational drug design, availability of diagnostic images, intelligent gateways to retrieve information from multiple life sciences databases (the Unified Medical Language System is relevant to this), and important innovations in educational techniques.

NLM will be heavily involved in such projects, as well as in facilitating connections between medical libraries and Internet, and in providing for training the informatics researchers and information managers needed to exploit fully this amazing new technology. However, it profits little to create such marvelous possibilities if we do not develop an information distribution system capable of reaching those who need to know: this is what IAIMS is all about. HPCC, perhaps more than any other factor, will give a national mainstream priority to integrated information networks.

NLM will continue to foster the development of IAIMS with judicious awards but is gratified to see how rapidly broad support for IAIMS-like systems (whether called IAIMS or not) is developing. IAIMS, which began as a visionary project of the National Library of Medicine, has become incorporated into national strategies for the development of science and technology across the United States.