

*Symposium* ■

## IAIMS: Planning for Change

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**Abstract** The success of IAIMSs and other information technology plans depends to a great extent on the fit between the planning process and the nature of the organization. Planning processes differ as a function of both plurality of goals and the degree to which technology or the external environment changes. If all members of an organization share a common goal and the organization is in a relatively stable environment, the classic “plan, prototype, implement, evaluate” process may be appropriate. Most health care organizations are not consistent with this model. The components of the organization may have different goals, and both the health care environment and roles for technology are changing rapidly. In these circumstances, planning takes on a different light. This paper outlines approaches to IAIMS planning in various environments and provides a framework for IAIMS planning in rapidly changing environments.

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Virtually all members of the health care community support in rhetoric comprehensive and effective information management systems consistent with the vision of the IAIMS program of the National Library of Medicine. Yet only a few individuals associated with planning for these systems express satisfaction with their own planning processes. Planning, it seems, is hobbled by frustration, ineffective communication, lengthy and nonproductive meetings, and, often, an outcome far less promising than the dreams and visions one has when embarking on a planning process.

This brief essay argues that the method and outcome of planning will depend greatly both on the extent to which members of an organization share similar goals and on the extent to which planning can be conducted in a stable environment. All of the possible four combinations of goals and environments require different types of planning. Given a realization of these differences, one can examine an IAIMS in relation to planners, visions, functional organizations, and benchmarks. From these perspectives, it is possible to develop a number of “rules of the road” that may be helpful to those embarking on IAIMS-planning tasks.

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### Matheson and Cooper's Vision

In the 15 years since the publication of Matheson and Cooper's seminal paper,<sup>1</sup> the climate of academic medicine has changed dramatically. Their publication occurred near the end of an era of prosperity in academic medicine characterized by plentiful clinical and research funding, a faith in a clear and constant technologic vision, and the spirit of abundance and cooperation that is so easily achieved when times are good.

The Matheson and Cooper report has stood the test of time. They correctly identified a threatening fault line within the substrate of academe: information technology was not being used to unite disparate academic and clinical units into the seamless whole that had been characteristic of the smaller medical enterprises of previous eras. They anticipated an era of standards and unity that is the goal—if not the reality—of the modern academic enterprise. But, like most of the academic leaders of that era, they failed to anticipate the rise in influence of managed care and proprietary medical concerns and accordingly assumed that their vision would emanate from the dominant source of medical power in earlier decades—the school of medicine residing within a larger academic medical center. And given the importance of organizational memory and the relative sophistication of information technology in libraries relative to the rest of the academic medical enterprise, they reasonably concluded that the medical library would play a central role in the realization of their vision.

The ensuing decade has caused us to revisit the environment in which the Matheson–Cooper vision originated. Facing what some believe to be the decline in the glory of academic medicine, professionals and patients alike are calling into question the premises upon which our great institutions are based. The shrinking research support in academe has only compounded equally substantive declines in clinical revenues and near-catastrophic financial judgments against medical schools for alleged noncompliance with Medicare billing guidelines. Medical schools, when they do not face bankruptcy, often now owe their survival to potentially compromising relationships with publicly-held health care conglomerates. The schools' teaching census is shrinking, and they are not yet prepared to translate a century of hospital-based educational practices into the ambulatory care setting.

On the technology front, issues are in a similar state of dramatic change. Technology is so available, prevalent, and rapidly changing that virtually everyone can "own" sophisticated information systems and achieve access to discordant sets of resources. The rapid pace of evolution has brought with it the notion of the "Web year"—generally considered a period of two or three months—in which the pace of change usually experienced in a calendar year has been accelerated at least fourfold. With this rapid availability come many good things, but often at the expense of any ability to control or coordinate. It is a world where local optima rule even at the expense of the global good and where the "prisoner's dilemma" is the normal state of affairs. The modern, technologically advanced medical school is a symphony composed only of conductors; it is a mildly chaotic, churning force radiating new insights but only infrequently turning these insights into effective plans for economic or political action; it is not the world in which strategic planning can be easily introduced.

It is for this reason that we revisit the notion of information technology and planning in the current era. Given a clear sense of mission, information technology is essential for coordinating complex activities, effectively executing complex processes, ensuring "no-excuses" total quality, fostering collaboration, and developing a growing body of organizational knowledge. Few, if any, individuals, would argue against these activities as vital to the sustenance of our great educational institutions, and most, it is believed, are relying on information technology, and information technology planning, to ensure their survival and prosperity.

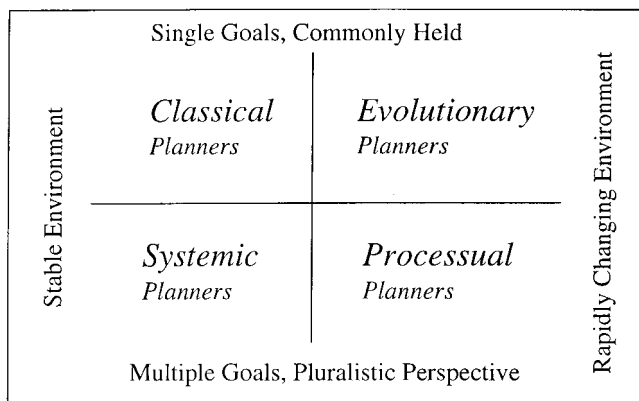
The Integrated Advanced Information Management System (IAIMS) approach is a means by which organizations can address their information needs in a comprehensive way. Such a treatment seems essential to meet our obligations to pursue research, educate students, treat patients, and, ultimately, provide the type of health care systems that we too will need when we become ill. It is simply too important to do poorly and, hence, it is reasonable to believe that effective planning can minimize our risks and maximize the likelihood of successful outcomes. One question must be asked, however: Is it really possible to plan for IAIMSs in the current environment?

To answer this question, we must remember that a plan is many things. It is often used synonymously with the word "strategy"; it is a process carried out by people; it is a method for achieving a goal; it is a mental formulation; it is a means of providing direction for tactics and operations; it is a means of bringing disparate actions together into a coherent framework; and, if done well, it can at times make the expensive affordable, and the near-impossible realizable.

## Planning Styles

The inward, all-absorbing emphasis placed on IAIMS planning by the core planning group will differ greatly from the views of those for whom the plan is intended. Faculty, students, staff, and patients are concerned with their own predicaments and will judge the IAIMS primarily by the extent to which integrated information technology adds quality to their lives. Until real results can be demonstrated, it is necessary for IAIMS planners to articulate their visions and processes within a perspicuous framework. Generally, it seems important to define the institutions and areas to be served by the IAIMS (the "where" of planning), the people for whom the plan is intended (the "who" of planning), the strategies that will be pursued (the "what" of planning), and both the tactics and the operational methods to be employed (the "how" of planning).

This writer suspects that much of the success or failure of IAIMS planning efforts is a result of finding an appropriate match between the comprehensive IAIMS planning processes and the character of the institution. Much theory in strategic thinking supports the notion that planning approaches and outcomes depend critically on plurality of goals and pace of change—two characteristics that may to a large extent explain the diversity and strengths in American medical institutions<sup>2</sup> (Fig. 1).

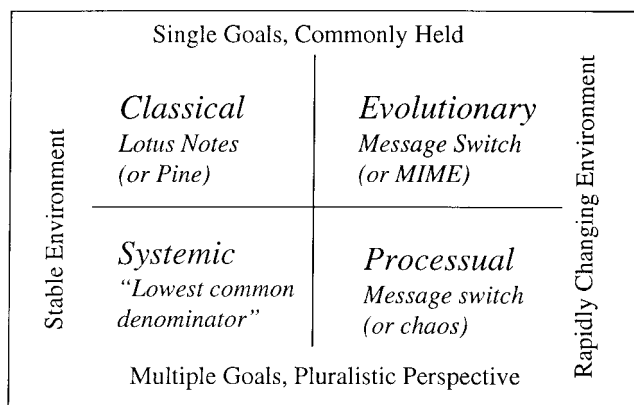


**Figure 1** The approach to planning depends on both the stability of the environment and the extent to which members of an enterprise pursue one or more possibly competing goals. (Adapted from Whittington.<sup>2</sup>)

### The Classic Planner

A reading of the early IAIMS planning literature suggests that an IAIMS would be implemented in an environment where institutions shared a common and coherent set of goals and a technology environment that, if not stable, certainly suggested a coherent and fiscally predictable future. These institutions—often smaller schools that owned their hospitals—seemed well suited for the “classic” notion of IAIMS planning. Very much akin to a planning process familiar to Alfred Sloan and other great industrialists of the fifties, “classic” planning paradigms assumed discrete boundaries between the “planning,” “model,” and “implementation” phases. (Indeed, early IAIMS requests for proposals clearly identified the amount of time institutions were expected to remain in each phase.) Like General Motors, some early IAIMS planning institutions had strong hierarchical governance models and a “general” in charge of all aspects of the IAIMS.

In general, “classic” IAIMS plans had simple, clear, and consistent outcomes in mind. They were deliberative and “top down,” often with a militaristic tone. The process as a whole was the sum of a distinct set of highly ordered components. Such planners no doubt used terms such as “in charge,” and “do not deviate from the plan.” Some technology issues—electronic mail, for example—could be solved by fiat. One simply imposed a common e-mail system on all members of the organization. This approach is still popular in hospitals and other health care organizations, but, as is discussed below, it is not clear that it remains the most constructive tactic for all institutions.



**Figure 2** An example of the influence of planning paradigms on technologic approaches to e-mail. Monolithic institutions embarking on a classic planning approach can implement a nonstandard but uniform e-mail system. If, however, these institutions later become part of a larger enterprise in a more rapidly-moving environment, an evolutionary or processual approach will be necessary, and, in these circumstances, newer technologies such as e-mail message switching may be advantageous.

### The Systemic Planner

A second form of planning is necessary when an organization composed of individuals with different goals is addressing a stable (or at least predictable) near-term future. This appears to be the dilemma faced by large, heterogeneous, research-based medical schools that attempted to address IAIMS in the early years of the NLM program. Planning in the classic sense was felt to be possible if only the disparate goals and complex social systems could be interwoven into a coherent and unified framework. Such a framework, often called a systemic approach, would allow individuals to pursue local goals while still providing benefit to the whole of the organization. In areas not requiring a common technologic base, such an aim was possible because the benefits (be they measured in publications, extramural grants, clinical revenues, or legislative appropriations) were simply the sum of the benefits conferred on the individual components of the organization. (For example, the net clinical revenue of a school was simply the sum of the net revenues of the components, less overhead and other common expenses). These are organizations in which there are few interdependencies, and an adverse event in one component will not have a deleterious impact on any other component.

Unfortunately, technology had not yet evolved to allow each component to achieve maximum benefit while maintaining a global coherence. Electronic mail,

for example, only broadened the schism between administrative computing services and research-based computing services. The former often used proprietary e-mail systems such as IBM's PROFS or DEC's All-In-One, while the latter favored generic UNIX mail or generic VMS-based e-mail systems. Even at the networking level, the protocols of the two groups were not compatible, and neither group rightfully wanted to change; each had too much invested in other software supported by its unique computing environment. The rhetoric of the various parties paralleled the split between administrative and research computing. When discussing infrastructure, one often heard phrases such as "I work for a university; don't tell me what kind of software to use" and "I'm just trying to do the right thing for my patients but the administration is imposing a useless and costly information system on me."

### The Evolutionary Planner

Even those institutions previously structured along "classic" planning lines have been forced to change their approaches with the rapid evolution of technology and dramatic decrease in health care and research financing. On the technology front, progress is now measured in "Web years"—periods generally corresponding to only a few months. On the health care delivery front, legislatures change laws far more quickly than software engineers can change the computer infrastructures required to accommodate the changes. (This phenomenon is not unique to health care; it has also been noted recently in areas as diverse as means testing for welfare recipients and auditing computer-generated income tax forms.)

Planners operating in this environment are sometimes considered "evolutionary" planners. They see no clear long-term path and observe that the environment often changes far more quickly than one can change the plan. In these environments, only the fit survive, and "early winners" are used as models for future technology directions. (In the field of consumer electronics, for example, it is said that Sony introduced over 160 different models of personal portable tape players in order to better understand consumer preferences.)

IAIMS planning and management in this environment consists of creating a climate where a diverse set of low-cost "experiments" can be conducted and in which a community can quickly abandon failures and converge on more promising directions. Leadership remains a strong requirement in this environment, simply because all parties share common goals and are willing to accept the need for a leader to control costs,

oversee a selection process, and allocate resources in a manner most likely to benefit the overall organization. Electronic mail delivery in such an environment is best done by simplifying connectivity between disparate systems and creating incentives for migration to e-mail systems with more functionality. Large companies that both acquire and sell off various divisions, for example, often use message-switching software to integrate disparate mail systems. Anecdotally, it appears that over time the Babel of disparate mail systems abates through natural evolution (Fig. 2).

### The Processual Planner

Even evolutionary planners, however, benefit from a common goal (e.g., profit maximization) or a size that allows for a relatively hierarchical and coherent administrative structure. Very large and distributed academic health care centers do not share this luxury. They face the same environment of rapid change but also represent very heterogeneous constituencies with differing goals. Evidence for this environment is found when there are large functional differences between preclinical and clinical departments, or when a medical school and a hospital are in disagreement over fundamental policies.

Planners in this environment are called processual planners, because they understand the futility of long-term centralized planning and instead focus on pursuing the best of a limited number of options before them. Opportunistic planners share with the evolutionist the belief that opportunities are more the result of exploiting success than of creating programs a priori. Strategy, to the opportunist, is discovered in action, and coherence emerges as common themes become apparent.

Fortunately, most major corporations—in commerce, finance, service, technology, health care, or education—face environments in which the external environment is changing rapidly and internal goals are more pluralistic than monolithic. The suggestion that the word represented by the "A" in IAIMS should be changed from "Advanced" to "Area" in part is a recognition that the problems of distributed and rapidly changing organizations require a perspective different from that of an "academic" or "advanced" information systems planner. From a technologic perspective, open systems architectures, standards, component-based software, and other common technology infrastructures are available to allow these organizations to achieve global gains.

Electronic mail deployment and support again serve as an example of the task facing the processual plan-

ner. Added to the evolutionary planners' need to accommodate rapid technologic change, the processual planner must also create an environment in which different parties can explain to one another why their disparate e-mail systems are optimal for them. Some groups, for example, believe the added cost of security and encryption is unnecessary, while other groups find the same features vital. The processual planner achieves progress by providing all groups with the information needed to allow convergence when possible, and respect for differences when necessary.

### **The Generic Components of an IAIMS Plan**

IAIMS planning applications generally have a distinct set of components. Early in the document one reads descriptions of the institution, its mission, its governance, and its current information management resources. This information is followed by a listing of contributing individuals representing a broad cross-section of the enterprise. Applications often then include a vision or IAIMS-goal statement and argue how the IAIMS planning process will advance achievement of the goal.

The strategies and tactics proposed to achieve the planning goals generally require a partitioning of planning along a number of functional areas. Generally, specific groups address educational needs, clinical needs, research needs, and network infrastructure. Outreach and community-based or area-based strategies are also generally addressed. Planning documents often then propose processes planning groups will use to achieve the desired outcomes, and they address relevant planning benchmarks as well as the critical coordination of all activities into a single, coherent, and effective plan of action.

Many authors emphasize that planning is a means to an end and not an end in and of itself. The sustainability of the planning process and its execution are paramount. Accordingly, some proposals address how the planning process will lead the development of self-sustaining organizations and technologies that will be driven by institutional exigencies and resources. A good IAIMS plan should be so attractive to the community served that it will be realized in an implementation phase with or without extramural support. IAIMS planners rise in the morning wondering how to make their plans more effective in the short term, and, in the long term, focus their energies on the development of a broader group whose members will in the near future rise in the morning focused primarily on sustaining the initiative over years to come.

### **The Planners**

Recognizing differences between unanimity of goals and pace of change, it is possible to identify separate components of effective IAIMS plans and to examine how local conditions would impact any given component.

The most important component of an IAIMS plan is the presence of planners who understand their institutions, the challenges faced by their constituents, and the resources available to meet these challenges. In general, the core IAIMS planning group is composed of a small group of people who are closely affiliated with the principal investigator(s) and a larger group of individuals who represent the scope of positions associated with formal and informal organizational influences. Many individuals are at the level of associate dean, associate vice chancellor, director, or chair. Others are influential core faculty. The highest levels of leadership—deans, university presidents, health care system presidents—are not generally involved, but unless these people both understand the importance of information technology to their enterprise and demonstrate their understanding in their words and actions, they are more likely than not to preside over the failure of both formal IAIMS proposals and other great opportunities to advance their institutions.

### **The Visions**

IAIMS plans often have a "vision statement" that best embodies what the organization wishes to achieve. The original Matheson and Cooper vision addressed the value of information exchange, and some parts of the vision have withstood the change of time quite well. The University of Virginia IAIMS discusses an "Electronic Academical Village"; the University of Missouri employed a retreat format to develop a vision; and the formulators of the Vanderbilt IAIMS proposal complemented their vision with several highly effective videotapes identifying how information technology would change the daily lives of the practitioner and the patient.

Visions are important because they describe what the IAIMS is about. By their very nature, vision statements avoid immersing the uninformed into technical implementation issues of little direct interest to anyone other than the technician. An effective vision can allow each member of a target audience to reify the vision in a way that seems most consistent with his or her individual needs. Visions are catalytic, but their power soon wanes if IAIMS planners cannot turn them into coherent plans of action.

### Functional Organization

IAIMS planning processes usually create subgroups along functional lines. One group usually addresses clinical issues, another addresses educational issues, a third addresses administrative information management, a fourth addresses libraries and other forms of organizational memory; a fifth addresses traditional biomedical research; and most also address specific informatics research activities. Within the past several years, IAIMS funding processes have also allowed for the support of IAIMS “trainees,” and this program has been met with enthusiasm by most IAIMS planners.

Once subgroups are identified, the IAIMS core planning team often finds itself “herding cats”—particularly in “systemic” and “processual” approaches. Such approaches—increasingly the norm rather than the exception—require knowledgeable leadership, with an ability to debate the opportunity costs and strategic direction in nonconfrontational ways. Standards—in terms of both technology and cost accounting—are critical to any large-scale IAIMS effort. IAIMS planning processes seem more successful if focus is maintained, following the adage “first things first, second things never.” To maintain this focus, it is important to adapt and to cut losses when necessary—particularly in “evolutionary” and “processual” settings.

### Benchmarks and Outcomes

Over the years in which the IAIMS program has evolved, an increasing emphasis has been placed on benchmarks and outcomes. In the early years, benchmarks seemed to be highly technical (e.g., network coverage) or measured by the ability to deploy a single information technology in a comprehensive way. Network coverage, for example, was a component of virtually all IAIMS planning proposals; clinical information systems were prominent in the Duke and Columbia efforts; and structured document architectures were central to Baylor’s early efforts with the “virtual notebook.”

As time has passed and both technology and institutional priorities have evolved, the benchmarks have changed to meet new demands. A comparison of the Vanderbilt plan with the Duke plan (both under the same principal investigator) shows a transition from a straightforward, local deployment to a regional deployment based on economic and technical models.<sup>3</sup> Return-on-investment studies—critical to initiation of projects in many sectors—are only beginning to emerge, and it is not clear that most IAIMS institu-

tions have yet fully addressed the important need to address the financing of IAIMS implementation and ongoing support.<sup>4</sup> Currently, most return-on-investment studies relevant to IAIMS planning are proprietary; with time, this is expected to change.

### IAIMS Planning “Rules of the Road”

Given the many institutions that have implemented IAIMS plans in diverse settings over more than a decade, one must ask whether any general principles or guidelines have emerged. Although the following suggestions may not represent a consensus view among IAIMS planners, they have been promulgated in some fashion or another by many of the most successful advocates of IAIMS.

#### Rule 1: Know Yourself

The IAIMS is the result of an institution’s ecology and its ability to fit a plan to its unique circumstances.<sup>5</sup> In some instances, IAIMS applicants may have failed to receive funding because they lacked a critical mass of individuals to carry a plan to fruition; in other instances, reviews may have been unfavorable because the institution’s leadership simply was unable to focus on this important area because of competing and equally important concerns in other areas; in still other instances it is possible that planners have not matched the planning strategy with the institutional culture—attempting to impose a classic model on an evolutionary context, for example. It is equally possible that the lack of success of some individuals was due to a failure on the part of reviewers to respect the diversity of various needs and to acknowledge that the “one approach fits all” model is not viable. In the current funding climate, it takes only one or two such individuals in a study section to eliminate the prospect of funding.

IAIMS planners, then, should understand the missions of their institutions. They should understand organizational power and who holds it. They should pursue the traditional “strengths, weaknesses, opportunities, and threats” approach to their own environments, and, from this analysis, determine a general course of action.

#### Rule 2: Begin at the End

IAIMS planners must be capable of generating a vision that represents a customer-focused approach to information management. They must reify the notion of information “anywhere, anytime” in a way that engages their constituents and engenders the patience

that is required when an institution undergoes significant evolution. IAIMS planners must think “win-win” at all times. Generally, success is best achieved when egos are left outside the workplace. Advancing the notion of what may someday happen is valuable because it focuses a group on the results and, in so doing, places the people before the technology.

### **Rule 3: Guess How to Get There**

Ultimately, IAIMS planners must act, with the realization that detailed IAIMS planning is difficult. When initial directions are arrived at, they must be acted on. At some point, one must advance in the absence of compelling data and more on the basis of communal instinct. This appears to be a small part of the overall “fast-track” approach promulgated by Vanderbilt.<sup>6</sup> At many institutions, the spirit of continuous quality improvement has extended into the arena of planning, and, with it, the belief that the planning phase is never completed. On the other hand, successful planning does not guarantee successful implementation.

### **Rule 4: Know When to Change Direction**

Particularly in rapidly changing times like our own, the approach to planning must be more evolutionary or processual. Throughout such transition periods, however, good IAIMS goals are relatively insensitive to change, but tactics and priorities may change more frequently than many find comfortable. When planning in an uncertain environment, one must embrace the adaptive spirit of the Internet, where valuable software ideas are introduced, widely disseminated, and discarded within relatively short periods. Such adaptation is acceptable during planning if it is felt to minimize the risk when programs are initiated, technologies deployed, and people trained. In general, it may be better to embrace the diversity of technologies and changes in the hope that, with proper guidance and coordination, a number of small planning and technology errors are to be preferred over a single, monolithic, carefully planned and well-executed catastrophic misread of an environment.

### **Rule 5: Maintain the Map**

IAIMS planners have been associated with many ste-

reotypes. They are more often viewed as architects than as generals; more often considered facilitators than enforcers. Most often, they are viewed as guides on occasion and map builders at all times. Even if one is not steering the ship, one should know the current location of the vessel, its course, and its speed. IAIMS planners often begin change merely by describing these events, and success sometimes is hastened if others are infected with enthusiasm and take ownership of processes.

At times the mere enthusiasm of the process leads to a successful outcome. There is a possibly apocryphal tale of a foreign military attachment on maneuvers in the Alps that became lost in a snowstorm. After several days of futile efforts to escape, the group members became dispirited and literally gave up and waited for hypothermia to consume them. Suddenly, one soldier found an old map of the mountains in his backpack and, with the map, successfully led his colleagues out of the snow-swept Alps. Only later did the soldiers discover that the map was not of the Alps, it was of the Pyrenees.

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