INFORMATION SYSTEMS PLANNING REPORT
MEDICAL SECTOR

DECEMBER 1986

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I MAJOR ISSUES

- The medical and health care industry sectors have experienced massive changes over the past three to five years. Most of these changes have created equally difficult changes for Information Systems (IS) departments to respond to. The challenges to IS and to smaller organizations implementing automated systems for the first time are no longer simply automation or data processing based, they are now challenges to the core of the business, specifically centered on the institution's ability to compete for patients and for physicians.

- This is further complicated for IS management since the industry has cost pressures from all angles. Thus, IS is squeezed by the pressure to automate to cut costs on one hand and the current pressure to reduce costs, period, on the other. INPUT found a further compounding problem for IS management: a lack of confidence by senior management that IS could accomplish what was required, as well as doubts on the part of senior management as to the benefit or value of IS. This attitude was more prevalent in the smaller institutions than in the large ones.

- These issues and others are analyzed and discussed below.

A. DRIVING FORCES

- The dominant driving force in the medical and health care industry sector is cost. Increasing costs have changed the entire business environment and the pressures to contain costs, in response to both legislation and to market dynamics, are changing the way organizations operate and the way IS supports the organization. As shown in Exhibit I-1, this is one of the driving factors.

- Government regulations from the various regulatory agencies are significant factors in determining the information systems needed for operation. The accounting and reporting systems needed for reporting and reimbursement are large and complex, placing significant demand on IS and ranging from selecting new software to reprogramming old systems to meet the current requirements.

- Another driving force is competition within the industry. Hospitals and other health care organizations are, more than ever, competing for patients and for physicians. From an IS perspective, IS could be the determining competitive factor. For example, if a physician has a choice of using two institutions and one has a system that will allow retrieval of patient records, that institution will have a distinct advantage over the institution that would require bringing patient records from the office.

- This competitive thrust has also spawned increasing pressure on productivity at all levels. For IS this challenge could mean an enhanced role within the organization. However, IS must rise to the challenge and uncover ways to identify, design, and develop productivity improvement systems for all areas of the operation. IS must not react to the productivity pressure by retreating into narrow areas like programmer productivity which, although important, will be of little benefit.

EXHIBIT I-1

MEDICAL
DRIVING FORCES

- Cost Containment
- Government Regulations
- Changing Reimbursement Mechanisms
- Industry Competition
- Improving Productivity

B. ISSUES AND OBJECTIVES

- Exhibit I-2 summarizes the issues and objectives for IS management. The priority for IS organizations reflects the level of priority for the organizations' objectives relative to the issues. For example, the cost pressure issue results in a high-priority objective to contain cost. Additionally, the objective to implement on-line accounting systems is justified primarily to satisfy the regulatory requirements for more complex accounting systems. However, there is, at best, a medium priority objective for the accounting systems to address cost pressures, in this case to ensure receivables are processed and collected expeditiously.

- Nearly all the respondents felt a major objective is meeting budgetary constraints intended to contain costs.

- More complex and complete accounting systems that support DRG and other requirements are stated objectives. The issues surrounding this objective are the apparent lack of application software available from vendors. This further complicates the situation for IS because these systems are needed now.

- Development of ongoing enhancements to patient care systems continues to be a key objective for IS organizations. These systems contribute to the cost effectiveness and competitiveness for the organization. Issues cited regarding patient care systems are confidentiality of patient information and the need for multiple interfaces between patient systems and the pharmacy or the laboratories.

- One area in which IS can demonstrate productivity improvements is that of automating manual processes.

EXHIBIT I-2

MEDICAL
ISSUES AND OBJECTIVES

	Cost Containment	Implement On-Line Accounting for Regulatory Reporting	Improve Confidentiality of Patient Information	Attract Physicians With Technology Innovation	Implement Integrated Patient Care Systems	Support End User Needs
Cost Pressure	High	Does Not Apply	Medium	Does Not Apply	Medium	Does Not Apply
More Complex Accounting Systems	Medium	Does Not Apply	High	Does Not Apply	Medium	Low
Centralized Patient Information	Medium	High	Medium	Medium	Medium	Medium
Provide Automated Tools to Assist/ Attract Physicians	Does Not Apply	Medium	Medium	High	Medium	Medium
Automated Manual Processes to Improve Productivity	Medium	Does Not Apply	Low	Low	High	Medium
Regulatory Reporting Compliance	Medium	Low	Medium	Low	Medium	High

- The regulatory issues are placing a great strain on administrators and on IS. In order to satisfy the reporting requirements in a timely manner, the end users must be supported so they can more directly interpret the regulations into reporting documents for the compliance agencies.

- In summary, the challenges facing IS organizations are to organize the patient information more effectively to satisfy the regulatory and cost issues and to improve the level of integration of this data with the accounting and payment systems.

C. MANAGEMENT PERCEPTION AND ORGANIZATIONAL ISSUES

- Most respondents' management are unaware of the benefits that IS can provide. They perceive IS as solely a cost, primarily because of the late entry of most of these institutions to automation of their nonmedical functions.

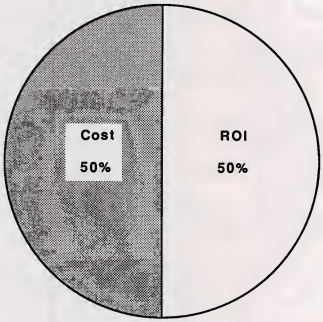
- Respondents measure their performance by performing cost/benefit analyses on major projects and comparing budget expenditures to similar institutions' IS departments. None of the respondents believed that these measurements convinced management that IS is of strategic importance to the institution. Exhibit I-3 shows the measurement techniques used by the respondents.

- The IS departments in the medical sector have become more proactive to user needs. Previously, IS was totally reactive to user demands and poorly funded to meet the information systems needs of the organization. Respondents believe that in the next two years their role will become more consultative and they will provide more end-user access to authorized computer-based information.

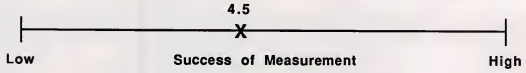
- IS has become part of the corporate planning process in many institutions. It is the first indication that IS' role and status is increasing.

EXHIBIT I-3

MEDICAL
I.S. MEASUREMENT TO MANAGEMENT



Percent of Responses



- The respondents believe IS can be used to improve the institution's competitive position, primarily by providing new, technology-based tools for physicians.

- Exhibit I-4 shows that IS is highly centralized in this sector. Corporate IS controls over 80% of the information expenditures. In 1987, respondents project that there will be a slight shift in IS funding from corporate IS to end users, primarily for microcomputers and end-user systems that are part of the end-user budget.

D. IMPACT OF TECHNOLOGY

- End-user computing has reduced the workload in many respondent institutions. In most cases, however, end-user computing support has existed for only one year.

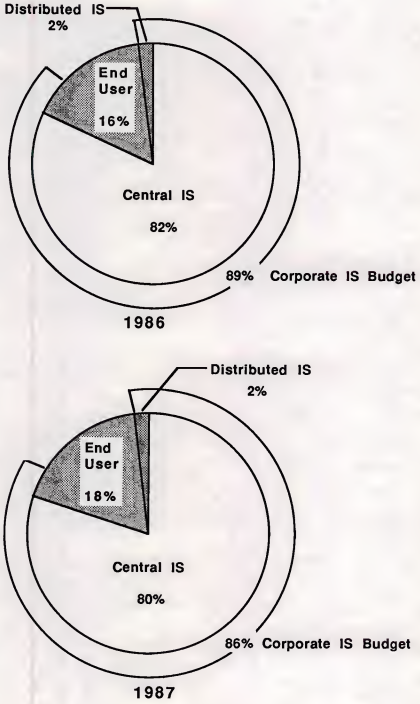
- Departmental processors have a high impact on the medical sector's IS departments. Many hospital departments have their own processors to run scientific applications which, in turn, have the greatest potential for linking with corporate information systems to provide local office automation and administrative support.

  - Some respondents cited the need for interfaces outside the hospital; for example, the need for a link to the physician's office that would allow the doctor to schedule patients or transfer medical records.

  - Hospitals continue to be more interested in new technology for medicine than for information systems. This is a challenge for IS.

EXHIBIT I-4

MEDICAL
DISTRIBUTION OF CORPORATE COMPUTING EXPENSES



Percent of Corporate and Company-wide IS Budgets

- Distributed systems development should also have a high impact on this sector. The availability of departmental processors provides the opportunity to develop local systems that can be used by other units. Coordinating and controlling these efforts is a major management challenge. Most respondents are beginning to plan for distributed systems development; however, implementation of this concept is at least three years away.

- Very few institutions in the medical sector are planning to use relational data bases.

- Merging voice and data is being considered by some respondents, but is a low priority.

- There is a high demand for LANs in this sector. Networks must be established linking corporate and departmental systems. Implementation has been delayed due to a lack of LAN standards.

- Exhibit I-5 summarizes the impact of the above technological issues on IS for the medical and health care sector.

- Additionally, there are indications of the increasing application of existing technology. Among examples cited were:

  - Systems for forecasting cost and supporting cost control programs.

  - Systems that provide more detailed data that, in turn, can be used to justify higher billings.

- INPUT does not expect this sector to be a leader in adopting technology.

EXHIBIT I-5

MEDICAL
IMPACT OF TECHNOLOGY

	IMPACT	COMMENTS
End-User Computing	Low/ Medium	Potential to reduce IS workload. Most just beginning to support end users.
Departmental Processing	Medium/ High	Many departments have their own processors - strategic need to integrate, support, and optimize benefits.
Distributed Systems Development	High	Heavy DDP environment with specialized computing needs.
Relational Data Bases	Low	Low activity.
Voice/Data Integration	Low	Not an immediate priority.
LANs	Medium/ High	Lack of standards is delaying implementation, but the DDP environment requires a well-planned LAN strategy.

E. END-USER COMPUTING

- End-user computing has great potential in this sector. The user community is well versed in the capabilities of computing. Departmental processing is being planned, as is the integration of departmental processors with corporate mainframes.

- End-user support is just beginning in this sector. IS is doing some end-user training through the information center. The emphasis on training is underpinned by the fact that nearly all respondents reported increasing their budgets for training. Typically, respondent IS organizations are training the trainers in the end-user organization.

- Exhibit I-6 summarizes IS' role in microcomputer support.

  - IS establishes guidelines for microcomputer acquisition.

  - The respondent IS departments do very little micro systems development, acting primarily in an advisory capacity.

  - IS primarily trains the trainers in the end-user departments.

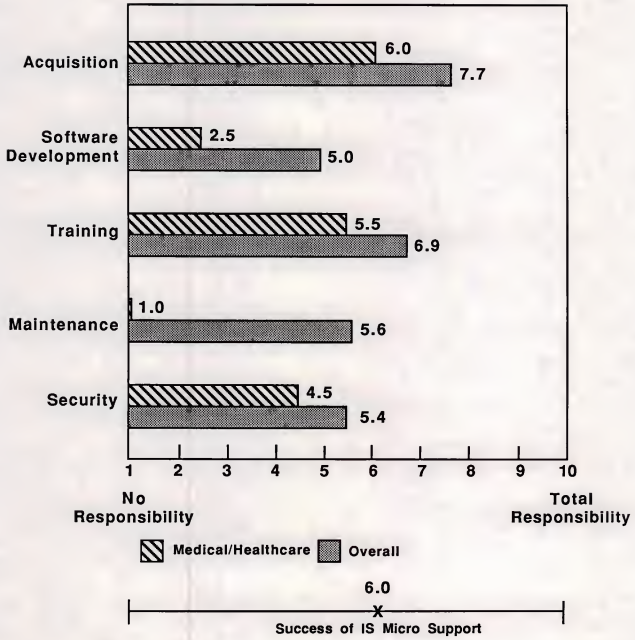
  - IS takes no role in microcomputer maintenance in the respondent organizations.

  - IS establishes security standards for the institution but takes no role in enforcement.

  - Although microcomputer support is just beginning, respondents believe they are providing adequate microcomputer support.

EXHIBIT I-6

MEDICAL
I.S. ROLE IN MICROCOMPUTER SUPPORT



II NEW APPLICATIONS

- The major new applications identified by respondents centered on building a patient information data base and enhancing payment-related systems (e.g., billing, claims, and finance and accounting).

- Contrary to other sectors, the medical and health care sector primarily uses external resources for development since most patient information and payment systems are complex packages. As shown in Exhibit II-1, most institutions interviewed have relatively small development staffs and rely on purchased software packages for major applictaions.

- Exhibit II-1 also lists the most important applications identified by the respondents.

- Most of the new applications planned for 1987 fall within the broad application systems cited above and include:

  - Admissions.

  - Transfer/discharge.

  - Financial planning and forecasting.

  - Patient accounting.

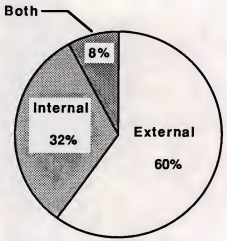
EXHIBIT II-1

MEDICAL
NEW APPLICATIONS IN 1986

Most Important Applications

- Patient Care Systems
- Accounting Systems
- Decision Support Systems
- Payment Systems

Source of Development
(All Major New Applications)



Percent of Responses

Cost Range: $20K - $1,500K

- Specific accounting, e.g., general ledger, accounts receivable.
- Order entry.
- Patient scheduling and modeling.
- Outpatient abstracting.
- Budgeting and budget planning.

- Additionally, several other new applications are planned, including:
  - Nursing schedules.
  - Nursing specialties/training.
  - Materials management.
  - Pharmacy.
  - Radiology inventory control.
  - Dietary system.

- As evidence of the concern regarding having the systems to support the business, one respondent reported they were developing a complete new integrated system for the hospital.

- While hospitals are increasing their expenditures for the purchase of application packages, they are still planning substantial development activities particularly for more complex systems.

- Respondents cited that vendors do not offer comprehensive patient management sytems necessitating them to build their own.

- Systems are being purchased to meet the minimum requirements for regulatory reporting and other requirements, but users are not satisfied with these systems and many expect to develop their own.

III BUDGET ANALYSIS

- The medical and health care sector's IS budgets grew slightly slower than IS budgets in general in 1986 and are projected to grow at a slightly slower rate in 1987. The mix of the expenditures has shifted. For example, some of the upward pressure is a result of organizations planning fairly large increases in their training budgets.

- Although there is an interest in end-user computing and a recognition of the important role microcomputers can play in this sector, the planned expenditures have leveled out after several years of high growth.

- The increasing budget allocation for education and training is part of the professional services budget category which is also budgeted to grow at a greater rate than recent years.

- The leading budget categories in terms of growth from 1986 to 1987 are personnel, external software, and hardware maintenance.

  - Exhibit III-1 shows the 1986 budget distribution and projects the growth of budget categories in 1987.

  - Exhibit III-2 compares this sector's IS growth in 1986 and projected growth in 1987 to the growth rates of IS budgets in general.

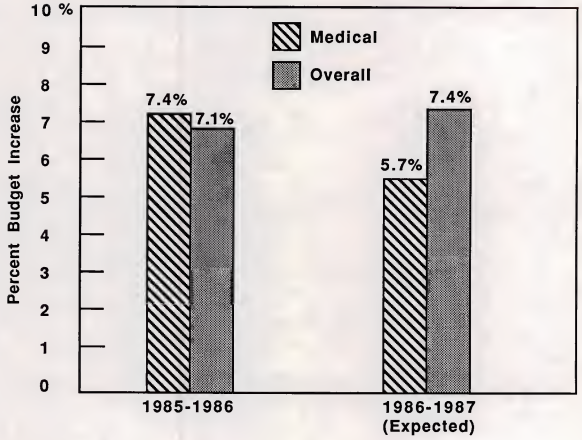
EXHIBIT III-1

1986 BUDGET DISTRIBUTION AND 1986/1987 CHANGES IN THE MEDICAL SECTOR

BUDGET CATEGORY	1986 PERCENT OF I.S. BUDGET	1986-1987 EXPECTED BUDGET GROWTH
Personnel Salaries and Fringes	38.2%	7.5%
Mainframe Processors	7.9%	3.1%
Minicomputers	5.5%	3.0%
Microcomputers	2.6%	6.5%
Mass Storage Devices	3.3%	4.8%
Other Hardware	8.8%	1.0%
Total Hardware	28.1%	3.0%
Data Communications	8.1%	7.3%
External Software	9.2%	6.5%
Professional Services	.4%	8.0%
Turnkey Systems	2.9%	0.0%
Software Maintenance	1.0%	5.2%
Hardware Maintenance	5.8%	7.0%
Outside Processing Services	0.1%	2.1%
Other	5.2%	7.0%
Total	100.0%	5.7%

EXHIBIT III-2

MEDICAL
I.S. BUDGET GROWTH



- Although the data is not conclusive, it appears the size of the institution plays a role in budget growth. The very large institutions are providing substantial increases to IS. The medium to large are managing on relatively flat budgets, and the small organizations, responding from sheer necessity, are budgeting IS at slightly increased levels.

- The budget pressure also appears to be contributing to a rift between IS and management. More respondents mentioned "lack of management support" as a factor than in recent years. Given the competitive environment, IS should expect that vendors approaching senior management directly will get a more receptive ear than in the past.

- Nearly 80% of respondents project their IS budgets will increase in 1987, but most believe the budget will grow at a lower rate than 1986 (see Exhibit III-3).

  - Factors contributing to increases in the IS budget include (in order of most frequently mentioned factors):

    . Personnel expense.

    . Hardware.

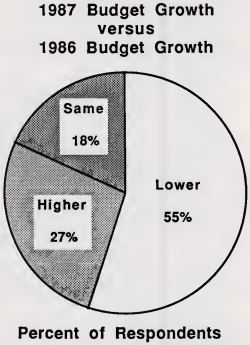
    . Regulatory requirements.

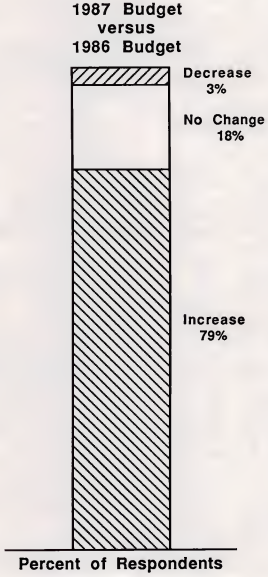
  - Personnel expense has shifted from previous years as a contributing factor to being the dominant factor contributing to increases in IS budgets.

  - The main factor contributing to decreasing the IS budget is management pressure to reduce costs. There are wide variations regarding how organizations achieve budget reductions.

EXHIBIT III-3

MEDICAL
MOST BUDGETS ARE INCREASING AT A LOWER RATE





- The medical and health care sector's IS budgets continue to be more dependent on the institution's revenue and profit than are IS budgets in general. This also continues to create barriers regarding the implementation of new technology.

- As shown in Exhibit III-4, the majority of the budget responsibility is at the corporate IS level.

  - Seventy percent of the respondents have the total IS budget and only 30% have allocated any budgets to the end user.

  - Nearly 99% of the total IS budget dollars are under control of corporate IS, with only 2% actually being distributed.

- Additional analysis of IS budgets reveals the following:

  - The very large users are planning major hardware upgrades as evidenced by substantial increases in their hardware maintenance budgets.

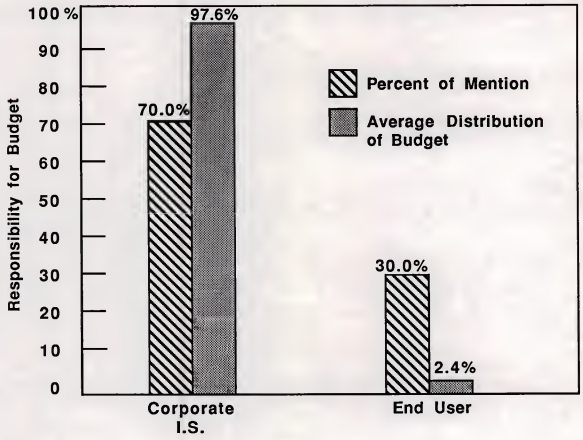
  - Increased software maintenance budgets for many IS organizations also is a signal of increasing expenditures for packaged software.

  - Increased budgets for data communications are substantial when planned. Most IS departments are budgeting for flat levels for voice communications.

- The distribution of the internal applications development staff shows that 32% of the resource is dedicated to developing new systems while 68% is for enhancement and maintenance, equally divided between the two. The range of this distribution shows wide fluctuations between these three major categories. For example, in some cases maintenance accounted for 60-75% of the budget for the applications development staff.

EXHIBIT III-4

MEDICAL
PRIMARY BUDGET RESPONSIBILITY IS AT CORPORATE LEVEL



IV UNFULFILLED NEEDS

- The major need identified is for a comprehensive patient management system. Financial cost/cost forecasting was also mentioned as a need that IS would like to see vendors satisfy.

- Several respondents also indicated a need for better laboratory testing systems. Many indicated the belief that artifical intelligence could benefit these systems in some way.

- Discussion regarding the direction of IS in this sector reveals some additional insights for what the industry would like to see:

  - Wireless terminals to preclude the cost and difficulty of "networking" a facility.

  - Understandable standards for patient care.

  - Small departmental systems (want to get system operating quickly and easier to justify).

  - Far better program development tools.

- The information systems needs within the medical/health sector will continue to be dynamic and will continue to be difficult to satisfy, at least for the next two years.