METHODS FOR SUCCESSFUL SYSTEMS INTEGRATION PROJECTS

INPUT

About INPUT

INPUT is a worldwide consulting and market research firm uniquely focused on the information technology services and software markets. Executives in many technically advanced companies in North America, Europe, and Japan rely on INPUT for data, objective analysis, and insightful opinions to support their business plans, market assessments, and technology directions. By leveraging INPUT's considerable knowledge and expertise, clients make informed decisions more quickly, and benefit by saving on the cost of internal research.

Since 1974, INPUT has compiled the most extensive research base available on the worldwide information services market and its key segments, providing detailed market forecasts, vertical industry sector analysis and forecasts and analysis of vendor strategies and products. INPUT delivers specific expertise in the fast changing areas of outsourcing, systems integration, EDI/electronic commerce, software development/CASE, and on the impact of downsizing.

Consulting services are provided by more than 50 professionals in major international business centers. Clients retain INPUT for custom consulting/ proprietary research, subscription-based continuous advisory programs, merger/acquisition analysis and detailed studies of U.S. federal government IT procurements.

Most clients have retained INPUT continuously for a number of years, providing testimony to INPUT's consistent delivery of high-value solutions to complex business problems. To find out how your company can leverage INPUT's market knowledge and experience to gain a competitive edge, call us today.

INPUT OFFICES

North America

San Francisco
1280 Villa Street
Mountain View, CA 94041-1194
Tel. (415) 961-3300 Fax (415) 961-3966

New York
Atrium at Glenpointe
400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050 Fax (201) 801-0441

Washington, D.C.
1953 Gallows Road, Suite 560
Vienna, VA 22182
Tel. (703) 847-6870 Fax (703) 847-6872

International

London - INPUT LTD.
Piccadilly House
33/37 Regent Street
London SW1Y 4NF, England
Tel. +71 493-9335 Fax +71 629-0179

Paris - INPUT SARL
24, avenue du Recteur Poincaré
75016 Paris, France
Tel. +1 46 47 65 65 Fax +1 46 47 69 50

Frankfurt - INPUT LTD.
Sudetenstrasse 9
W-6306 Langgöns-Niederkleen, Germany
Tel. +6447-7229 Fax +6447-7327

Tokyo - INPUT KK
Saida Building, 4-6
Kanda Sakuma-cho, Chiyoda-ku
Tokyo 101, Japan
Tel. +3 3864-0531 Fax +3 3864-4114

JULY 1992

METHODS FOR SUCCESSFUL SYSTEMS INTEGRATION

INPUT®

1953 Gallows Road, Suite 560, Vienna, Virginia 22182 (703) 847-6870

Published by
INPUT
1953 Gallows Road, Suite 560
Vienna, VA 22182-3934
U.S.A.

U.S. Systems Integration Program
(SISIP)

Methods for Successful Systems Integration

SISPM • 437 • 1992

Abstract

Success in the growing systems integration (SI) market is based on how vendors and users structure their SI relationships. Maturing user sophistication and vendor experiences are promoting stricter contract terms, open communication channels and strong reliance on program management tools and procedures.

This study, one of a series on U. S. systems integration, was prepared as part of INPUT's U. S. Systems Integration Program. *Methods for Successful Systems Integration* documents the approaches to SI program management that users and vendors have found successful jointly and independently. The importance of program manager personnel in both organizations is also stressed.

Critical processes such as change management, problem tracking and risk management are approached from the vendor and user perspectives.

Conclusions and recommendations are offered to both SI vendors and SI buyers on how to reach their common goal: a successful finished solution.

This report contains 124 pages and 51 exhibits.

Table of Contents

Table of Contents (Continued)

Table of Contents (Continued)

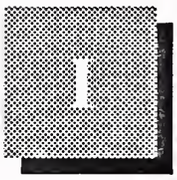
Appendixes

Exhibits

Exhibits (Continued)

V

Appendix A



Introduction

How systems integration (SI) vendors and users structure their program management approaches to an SI engagement is key to a successful relationship and an acceptable solution. Both parties should work together to achieve SI program goals.

Existing SI vendors and new entrants into the market need program management guidance on how to succeed in this growth market. Maturing user sophistication in SI is prompting vendors to reevaluate and strengthen their approach to SI relationships.

The growing systems integration market offers many opportunities for vendors in the information systems and services market. Traditionally, SI contracts have been large in scope. Now, user demands for open systems are creating additional opportunities for vendors, some on a smaller scale. The escalating downsizing trend under way in the market also increases opportunities for vendors.

These trends are influencing the dynamics of the roles vendors and customers play during an SI contract. The roles are not static; they are evolving as vendors and customers learn from their experiences.

INPUT expects these trends to continue. Program management techniques will continue to be the cornerstone of successful working SI relationships for both vendor and customer organizations.

A
Purpose and Scope

Methods for Successful Systems Integration was researched and written to document the management processes adopted by vendors and customers in systems integration contracts. Insight into how both parties structure a relationship that is conducive to responding to change and effective at problem solving is stressed.

The vendor perspective is presented from the point of view of experienced program managers, or their management. INPUT uses the terms *buyer, customer, client,* and *user* interchangeably. End users are referred to specifically, and may or may not be the buyer/customer/client/user.

The report describes the methods and processes used to manage successful systems integration contracts today. Users and vendors were surveyed and are included in this study.

User respondents were selected through random sampling and from INPUT's data base of SI programs. Vendors were targeted for interview based on existing market presence in the commercial and federal SI sectors.

See Appendix A for INPUT's detailed definition of systems integration.

B
Methodology

Telephone interviews were conducted with 16 vendor and 15 user respondents. Only users that had started or completed an SI contract within the past three years were interviewed. One-third of the users were from the federal sector. Twenty-seven percent represented state and local governments. The balance of respondents were spread across other vertical markets. The questionnaires aimed at both respondent groups are included in Appendix B of this report.

C
Report Organization

This report consists of the following additional chapters:

- Chapter II is an executive overview highlighting the findings of this study.

- Chapter III—Systems Integration Program Management—defines program management components; summarizes the phases of the relationship from the vendor and user perspectives; and discusses program management methods, problem detection approaches and success factors. Training and selection of program managers are discussed in depth.

- Chapter IV—User SI Program Management—discusses customer management processes, issues of control, and effective communication methods between vendors and customers. Experiences of users offer valuable lessons to apply in future SI contract relationships. Standard and non-standard contract negotiation issues are also addressed.

- Chapter V—Vendor SI Program Management—focuses on the development and selection of program management personnel; risk containment and reduction methods; program management tools; relationship interaction guidelines; and problem resolution methods. The lessons learned by vendors are also presented.

- Chapter VI—Conclusions and Recommendations—summarizes general program management conclusions drawn from the experiences of both respondent groups in this study. Recommendations are offered individually to users and vendors that will aid in structuring successful SI relationships in the future.

Two appendixes are also included in this report.

D
Related Reports

To develop comprehensive insight into the U.S. systems integration market, readers are encouraged to consult the following INPUT reports:

Published:

Systems Integration Competitive Analysis, 1991

Systems Integration Trends and Forecasts, 1991-1996

Systems Integration Technology Trends

Subcontracting to Client Integrators

Systems Management Directions and Priorities

Scheduled in 1992:

Systems Integration Competitive Analysis, 1992

Systems Integration Trends and Forecasts, 1992-1997

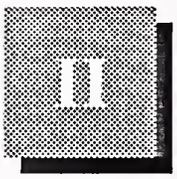
Impact of Downsizing on Systems Integration

Systems Integration Opportunities in Re-engineering

Impact of Outsourcing on Systems Integration

Networking Systems Integration Opportunities

In addition, INPUT regularly issues systems integration Research Bulletins that highlight important industry announcements, issues or trends.



Executive Overview

Vendors and buyers approach systems integration (SI) engagements cautiously. Many unknowns exist in SI engagements. The relationship between the vendor and the customer is new. It is created to develop a specific IS solution. The dynamics of the relationship will evolve over time as both parties establish their roles. In addition, unknown elements encountered during the process have the potential to rescope a solution from that originally envisioned by the vendor and the customer.

Structured program management techniques and processes are practiced by both parties to control the variables in the dynamic SI environment. Without these procedures, systems integration contracts have little chance for success.

This report focuses on the techniques, processes and methodologies used by vendor and customer organizations to support systems integration implementation.

A
The Systems Integration Environment

INPUT defines systems integration as a business service that provides a systems solution primarily based on information industry products and services. Most or all of the following are performed in SI contracts:

- Needs analyses
- Specification development
- Conceptual and detailed systems design and architecture
- System component selection, modification, integration and customization (includes off-the-shelf applications and systems software products)
- Software design and development

- Hardware design, development and purchase
- Systems implementation cut-over, testing and evaluation
- Life cycle support (includes training documentation, operations and maintenance)
- Financing
- Other services

The stages of systems integration that apply to vendors and users (customers) are presented in Exhibit II-1. The exhibit points out the roles that both parties play, sometimes jointly, to develop an integrated vendor solution.

EXHIBIT II-1

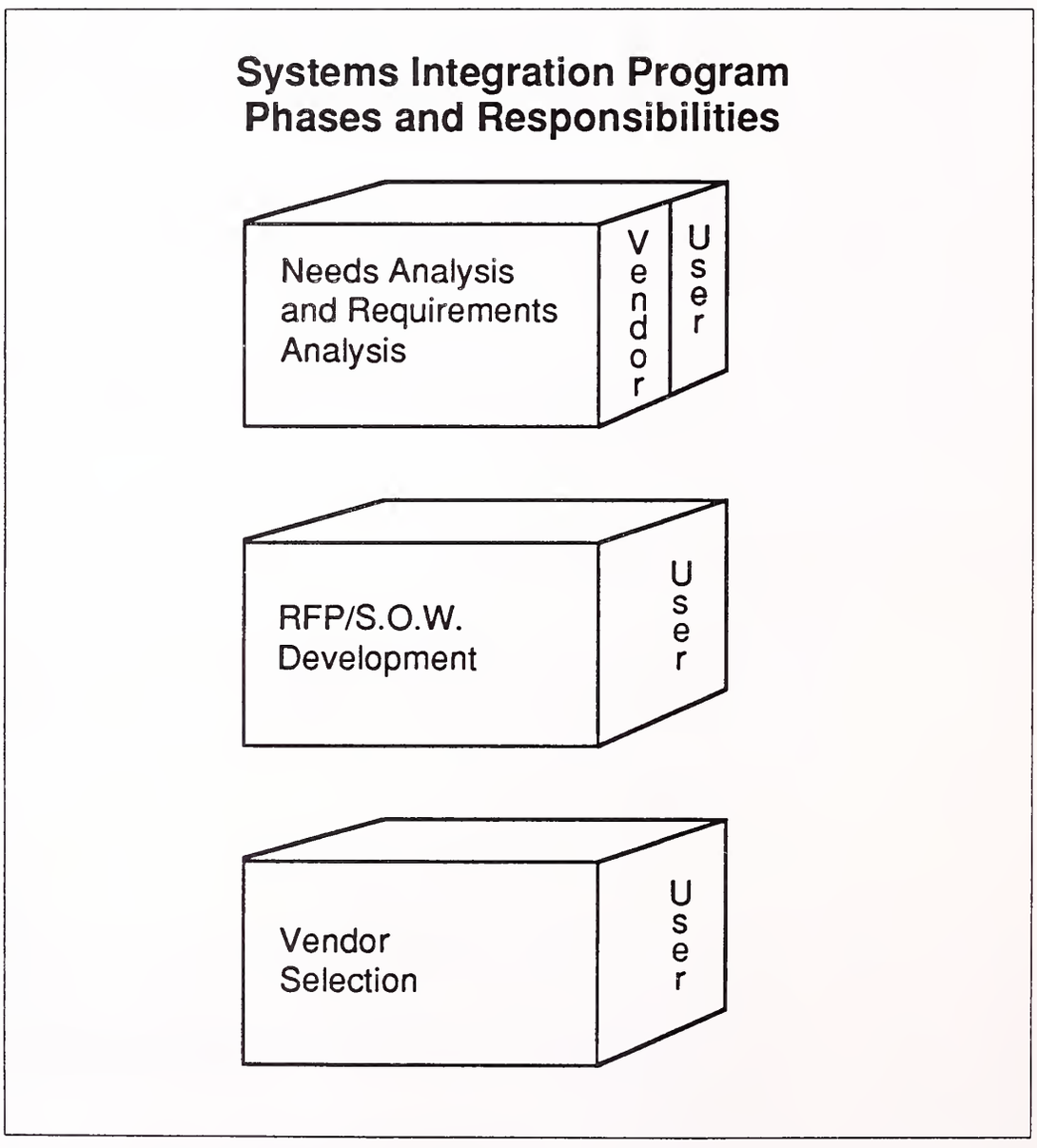
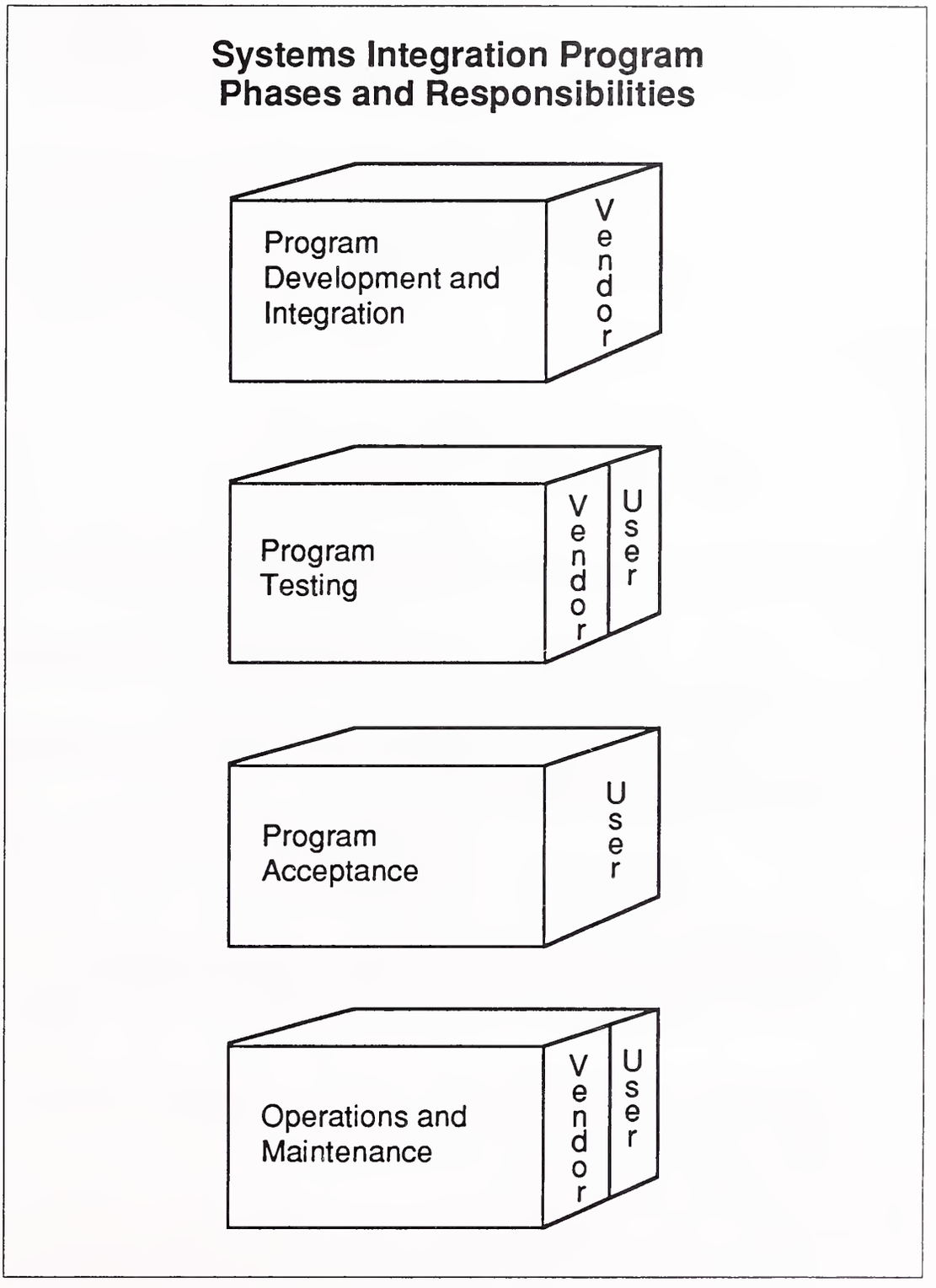


EXHIBIT II-1 (CONT.)



B

Differences in Program Management

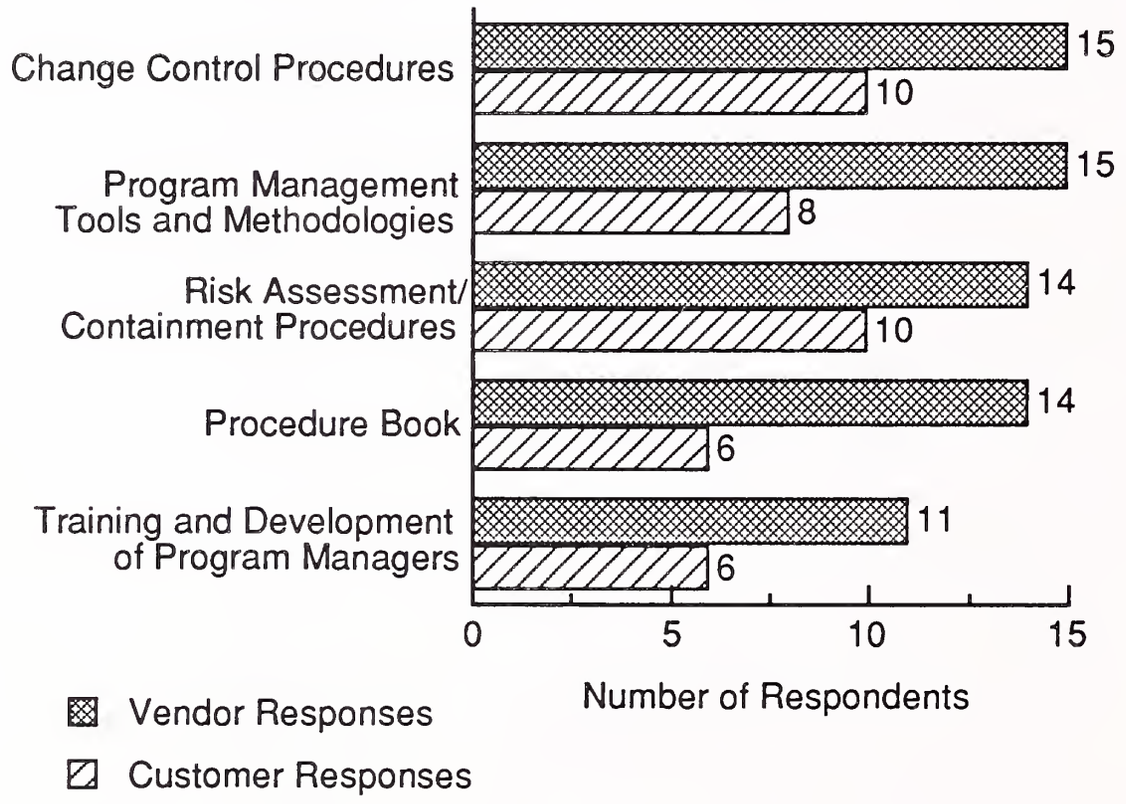
Each party applies program management strategies to all phases to nurture the developing system to its successful completion. The user organization may initially lack the sophisticated program management of the vendor. As user experience increases, more structured processes are applied, often

that mirror those of the vendor. Users are becoming more aware of their responsibilities to their organizations and to the role they play in providing assistance to the contracted vendor.

Exhibit II-2 shows the components of formal program management processes used by each party during an SI contract. As expected, customer procedures do not include as many common elements as those of vendors. Differences between the two respondent groups can be accounted for by the scope of each party's needs.

EXHIBIT II-2

Components of Program Management Processes



Note: 15 vendor respondents have a formal SI program management process.
11 customer respondents have a formal SI program management process.

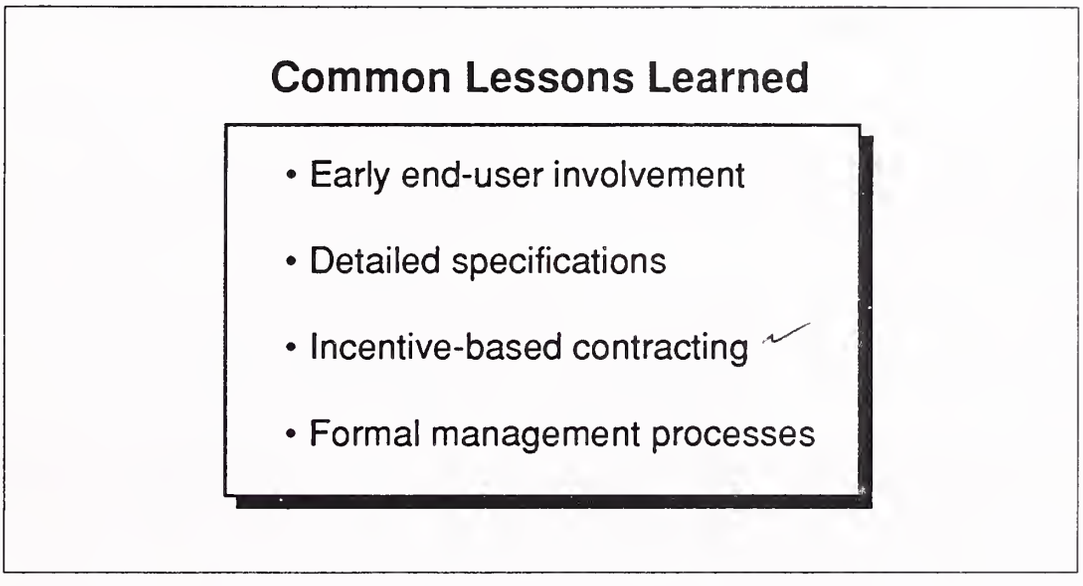
One of the main reasons users hire SI vendors is to obtain their expertise in building systems. Users want to transfer the responsibilities and risks associated with development to a vendor. Accordingly, vendors develop repeatable processes to reduce risks and provide discipline to program development.

Users do not always find it necessary to hire more than one systems integrator. However, experience has taught many users to strengthen their program management skills and procedures on subsequent contracts.

C
Common Lessons Learned

Vendor and user respondents in this study agree on the lessons learned from SI contracts (see Exhibit II-3).

EXHIBIT II-3



End users should be directly included in all component phases of the process. At a minimum, involvement should occur during the system's requirements analysis and definition phases, as well as during system testing. Inclusion at these critical phases usually translates into the system's acceptance at a later date.

As much detail as possible should be gathered from the customer organization to ensure that its requirements will be met by the vendor.

Vendors are more motivated to finish contracts ahead of schedule under incentive-based contracts. Because SI is a service, changes to the system will be needed during the contract's duration. Vendors are restricted in how they respond to customer requests for change when an inflexible, fixed-price contract is in place. Ultimately, this will affect customer satisfaction with the finished product.

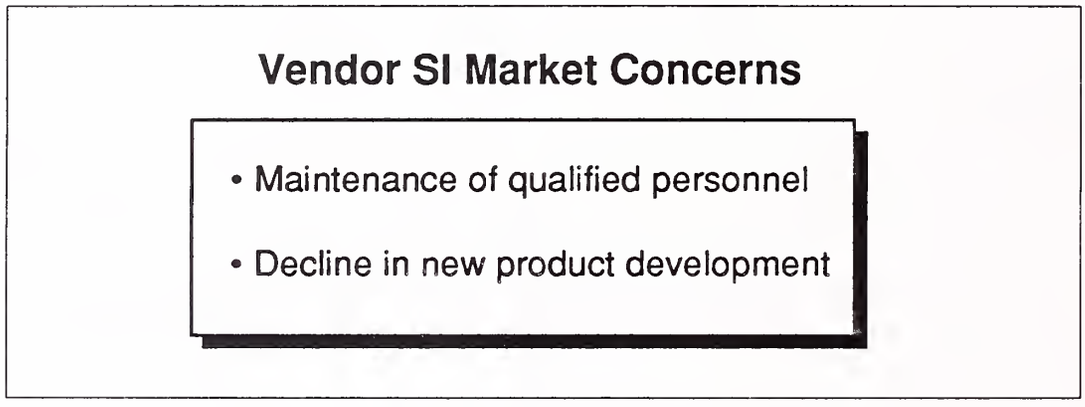
When both parties apply structured program management techniques, productivity gains and successful implementation goals are more easily met.

D

Vendor Market Concerns

Buyers of systems integration services expect vendors to maintain personnel resources encompassing a wide range of technical expertise. This expectation presents two major problems for some vendors, as shown in Exhibit II-4.

EXHIBIT II-4



Many small to medium-sized systems integrators evolved from professional services firms that specialized in proprietary software development. These firms cannot afford to retain staff technically versed in a wide variety of systems. In this situation, vendors often hire subcontractors and consultants to fill technical gaps.

Vendors also find it difficult to retain high-level people to connect proprietary systems together. The creative talent of some companies is leaving as buyers' needs center more on integrating existing products. The marketplace demand for new products is diminished. One vendor expressed his concern for the future of the industry as a whole if this trend continues.

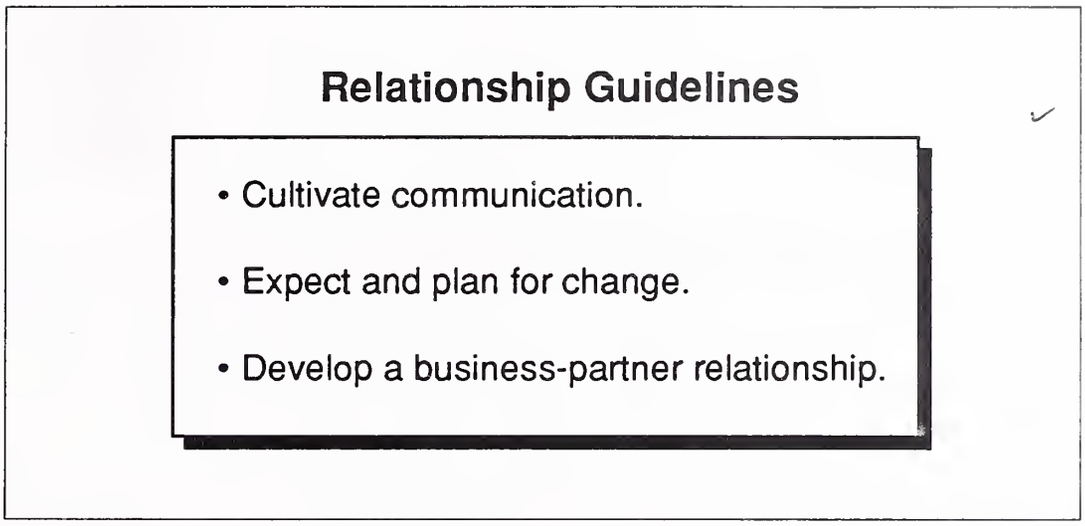
E

SI Relationship Guidelines

The success of a systems integration contract is often dependent on the implementation of the guidelines offered in Exhibit II-5.

The core of an SI relationship is communication—with whom, how often, and under what circumstances. If effective communication channels are established among all affected parties early on, requirements and specifications are clearer for the vendor. The customer's chance of receiving a satisfactory solution is improved.

EXHIBIT II-5

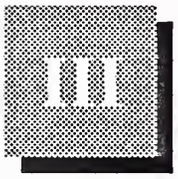


It is easier to detect and resolve problems that arise during the relationship when an atmosphere of mutual trust has been built through communication between the two parties.

How well the vendor and customer organizations communicate will influence how easily changes and problems will be resolved during a contract's term.

Systems integration contracts are also intrinsically evolutionary. Both parties should enter the relationship expecting to respond to change. Communication aids in preparing each side for this eventuality. In addition, contract terms should address change documentation and control processes.

In many SI contracts, the vendor and the customer have played adversarial roles. This scenario is changing as users are coming to appreciate the complexity of the tasks vendors assume in SI contracts. Users realize that SI vendors share the same goals as their customers: the delivery of a satisfactory custom solution on time and within budget. Vendors too are seeking proactive working partnerships with their clients. Vendors want to win additional contracts from their customers and build reputations that will influence potential clients.



Systems Integration Program Management

Chapter III covers program management from a general perspective. Discussions of its component phases for both the vendor and the user/customer are included. Program management methods are contrasted. Differences in program manager selection and training processes are addressed. The procedures used to detect and resolve problems during an SI contract, and INPUT's recommendations, conclude this chapter.

A

Program Management Definitions

Program management is a term that has evolved from the federal market, where the development of defense systems and major information support systems was identified as program development and management activity. The term *program management* is broader in scope than the term *project management.* It encompasses all projects and activities in a systems integration program, from needs analysis through life cycle support.

Program management used in the context of this report applies both to the management process used by the contracted vendor, and to the customer/buyer/user to manage the development and integration of a major system solution.

The components of the solution include most or all of the following functions:

- Needs analysis
- Specification development
- Conceptual and detailed system design and architecture
- System component selection, modification, integration and customization (includes off-the-shelf applications and systems software products)

- Software design and development
- Hardware design, development and purchase (includes custom, off-the-shelf and turnkey systems)
- Systems implementation, cut-over, testing and evaluation
- Life cycle support, including:
  - System documentation and user training
  - System operations and/or management
  - System maintenance
- Financing
- Other services (engineering services, automation equipment, computer supplies, business support services, general supplies, etc.)

In the federal sector, contracts and program management functions are more strictly governed by federal policies, regulations, and formal procedures. Agencies view themselves as controlling a contract, even if they do not.

B

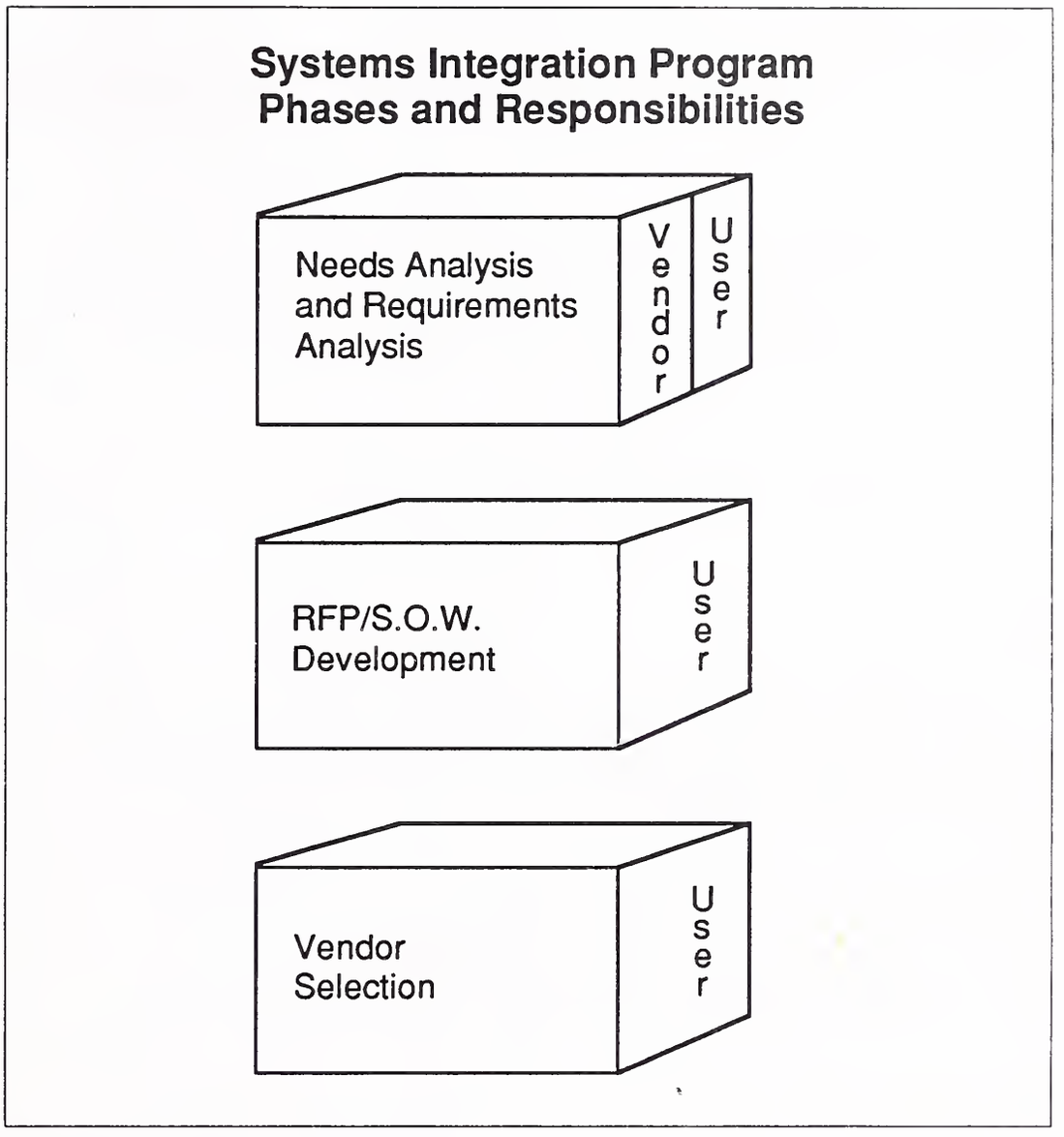
SI Program Requirements

1. Program Phases

A general overview of phases of an SI program is depicted in Exhibit III-1.

The initial phase of any SI program is the identification of users' needs and requirements for the future system. The user's business justification of SI services is further developed by performing a requirements analysis. This activity may be performed by the customer, contracted to a professional services firm, or completed as the first stage in a systems integration contract.

EXHIBIT III-1

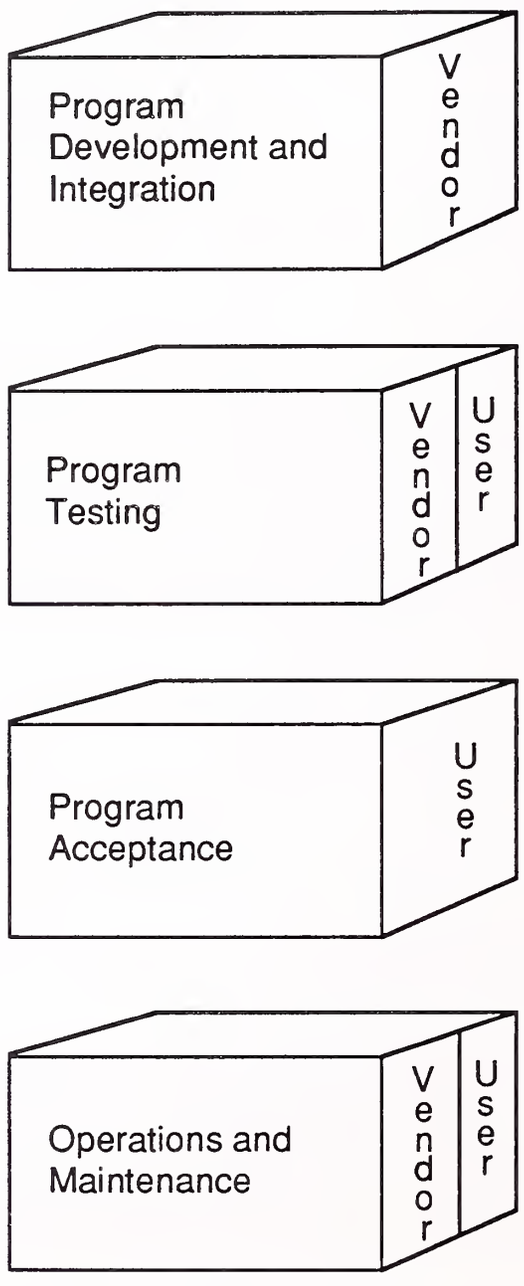


When this phase is performed by the customer, business consultant or professional services firm, the results form the basis of the Request For Proposal (RFP) or Statement of Work (S.O.W.). Federal requirements are usually defined by the customer or an outside consultant. In the commercial world, any one of the three alternatives may be used. More commercial projects are following the federal RFP practice.

In response to a potential customer/buyer organization issuing an RFP or S.O.W., interested vendors develop and submit a proposal. The vendor proposal usually includes management function specifications, design specifications, a proposed system architecture, an implementation schedule and cost commitments. Customer-required or vendor-specified acceptance criteria and procedures may be defined in the RFP, vendor proposal, or final contract. Negotiations occur with the vendor or vendors pending final selection and contract award.

EXHIBIT III-1 (CONT.)

Systems Integration Program Phases and Responsibilities



Program development, integration and testing are the major components of contract performance. Hardware and software acquisition, software development, integration and installation activities occur at this time. During this phase the vendor must meet the requirements, schedule and budget commitments agreed upon in the contract.

Transition, integration and testing of the system are included in this phase. It may not be possible to develop the contracted solution in isolation from the customer's other systems. Components of existing systems may be incorporated into the new system. Training and education of the customer and end users occurs.

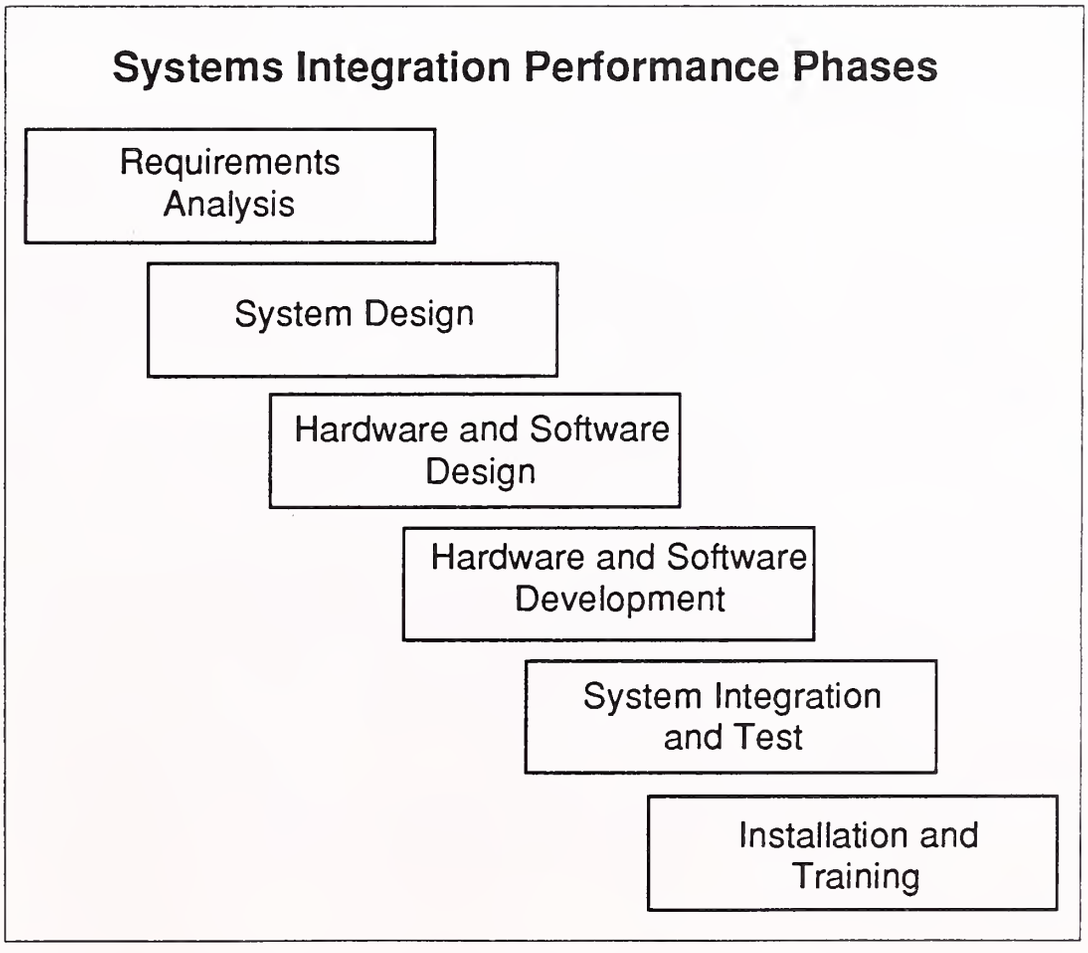
Program acceptance is usually determined through alpha testing and parallel running procedures based on predetermined test criteria developed by the customer with vendor assistance. Change management procedures are critical to completing the performance phase of an SI contract.

The operational phase of a system is an option that may or may not be included in the contract. Maintenance of the developed system's hardware and software is often turned over to the customer if the operation is not contracted.

2. SI Performance Phases

An in-depth view of performance phases is presented in Exhibit III-2. Some of the activities may have been performed in earlier phases or by a separate contractor. In addition, some phases, such as hardware and software design and development, may be unnecessary if off-the-shelf products are used.

EXHIBIT III-2



However, what is inherent in any systems integration program is the diversity of knowledge and skills that is required of the vendor organization. It is up to the vendor's program manager to orchestrate the multitude of skills and activities into a solution and a schedule that meets requirements and cost restrictions. Informal and formal program management procedures and tools are used to perform this process.

Because of the complexity of the systems required, vendors often use subcontractors to perform portions of the project. It is often more cost-effective for vendors to go outside their own companies for specialized technical expertise. Using subcontractors also allows small vendors to function as prime contractors in the SI market. However, selecting, hiring and managing subcontractors adds a dimension of complexity to program management responsibilities. The continuation of subcontractor responsibilities and performance is a key element of vendor program management.

C
Program Management Methods

1. Program Management Procedures

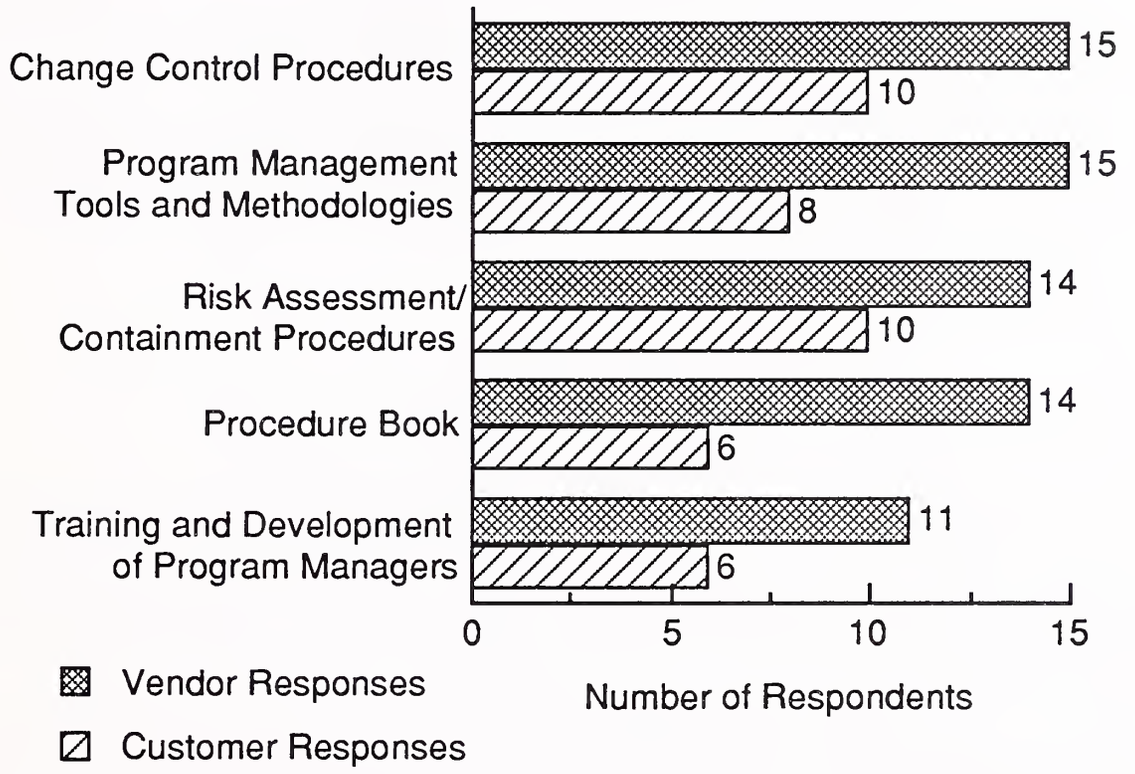
Customer organizations that use SI vendor services are becoming more procedural in how they approach an SI relationship. Exhibit III-3 contrasts the components of both vendor and customer SI program management processes.

As expected, almost 100% of the vendors interviewed for this study had a formal process, while 75% of the customer respondents followed a similar SI management process. However, as Exhibit III-3 shows, customer program management procedures do not include as many common elements as do those of the vendors. Differences between the two respondent groups can be accounted for by the scope of each party's needs.

For vendors, systems integration is a business. Vendors have many SI contracts, and hope to win others in the future. They are out to make a profit, build their reputations and expand their businesses. Experience has taught vendors to use formal or structured approaches to achieve SI business goals. Customers hire vendors for their expertise in building systems. Customers may only need to hire one SI contractor over a long period of time.

EXHIBIT III-3

Components of Program Management Processes



Note: 15 vendor respondents have a formal SI program management process.
11 customer respondents have a formal SI program management process.

Vendors utilize program management tools, risk assessment and containment procedures and change control procedures. Customers also employ similar procedures when they formally approach SI program management. In large organizations especially, vendors find it necessary to document procedures, rather than depend on other forms of communication. Customer organizations are less likely to follow this practice.

Training and development of program manager personnel is critical in vendor organizations. Vendors must maintain access to qualified individuals to step into new contract relationships, or to take over existing projects if an assigned program manager is not successful. Finding and developing individuals with the ability to assume SI management roles is a lengthy and intricate process. Users of SI services, on the other hand, may only have a one-time need for a program manager. Occasionally the vendor may assist the client program manager to develop skills.

2. Differences in Customers' Approach to SI Management

Approximately 70% of the SI customers in this study said they would apply the same SI management process to in-house integration efforts that they were using on their current projects. INPUT expected more variation in the responses, considering that customers' SI management and technical skills are probably less than those of an experienced vendor.

The data suggests that customers are, for the most part, satisfied with the skills and procedures they apply to program management. Few see reasons to improve. Those with different SI strategies for in-house projects noted the following differences:

- More end-user involvement
- More face-to-face interaction
- Assignment of in-house project leaders
- Use of in-house systems development methodology

It is not surprising that the main difference between internally performed SI projects and those performed by a vendor is the extent of involvement of the internal integration organization with the users of the system. It is easier to have face-to-face contact with members of your own company.

Obviously, in performing in-house SI, project leaders are assigned to manage the development of the different components of the system. Systems development methodologies are also used to speed the process. Because of past experience, a vendor has a better chance of applying development methodologies, such as CASE tools, properly. Customer organizations attempting SI projects for the first time should cautiously approach unfamiliar methodologies and processes. Mistakes will undoubtedly occur.

3. Customer Satisfaction

The average score for customer satisfaction with the vendor's approach to program management was 3.8 (5 = extremely satisfied). Of the customers, two-thirds rated their vendors either a four or a five on a five-point scale. Users' positive and negative remarks about their vendors are shown below:

Positive Remarks	Negative Remarks
Extremely responsive	Lacked people skills
Communicated well with IS	Inefficient problem-solving skills
Met goals	Lack of division coordination
Good relationship/knew boundaries	

Generally, customers believe their vendors are attempting to ensure that the SI contract will be successful. One user commented that he had a business-partner-like relationship with his vendor. However, the vendor should know his boundaries in the relationship.

Some users who experienced problems with their vendors had personality conflicts with the vendor's program manager or hired a vendor new to the SI business. Vendor track records are important, especially in the area of problem identification and tracking. It takes experience for vendors to develop project control skills and procedures to manage change efficiently in SI projects. In addition, entrants in the SI arena may not have developed the internal infrastructure to provide support from multiple divisions.

4. Measures of Success for SI Contracts

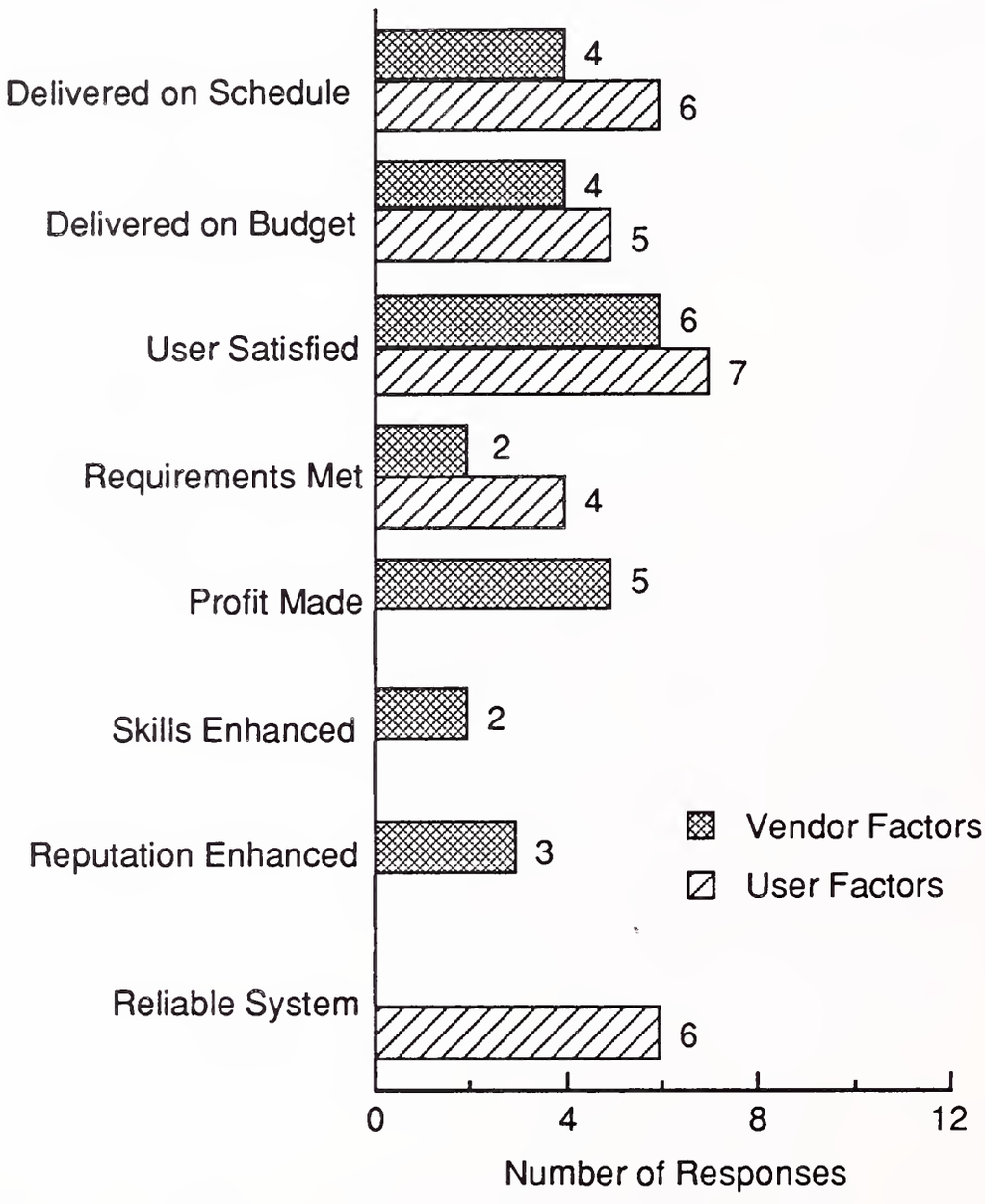
Perceptions of the measures of success for vendors and users are shown in Exhibits III-4 and III-5. Each group was asked how it viewed success for vendors and customers. The relative importance of each of the success factors can be determined by comparing the responses of the two groups. Although the same number of interviewees responded to the question on success factors, the frequency of user responses is considerably lower. Most vendors put a great deal of thought into replying to the question. Users offered shorter responses, noting only one or two factors.

Users did not perceive that adherence to schedule was as important to vendors as vendors believe it to be. Only four users believed that vendors consider delivering an SI system on the agreed-upon schedule as a measure of success. In contrast, ten vendors mentioned meeting the schedule as a measure of success. Users fail to understand that vendors' profit margins are impacted if schedule goals are not achieved.

Both groups of respondents mentioned meeting budget goals, and the vendor's opportunity to enhance skills and reputation with the same frequency.

User satisfaction also appears to be more important to vendors than is perceived by users. Customer satisfaction was cited most frequently as an indication of a successful contract. Both respondent groups used user satisfaction in an overall context. It includes many components: a workable system, meeting schedule and budget constraints, happy end users, and fulfillment of requirements.

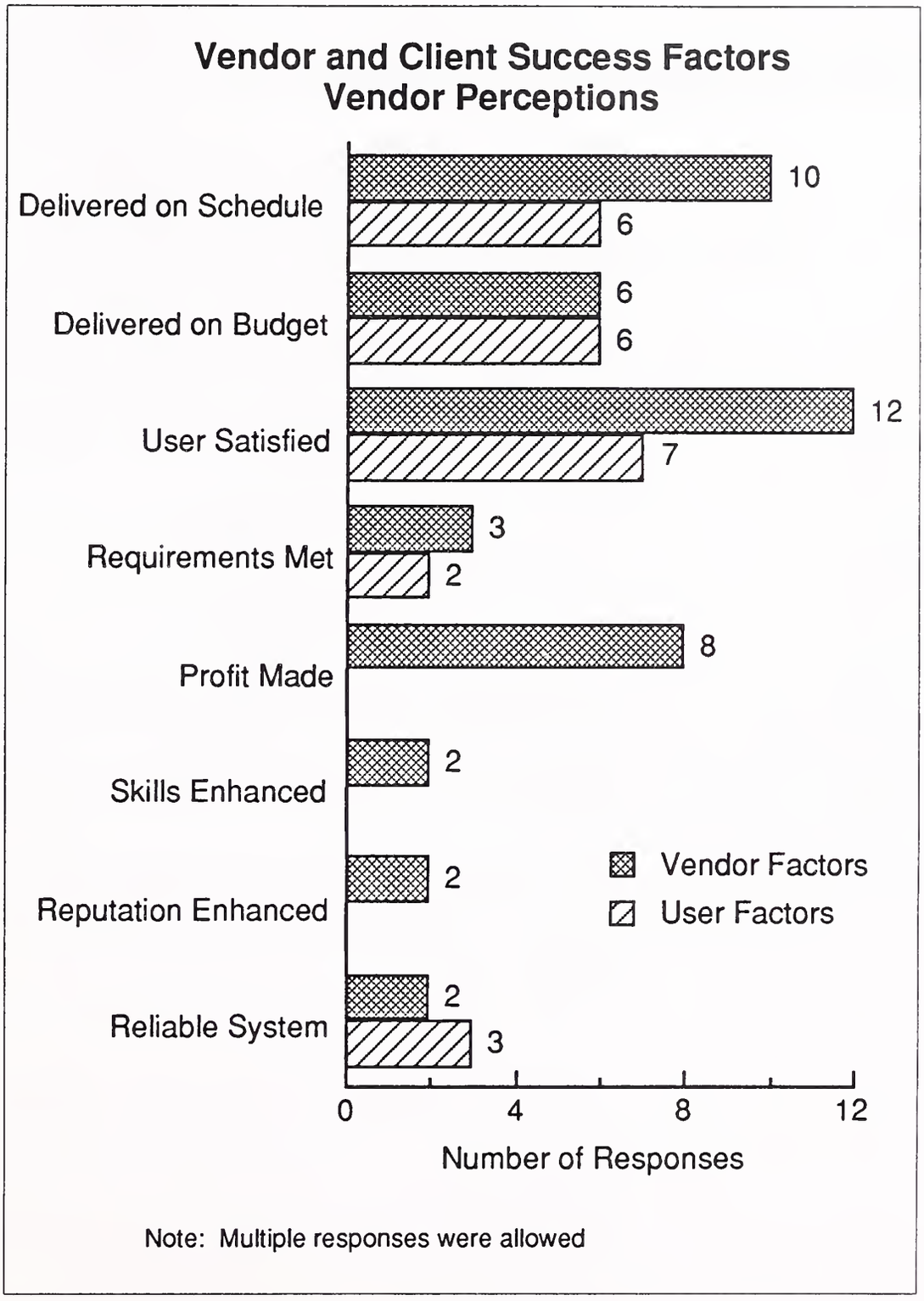
EXHIBIT III-4



Note: Multiple responses were allowed

Obviously, making a profit from the contract does not apply to SI customers, but is important to vendors. Vendors are in the systems integration business to make a profit. One-third of the user respondents have not forgotten that profit drives vendors to be successful.

EXHIBIT III-5



The everyday reliability of a system is one of the factors frequently mentioned by users as a success measure. Users must use the system to perform their line of business after the system has been completed. Specifically, vendors are less concerned about this factor. They view overall user satisfaction as a test of whether or not the system is reliable.

D

Program Manager Selection and Development

The way an SI contract is managed is critical to vendors and users. The person the vendor company selects as a program manager will influence whether a system fails or succeeds. A great deal of experience and skill is found in the rare individual capable of managing an SI contract. During an SI contract, the vendor's program manager must be ready to manage diverse groups of people, issues and resources. Some of the general responsibilities include the management of vendor personnel assigned to the contract, the vendor's internal organization to provide ancillary services, subcontractors, and the customer's interface organization. As a result of these responsibilities the vendor program manager must know how to:

- Handle differences in skill and attitude levels of both vendor and customer personnel
- Set up communication channels for all involved parties
- Set up program management tools and processes
- Obtain agreement from vendor and user personnel on processes to be used
- Obtain agreement on acceptance criteria and deliverables
- Negotiate deliverable terms and often arbitrate disputes between all parties
- Handle personality conflicts
- Proactively change any process or personnel that do not foster successful completion of the project, including subcontractors
- Handle the vendor company's demands for resources to be applied to other projects. Management of the vendor company's own internal conflicts and acquiring high-quality resources is a tough issue.
- Make accommodation for marginal or unacceptable performance levels of people and equipment. In some cases, this may also apply to the customer organization.

In order to accomplish the above, a variety of skills and experience make a well-qualified vendor program manager. Vendor opinions on the characteristics of a well-qualified program manager do not differ significantly from those of users. When surveyed on these characteristics,

both respondent groups rated all characteristics either a 4 or a 5 on a five-point scale of importance. Only one characteristic received an average rating of 2.9 by vendor respondents. The characteristics are compared in Exhibit III-6.

EXHIBIT III-6

Characteristics of Well-Qualified Vendor Program Managers

Characteristics	Average Ratings*	
	Vendors	Users
Understand specific user environment	4.5	4.1
Communication skills	4.5	4.7
People skills	4.2	4.8
Knowledge of vendor contracting practices	4.1	4.5
Knowledge of customer organizational procedures	4.0	4.1
Program financial management experience	3.9	3.7
General ADP/IS knowledge	3.9	4.1
Management skills	3.9	4.1
Negotiation skills	3.6	4.1
Technical skills	3.5	3.5
History of applying TQM	3.1	3.6
Time with vendor company	2.9	3.3

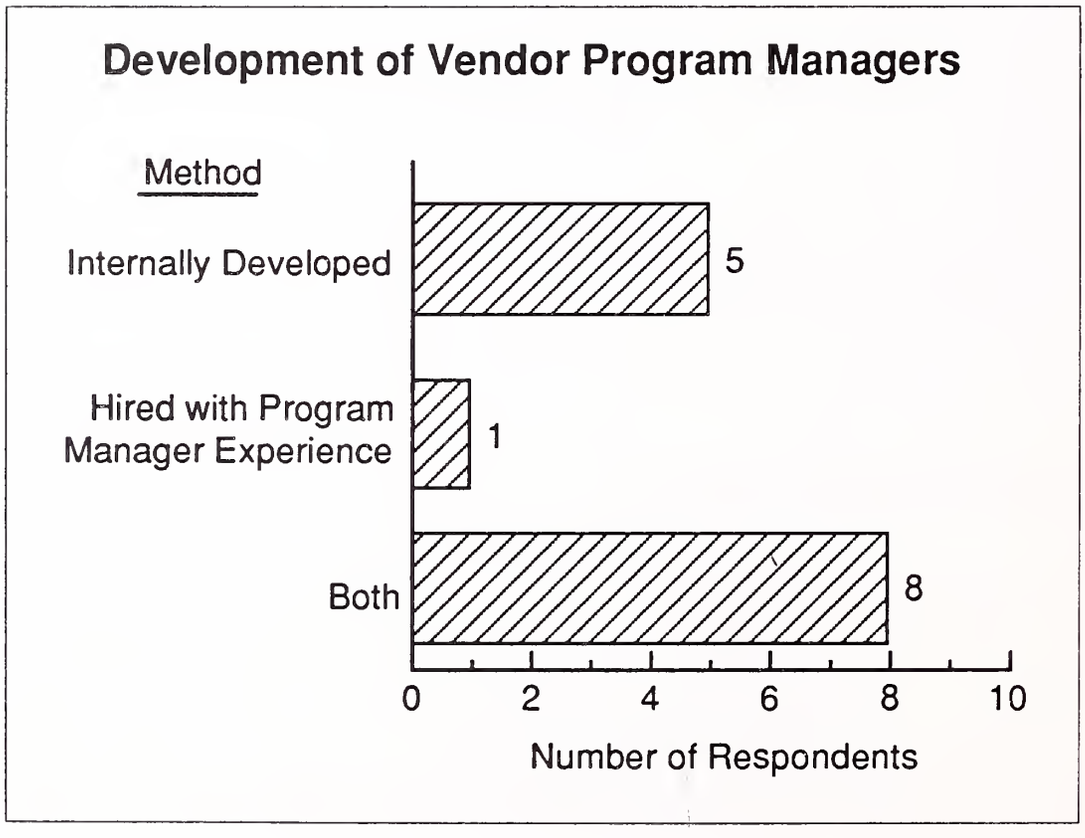
* Ratings based on a 1-5 scale; 5 = extremely important, and 1 = not important at all.

For vendors, understanding the specific user's environment is the most important qualification a vendor's program manager should possess. Users believe that interpersonal skills rate higher.

Vendors and users are in agreement on the relative importance of specific technical skills, history of applying TQM techniques, and length of employment with the vendor company. All three rank at the bottom of the list of qualifications. This should not be interpreted to mean that these qualifications are unimportant, only that they are not critical to the success of an SI contract.

Although vendors expressed a preference to appoint program managers who are internally developed over the long term, as shown in Exhibit III-7, it is difficult to maintain in practice. The development of program managers is a time-consuming and expensive process. Most vendors cannot ignore capable talent developed by one of their competitors. INPUT found that companies that solely use internal talent are highly structured, with seemingly inexhaustible resources, or are in specialized SI markets.

EXHIBIT III-7



Only one company hired experienced program managers exclusively. It had recently expanded into the SI market, and did not possess qualified in-house personnel.

E

Problem Detection and Resolution Approaches

Although SI projects usually involve the delivery of a unique or custom solution for the business processes of the customer, problems encountered along the way tend to be unspecific. Both vendors and customers enter the relationship expecting problems or issues to arise. Because of this expectation, both parties establish procedures to detect problems throughout the course of the process.

Systems integration program management is viewed as an exercise in managing change and problems. Especially in large, complex SI engagements, automated systems are used to track SI budget, schedule, problems and changes during program development. Exhibit III-8 shows the problem detection approaches utilized by vendors and users.

Vendors and users use similar techniques to identify and prevent possible complications in developing a proposed system. Vendors consistently use all of the processes listed in the exhibit. Some deviation exists for user respondents.

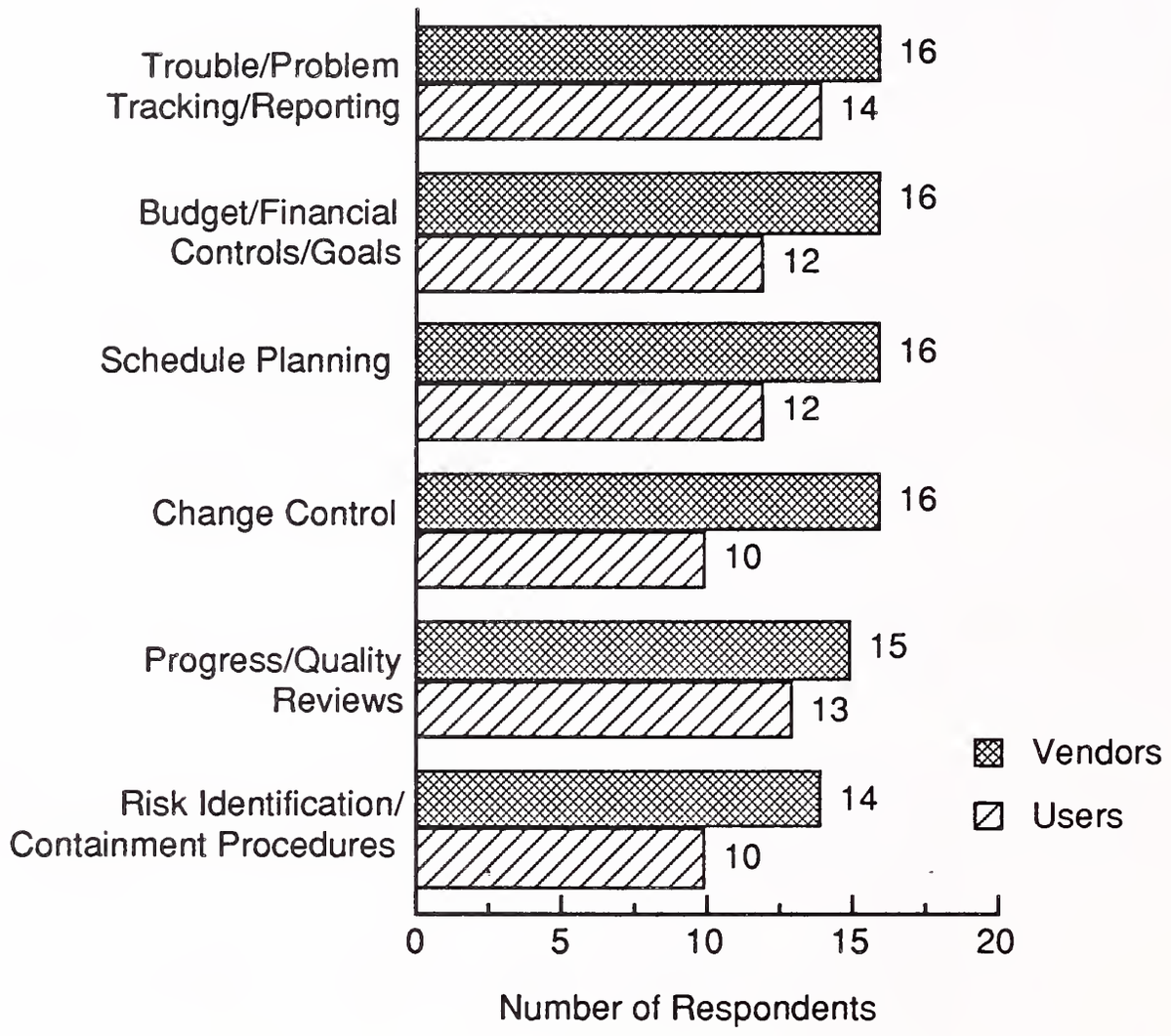
One-third of the user respondents do not employ risk identification/ containment processes, or change control procedures. These users assume that these tasks are only performed by the contractor.

Historically, vendors have appeared to be more at risk because the burden of developing a system rests upon them. Vendors were not paid until they delivered a satisfactory solution to the customer. Therefore, the SI vendor was the logical party to establish risk identification and management practices. However, users are now coming to terms with the risks their companies face if contracted systems do not perform as required, or are delivered late. Two-thirds of the users in this study practice risk management.

Managing change in the SI process has until recently been a vendor responsibility. Users, however, are taking a more active role in ensuring that changes are managed effectively. They are more active in estimating labor and materials to accommodate fluctuations in requirements. Change management processes flow more efficiently when both parties agree to use the same process. In addition, vendors generally require their customers to officially acknowledge various phases of the change process in writing.

EXHIBIT III-8

Vendor and User Problem Detection Processes



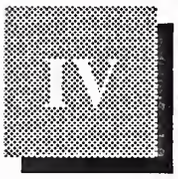
Vendors set milestone schedules to review their performance on a project. Reviews point to problems that may impact the overall schedule, functionality or budget. Progress reviews also usually incorporate quality assessments of the work performed thus far. Progress is reported on a regular basis to the customer. Most users perform their own assessments of a project's status to balance the vendor's perspective. Regular reviews of milestones and progress also serve to justify progress payments to the vendor, and reduce the complexity of the final acceptance process.

The size and the complex nature of most SI contracts demand that vendors and users establish specific systems to handle problems that develop over the course of the relationship.

Vendors and most users define budget guidelines or controls, and chart a schedule of planned events. Not meeting budget or schedule goals is an indication of a problem that both parties must address and resolve. Budget guidelines analyze the work to be performed in terms of labor, materials and overhead. Vendors also include a profit estimation in their budget projections. The schedule becomes the path that labor and materials will follow to complete the system.

F
Recommendations

A formal approach to SI management is necessary for both vendors and customers in the systems integration arena. SI must be tackled progressively in terms of relationships, planning, development and operations. The key to a successful solution is the structure of the relationship between the vendor and the customer. It must be flexible and accommodate evolving requirements and changes from all levels. Clients need to learn the vendor's system. See Chapter VI for specific recommendations to SI vendors and users.



User/Client SI Program Management

This chapter examines how the customer organizations in this study implement program management processes. Customers' criteria for in-house program managers and the specific methods applied to SI program management are presented. Particular attention is devoted to which party controls the relationship. Recommendations are offered on effective communication methods and contract terms based on the experiences of SI users.

A

Program Manager Selection Criteria and Process

Placement of program managers is becoming more critical to customer organizations as users increasingly manage SI contracts in a businesslike manner. For most, the qualifications of their own program managers are the same as those expected of the vendor's program manager (see Exhibit IV-1). User organizations do not want their program managers to be out performed by vendors' program managers.

EXHIBIT IV-1

Customer Program Manager Qualifications

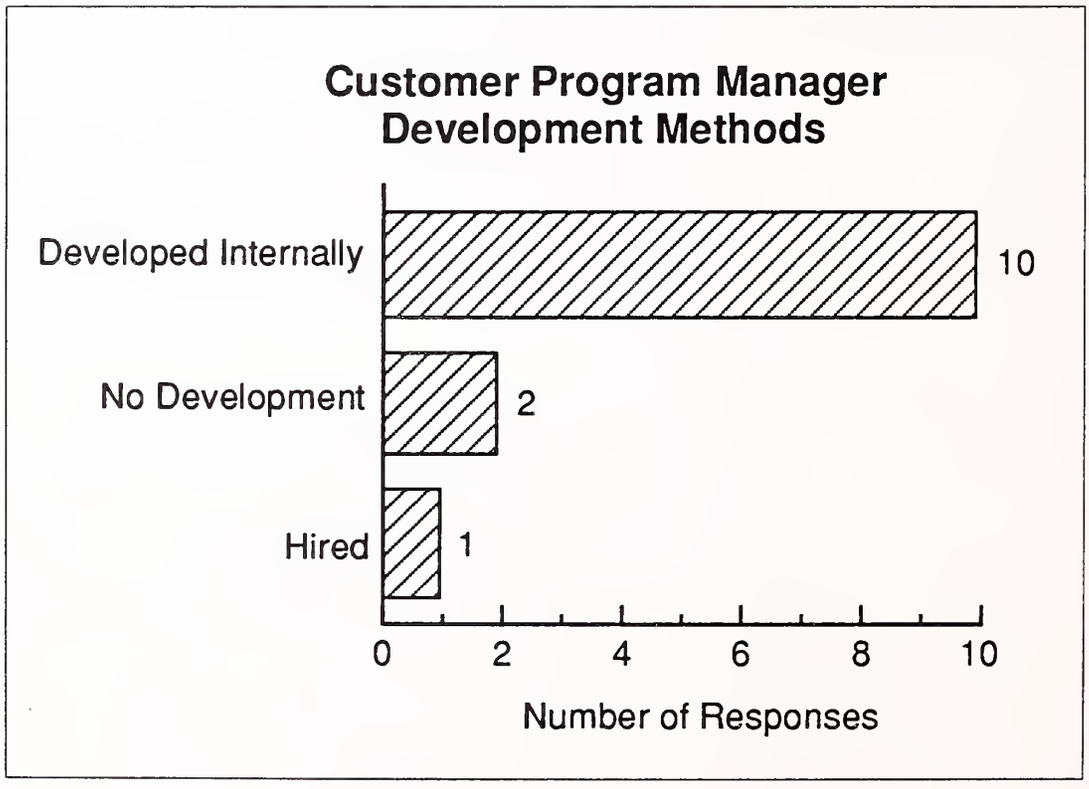
Compared to Vendor's Program Manager	Percent of Respondents
Same	80
Different	13
Don't know	7

The customer's program manager oversees the vendor's adherence to the contract. The person in this position is in charge of the interface with the vendor organization, and interacts directly with the vendor's program manager. As users' SI experiences mature, their program managers' skills are expected to rival those of vendors.

Knowledge of company procedures, and broad management skills dealing with people and communication are essential. The ability to negotiate effectively is mandatory to successfully work out problems and contract modifications. Most vendor program managers are trained for years to develop the skill mix necessary for SI program management.

This study shows that user organizations with multiple SI requirements are beginning to look internally for individuals possessing program management potential, as shown in Exhibit IV-2. A public utility intends to hire a vendor to train internal personnel in program management skills. One respondent mentioned that program managers are hired from the outside because of a lack of internally qualified individuals. Two respondents indicated that their companies have no active method of program manager development.

EXHIBIT IV-2



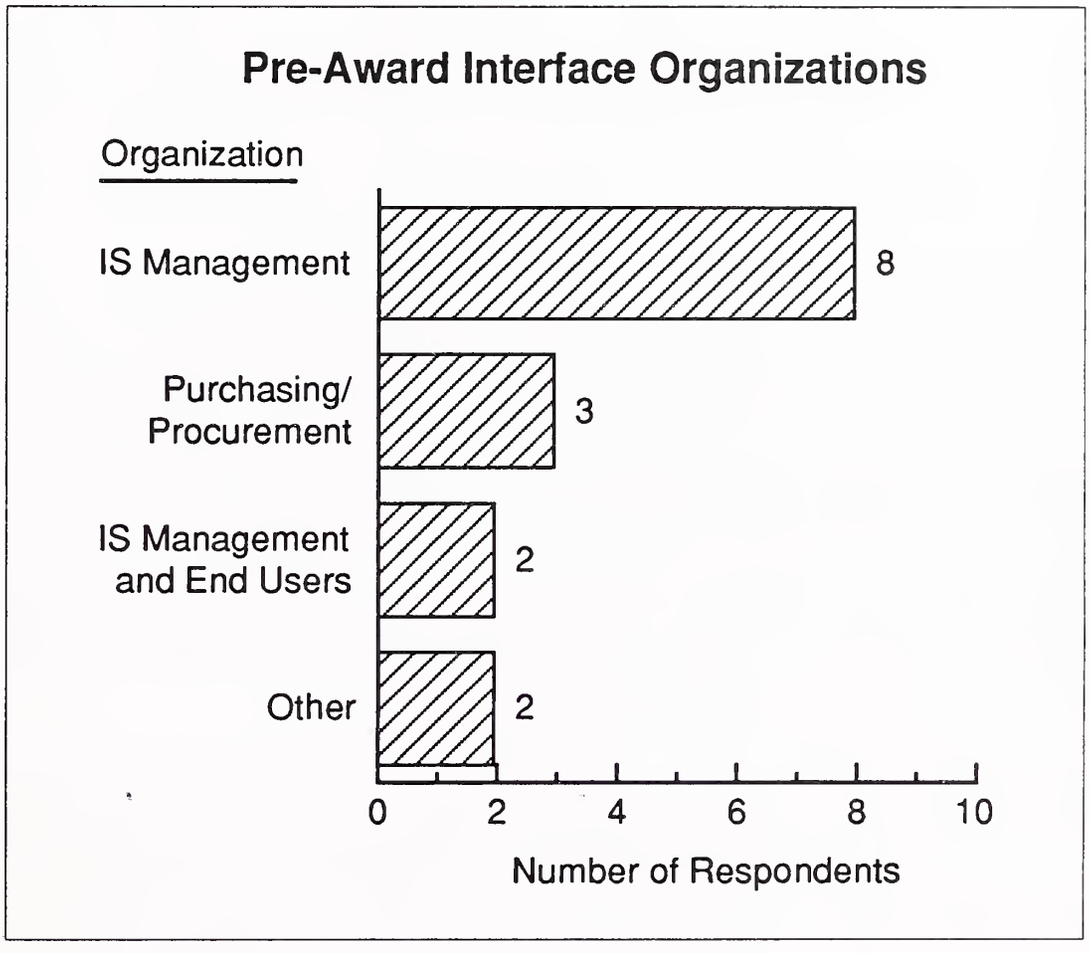
Most users may not need to set up formal training courses for program managers. But they are trying to develop internal career paths for individuals who exhibit program management potential. Seminars and on-the-job experience provide the bulk of the preparation for this position that is attained by employees of user companies.

B

Management Approaches

During the proposal and vendor selection processes, over half the users in this study assigned representatives from their IS management organization to interface with vendors, as shown in Exhibit IV-3.

EXHIBIT IV-3



Two respondents put IS management and end users into the team to interact with vendors. Another user organization felt totally unqualified to handle RFP development, proposal evaluation and vendor selection. An independent consultant was hired to handle this phase of the program.

Approximately half of the user organizations in this study changed their interface organization or representative(s) for the contract performance phase, as seen in Exhibit IV-4.

EXHIBIT IV-4

Customer Interface Changes During Contract Duration

Interface Remains the Same?	Percent of Respondents
Yes	47.0
No	53.0

One should not assume that the 53% who indicated they changed their designated interface were all federal agencies. New contracting officers and program (project) managers are usually assigned after a contract is awarded, especially in the DoD. However, in this study, two civil agencies did not follow this practice. Some commercial users also reassigned personnel after the contract award phase.

The responses in this study (60%) also suggest that when a representative(s) of information management is the chief interface to the vendor organization, this interface mechanism will continue for the duration of the contract.

When representatives of purchasing or procurement organizations deal with the vendor in the early stages of a potential relationship, it is highly unlikely that they will have the necessary expertise to oversee the contract during the development process. Responsibilities for interaction with the vendor are usually transferred to information systems management, or to another interface team, as shown in Exhibit IV-5.

Central to effective communication with the vendor is the person or team of individuals that works with the vendor. As shown in Exhibit IV-6, almost half of the respondents had structured a program team, headed by a program manager. Approximately 25% appointed a program team only. Program teams usually consist of technical experts in specific functional areas. Sometimes end users are included. Most vendors and users agree that communication with end users is critical to the success of most SI contracts. Including end users in the interface organization facilitates this process.

EXHIBIT IV-5

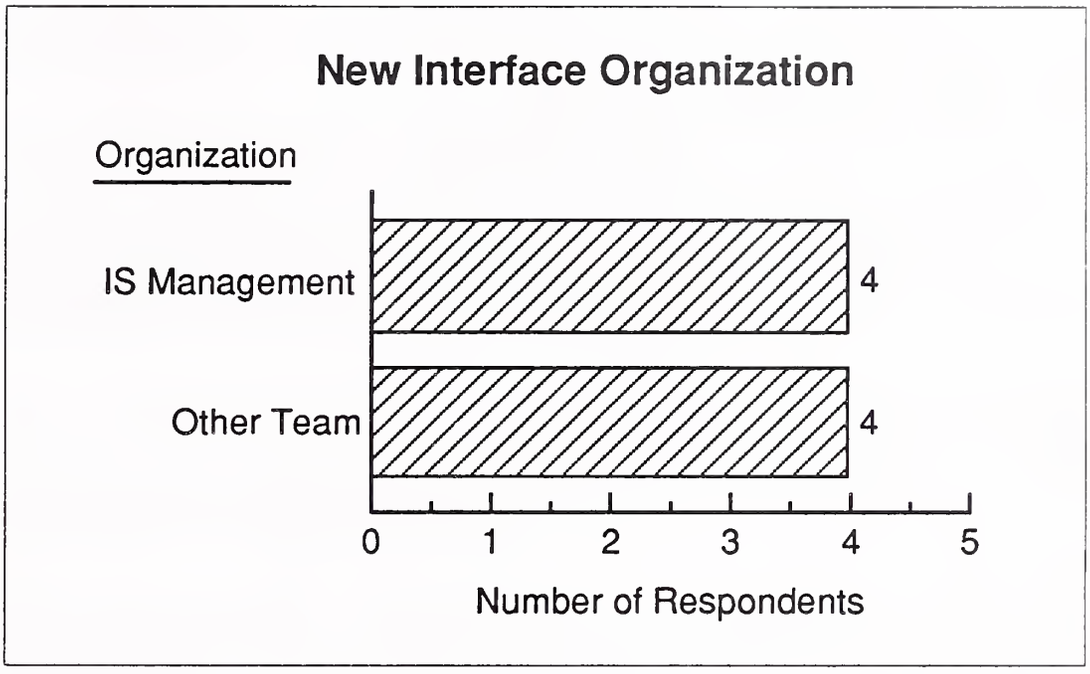
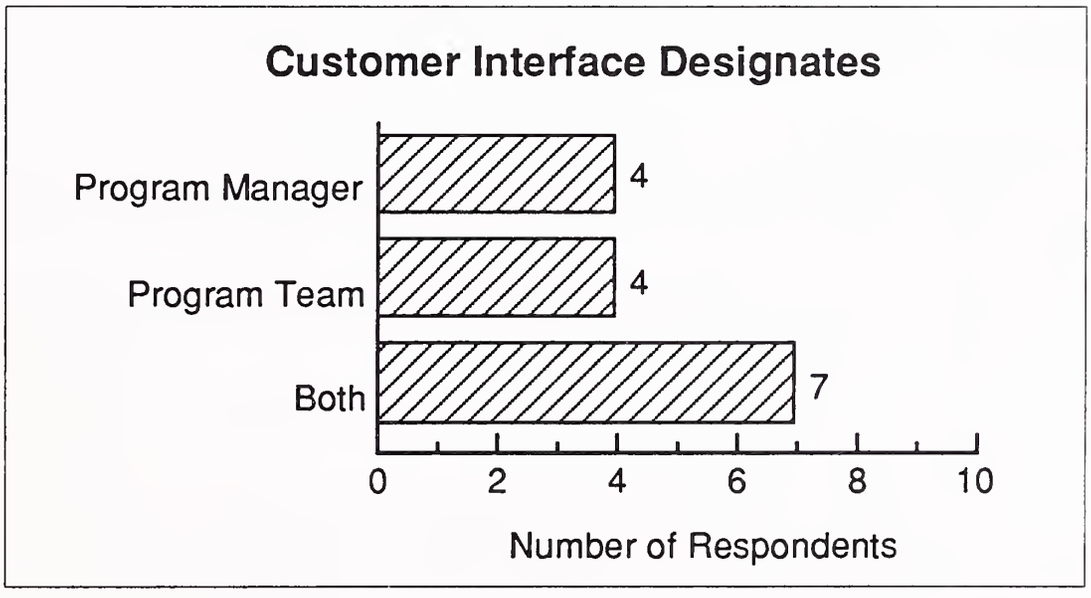


EXHIBIT IV-6



Designation of a single program manager to interface with the vendor is done for one of two reasons: to promote time efficiency, or because projects are small in scope. The development of large and complex systems is more successful when interaction with the vendor is carried out with representatives from various levels of the client organization. Most companies cannot rely on the experience and skills of one person to manage an SI job. Program teams often mirror the vendor's program team. A program manager is necessary as a focal point, overall spokesperson, and signatory authority for contract changes.

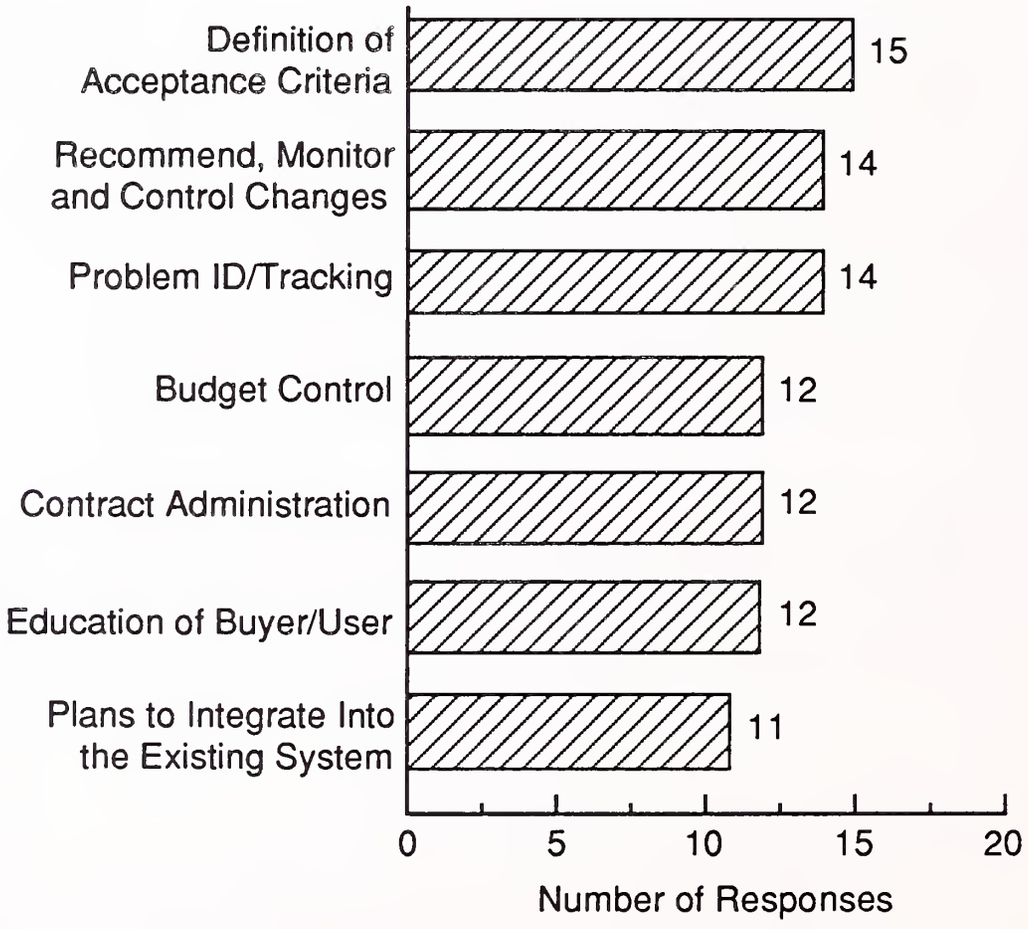
C

User Project Execution Concerns

1. Procedures Used by Customers to Manage the Vendor Interface

What is the role customer interface organizations play in SI program management? The common procedures that customers use to manage their interface with an SI contractor are shown in Exhibit IV-7.

EXHIBIT IV-7



Users define their own acceptance criteria on deliverables from a vendor. Whether vendors have input into this process is not evident from the question asked of users.

The designated customer interface recommends, monitors and controls changes and problems during the course of an SI contract.

Most users employ budget controls during the course of an SI contract to monitor the vendor's progress. Careful monitoring of the allocated budget and schedule milestones of deliverables signals problems in the system when they occur, that should be addressed. All users should establish a budget control process. Few companies have the luxury of uncontrolled expenses.

It is surprising that all users did not practice contract administration during the SI contract. Some elemental processes, such as payment to the contractor on a scheduled basis if progress payments have been negotiated, must be performed.

Eighty percent of the SI customers indicated they were involved in education and training within their organizations. This number should not be interpreted to mean that 80% of the customers solely developed and trained their user organizations. Education and training components of SI contracts are common. Vendors routinely develop training materials and provide initial training services. They also train the customers' instructors. However, at some point during the contract, training is usually turned over to the customer.

An interesting finding of this study is that almost three-fourths of the users developed their own plans to integrate the SI deliverable into the existing system. Vendor services appear limited to development and integration of components. Most likely, SI solutions incorporate portions of existing systems. Impacted work flow processes were re-engineered by the user organizations.

2. Risk Management Tools Employed by Customers

The roles played by a customer's program management organization during an SI contract are similar to those of the vendor's program management staff. The customer's interests are best served by minimizing risks and problems that can potentially jeopardize the schedule, budget or deliverable products. Fluctuation or deviation from any of these can negatively impact a customer's main line of business and operations. The risk management tools applied by customers to manage SI contracts are listed in Exhibit IV-8.

EXHIBIT IV-8

Risk Management Tools Employed by Customers

	Number of Respondents Indicating Frequency of Use		
	Most Often	Sometimes	Never
Budget planning	13	1	1
Internal quality reviews	13	1	1
Schedule planning	12	1	1
Progress reviews	12	0	1
Schedule controls	8	2	4
Financial controls	8	1	5
Technical achievement measures	7	3	4
Sensitize all employees to risks	6	4	2
Change impact models	5	5	3
Contractor performance bonds	5	0	7
Risk management model	2	4	7
Independent quality reviews	2	5	6
Modular contracts	2	6	6

Budget planning, schedule planning and internal quality reviews are essential to customer organizations, according to users in this study. The application of more structured processes such as change impact models, schedule controls, financial controls, and technical achievement measures is dependent on the complexity of the project and the SI sophistication of

the customer's company. Experiences with SI contractors lead users to approach future contracts with more formal program management processes. This does not imply that users are generally unhappy with their SI relationships.

Systems integration experiences with vendors are maturing user organizations. After a client organization has gained experience using an SI vendor, the need or value of formal management practices becomes apparent. Vendors approach SI program management from a structured business standpoint. User organizations are finding that they must practice similar management techniques.

However, users find they do not need to mirror all processes that vendors employ. Risk management models are not used by half of the respondents. Financial control processes and measuring income and expenditure rates are frequently not required, from the users' perspective. Independent quality reviews are normally not performed if the user is satisfied with an internal assessment of the vendor's solution.

Surprisingly, only one-third of the respondents required their SI vendors to post performance bonds as a safeguard against non-performance. Federal agencies and many commercial users did not ask for performance bonds from their contractors. Vendor performance is better stimulated through financial incentives.

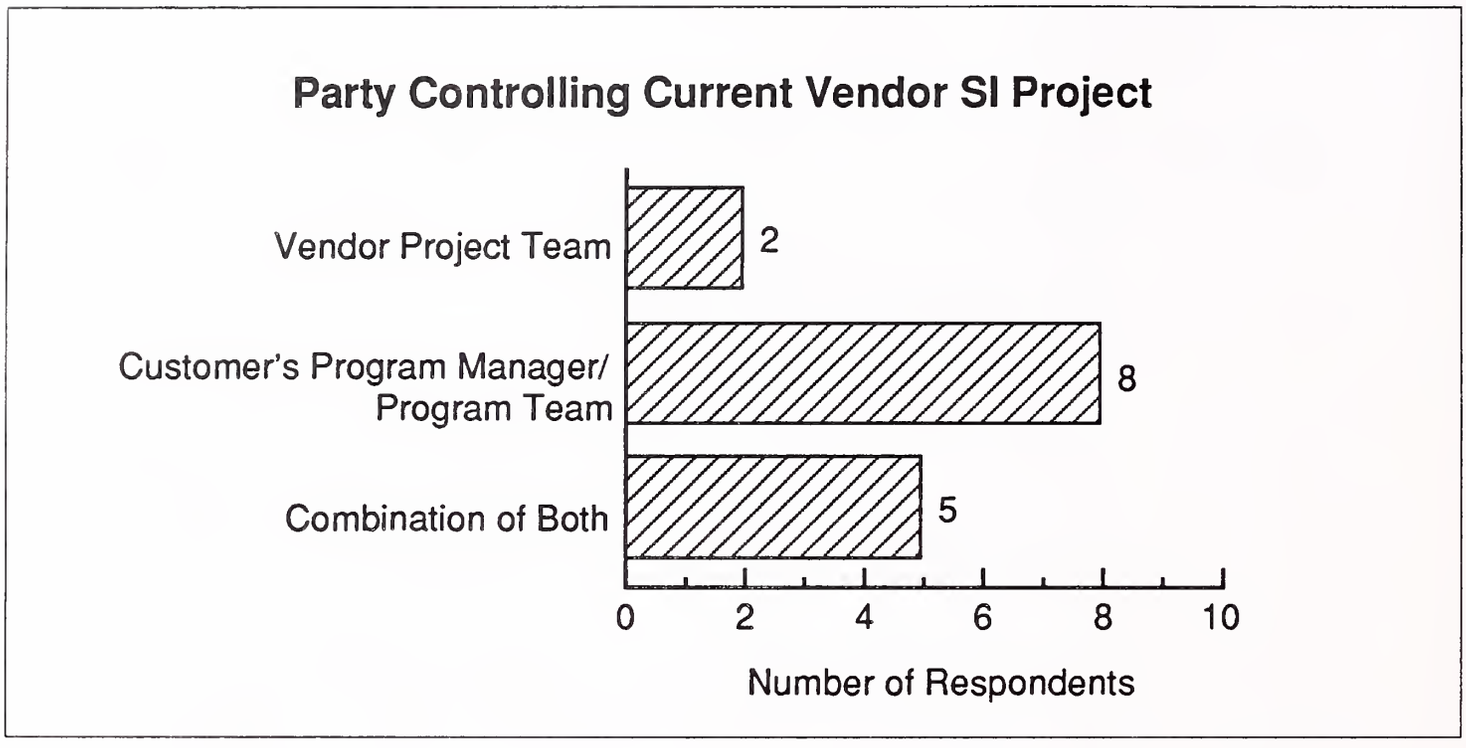
The scope of an SI contract determines the extent to which customers will advise and educate their employees on the risks associated with a proposed system.

3. SI Program Control

User organizations in this study were asked if the vendor or the customer controlled the current or recent SI relationship. About half perceive that their designated program managers or program teams are in charge. (See Exhibit IV-9.)

The term *control* is sensitive to users, and may be only a semantic issue. Control itself suggests an adversarial relationship between the two parties. Users want to believe that they impact the solution and dominate the contractor. Vendors are hired by users, and can be fired or replaced for non-performance. However, vendors are paid for their expertise in delivering a solution that the customer usually cannot develop. Users and vendors alike should place less emphasis on control and more on improving the SI relationship.

EXHIBIT IV-9



One-third of the users reported joint "control" with their SI contractors. The examples below illustrate some of the roles of both parties in a joint relationship:

- Customer involved in software development
- Vendor manages subcontractors totally
- Customer provides overall direction of the system
- End users participate in defining requirements
- Customer tests the system with the vendor

Some SI customers work side-by-side with a vendor to develop software components. Users expect vendors to manage and interface with all subcontractors involved in developing the system. The overall direction of the system is guided directly or indirectly by the customer's organization. End users are invited to participate in defining system requirements. Both the customer and the vendor jointly test the system against predefined criteria. Users report that "joint control" roles contribute to a "working relationship."

4. Factors That Build a Workable Vendor-Customer SI Relationship

From the user point of view, three factors are extremely important in forging a workable relationship between the SI contractor and the customer. As listed in Exhibit IV-10, these factors are: customer development of acceptance criteria, formal change management policies, and specific functional specifications developed by the customer.

It is critical for customers to define how they will determine to accept the final product the vendor delivers. Acceptance criteria are customarily defined by completion of specific tasks. Vendors are anxious to obtain the customer's acceptance criteria, preferably early in the SI process. Users in this study gave an average rating of 3.7 to vendor involvement in developing acceptance/delivery criteria. Evidently, vendors often assist customers in this process.

EXHIBIT IV-10

Customer Perception of SI Relationship Factors

Factor	Average Rating*
Customer development of acceptance criteria	4.7
Formal change management policies	4.7
Specific functional customer-developed specifications	4.7
Customer visibility during project life cycle	4.5
Continuity of vendor's staff	4.3
Buyer/user agreement on vendor program manager	4.3
Vendor program manager knowledgeable about customer's business	4.3
Vendor on customer site during transition	4.1
Vendor on customer site during development	3.9
Specific technical customer-developed specifications	3.7
Vendor involvement in developing delivery criteria	3.7
Vendor control of project	2.5

*Based on a 1-5 scale; where 5 = extremely important, and 1 = not important at all.

Establishing a formal change management policy is a basic practice because most SI contracts evolve into an exercise in managing change.

Primarily commercial customers describe desired features in a system, rather than tell vendors how to develop them. However, federal SI users place more importance on providing technical specifications to vendors.

Customer visibility during the project life cycle received a high score because it is important to customers and vendors alike. Sometimes the ultimate customer, the end user, is not involved in a project until the solution is ready to be delivered. Customer organizations realize that this is a bad policy. Use of the system and its eventual success may be jeopardized if all parties with a vested interest do not participate in the SI process with the vendor. All parties need to interact during all phases of an SI contract.

From the customers' perspective, a stable vendor's staff is ideal. However, users realize that zero staff turnover is an unrealistic expectation, especially in long-term projects. Users ask vendors to try to minimize personnel turnover. They may request specific contract terms addressing the longevity of the vendor's program manager. It is also preferable to the vendor that customer personnel have limited turnover during an SI contract. Continuity of requirements, personalities, processes, etc. facilitates a smoothly running SI process. Interaction dynamics are continuous.

If the customer organization finds it difficult to work with a vendor's program manager, the person is replaced, usually by upper management within the vendor's company. A vendor program manager experiencing trouble communicating with or responding to the SI client will quickly be reassigned within the company.

Vendor program managers should possess knowledge of the customer's business, or the ability to acquire it quickly. Fundamental to building a solution is understanding:

- Why an automated solution is required
- What functions it should provide
- What are the unique needs of the industry, and of the specific company?

According to clients it is more important for the vendor team to reside on site during transition to the new system than during its development. Federal respondents place equal importance on a vendor's on-site presence in each phase of an SI contract.

With one exception, the average high ratings given to each factor indicate the impact of numerous components on the success of a relationship. INPUT believes users rated "vendor control of the project" significantly lower than the other factors because of the connotation associated with the term control.

5. Communication Methods

Users in this study were asked their opinions on effective methods of communication between the vendor and client organizations. All agree that the scope of an SI contract influences the frequency of communication and interaction with the vendor. The forms of communication commonly used in SI relationships are listed below:

- Status meetings
- Problem meetings
- Written status reports
- Issue/problem memos
- Newsletters

The participants or audience for any of the above depend on the topic addressed. Sometimes communication is limited to one-on-one interaction between the vendor and customer program managers. On other occasions executive management and end users may be included, in addition to program management personnel. Fax machines and electronic mail are used to speed communication between the parties.

One additional communication vehicle that is particularly effective in building support from end users is product demonstrations that allow for hands-on use.

In one case, a dissatisfied respondent noted that communications between the vendor and the client do not guarantee that the client is heard. "Threatening the vendor's pocketbook" is extremely effective in getting the vendor to respond to client needs.

6. Lessons Learned by SI Customers

Two-thirds of the user respondents concluded that hiring a systems integration contractor is a learning experience. Insight into program management techniques are developed, which then affect how customers approach SI in the future. Respondents offer the following guidance on how to structure SI relationships with vendors:

- Develop detailed specifications and a contract
- Know end users' requirements
- Use formal program management processes
- Involve end users from the beginning

- Use incentive-based contracts
- Work closely with the vendor

Customers should not enter into SI contracts with ill-defined specifications and requirements. Examine the needs of end-user organizations before developing formal requirements. Buyers inexperienced in SI or lacking IS technical experience have difficulty defining requirements. In addition, many of these scenarios are invariably based on fixed-price contracts. The end results for the customer and the vendor may include: renegotiation of the contract, dissolution of the contract, or an unsatisfactory deliverable from the vendor.

Active participation in the program solution is encouraged through formal program management processes enacted by the customer's organization. Customers must monitor and manage the vendor's efforts to ensure a solution that satisfies the user organization.

Some users advise developing incentive-based contracts. Fixed-price contracts often put the vendor and the customer in adversarial roles. They do not work together. Little incentive is given to the vendor to deliver early. Customer-requested system changes result in a battle between the two parties.

Buyers of SI should bear in mind that they are purchasing a custom solution. It is likely that requirements will be modified as the system evolves. A contract vehicle should accommodate the transitional solution. Both the customer and the vendor desire satisfaction with the finished product. In order for a vendor to service a customer's needs, an amiable working relationship with the customer is essential. Most vendors attempt to develop mutual trust in their relationships with customers. However, the customer sets the rhythm of the vendor-customer relationship.

D

Contract Negotiation Issues and Recommendations

1. Contract Issues

In systems integration, "everything is fair game" during the contract negotiation phase. Rarely in the SI market do users require vendors to make special contractual arrangements to win a contract. Providing financial assistance through a third-party vendor appears to be the only circumstance under which a prime SI contractor will agree to furnish services outside the scope of the solution.

Negotiations lay the foundation for all future interactions in the vendor-client relationship. An SI contract should encompass the following critical elements:

- Agreement on deliverables and acceptance process

The SI customer and the vendor should agree on criteria to approve deliverables, as well as the processes that will be used by the customer in this phase. Vendors need to know what standards the customer will use to measure the success of the solution. The vendor can then configure and respond with an acceptable solution to the customer.

- Agreement on vendor's program management system

Agreement on the components of the vendor's program management system should be standard SI contract language. Program management systems provide discipline to improve the success of the program's development. If the vendor uses well-documented, repeatable processes, risks are reduced and costs are minimized. Some vendors use their program management strategies as a competitive advantage and as sales tools. Buyers should be cautious about hiring vendors lacking in program management processes and experience.

- Agreement on change management processes

A standard part of any vendor's program management system is change management. Agreement from both parties on a formal structured process to manage change throughout the development of the system is required. INPUT advises users to audit changes by mimicking the vendor's processes. A critical negotiation issue between the two parties is who is allowed to initiate changes. This issue raises questions for the customer as well as for the vendor.

- Number and selection of customer program team members

It is to the customer's advantage to commit to the number and makeup of their interface team to the vendor. The vendor can best respond with a satisfactory solution if all concerned parties are known from the beginning. The vendor may also recommend customer personnel that should be included in the interface team. For some systems, the client's customer could be affected and must be considered.

- Communication forms/audiences

How the vendor and the customer communicate to each other is determined at this time. Formal means of communication are normally included as standard contract items. Both parties settle on meeting and status report schedules, report content guidelines, and audiences. Canceled meetings, terse memos, delays in returning phone calls, and off-site meetings are all signs of a project going awry.

- Contract renegotiation terms

Terms by which either party may renegotiate the contract are standard contract language. By defining renegotiation terms, both parties are forced to engage in a "what if" analysis to protect their interests. If extensive modifications are needed in a contract, a new contract is usually negotiated.

- Schedule, cost, and cost escalation

Also standard are clauses on a projected deliverable schedule, and the cost of the solution provided by the vendor. Schedules specifying milestones are favored over those with one drop-dead delivery date. The scope of most SI projects dictates systematic program development, with components operable at different stages. Progress reviews and customer testing can be performed incrementally. If piecemeal payments to vendors are part of the contract terms, a "schedule of events" must be agreed to.

Most SI contracts contain verbiage addressing cost limitations on change requests or new requirements. Thresholds are established to provide vendors with guidelines on budget limitations. Change management procedures should incorporate this scenario.

- Contract type/form of payment

Obviously contract type, performance duration, and method of payment to the vendor are standard in SI contracts. Vendor financing services to the customer are also included in the contract, if applicable.

- Vendor location during development and transition phases

Contracts normally include a section addressing where the vendor will perform services, and if vendor or customer equipment and software will be utilized for development and operations.

2. Recommendations

In addition, INPUT recommends that users incorporate the following issues into SI contracts:

- Vendor's program manager's period of performance

To ensure the continuity of the vendor's approach to the system, users should demand that the vendor offer a time-period guarantee on how long the vendor program manager will remain assigned to the contract.

- Independent quality reviews

If independent quality reviews are deemed necessary by either party to resolve differences in perception, which party will contract for and pay the costs of an independent evaluation?

- Technology refreshment

Often, proceeding from a vendor's proposal to a deliverable solution takes years. New, more efficient, and often cheaper technology arrives in the marketplace daily. Users should ensure that SI vendors deliver solutions using up-to-date technology. Users' best interests are not served by receiving a system that is already antiquated.

- Software escrow

Unfortunately, many vendors' positions in the information systems industry are unstable. Users should guard against a vendor's possible bankruptcy or discontinuance of support by requesting that the original source code used to develop their systems be deposited with a third party as "software escrow." Maintenance of a system is critical to buyers of SI over the long term. Users need assurances from vendors that systems' functions can be continued under any circumstances.

- Technical data rights

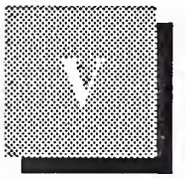
Specification of ownership rights to software developed during an SI engagement should be included in the contract. Vendors obviously want technology ownership, to re-sell the expertise to other buyers. Users mistakenly assume that they automatically obtain software exclusivity when they fund development. The issue of ownership of modified off-the-shelf products should also be clarified in the contract document.

- Non-disclosure agreements

Users should require vendors to sign non-disclosure agreements to protect the proprietary nature of the customer's business.

- Roles of each party

It is essential to the evolution of a working relationship between the vendor and the customer to spell out the expected roles and responsibilities of each party. Laying the groundwork in the contract forces each side to examine the dynamics of the relationship up front and come to agreement on how it will be executed.



Vendor SI Program Management

This chapter presents an overall view of vendor approaches to systems integration program management. Commonalities and differences relating to program management teams, tools and procedures, risk and change management are emphasized. Vendors' insight into the components of a successful SI job, and special strategies geared to improving client support are discussed. Attention is given to common problems and their resolution methods that evolve over the course of an SI contract.

The chapter concludes with an assessment of the lessons learned by SI vendors as reported in this study.

A
Program Management Staffing

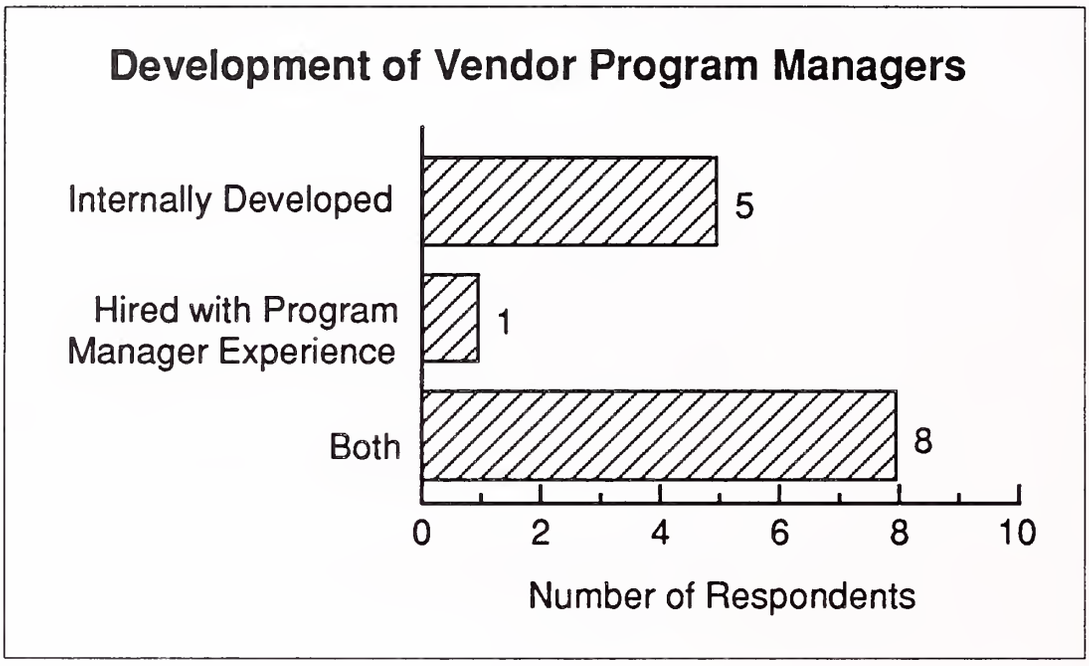
Vendor personnel assigned to systems integration projects include a program manager and a supporting staff to carry out the project. The program manager is responsible for the success of a project. The selection and development of program managers are critical processes for most SI vendors.

The vendor program manager must control the program from two perspectives. As the vendor, he is ultimately responsible for all deliverables, and the system working to the expectation of the functional design requirement. At the same time, he must also be a demanding client of his subcontractors on a small scale. He defines all of the requirements of a project for each of the subcontractors. While the prime vendor is responsible, often the reason for a program problem is the underperformance of a subcontractor or the inability of several companies to work together, or integrate their products and services. The vendor's program manager should be prepared to fall back on alternative subcontractors at any time.

1. Program Manager Development and Selection

Almost two-thirds of the vendors in this study use both internal and outside sources to staff their program management positions (see Exhibit V-1).

EXHIBIT V-1



Although vendors expressed a preference for appointing program managers who are internally trained over a long period, this practice is difficult to maintain. The development of program managers is a time-consuming and expensive process. Most vendors cannot ignore capable talent developed by competitors. INPUT found that companies that rely on internal talent are highly structured, with seemingly inexhaustible resources, or are in specialized SI markets.

Only one company hired experienced program managers exclusively. It had recently expanded into the SI market, and did not possess qualified in-house personnel.

As shown in Exhibit V-2, on average it took respondents 6.1 years to "grow" potential program managers in house. Training and skills development range from 2 to 15 years for small programs. Assignment to large programs is totally dependent on an individual's performance. One company reports that the process can take up to 25 years. Individuals hired with previous experience usually spend 1-2 years learning their new company's culture and processes before receiving an autonomous program manager assignment.

EXHIBIT V-2

Vendor Program Manager Training/Development Period

Method	Average Years of Training Required
Internally developed	6.1
Hired with experience	1.5

Note: Of the sample, 29% have formal, structured program manager training programs.

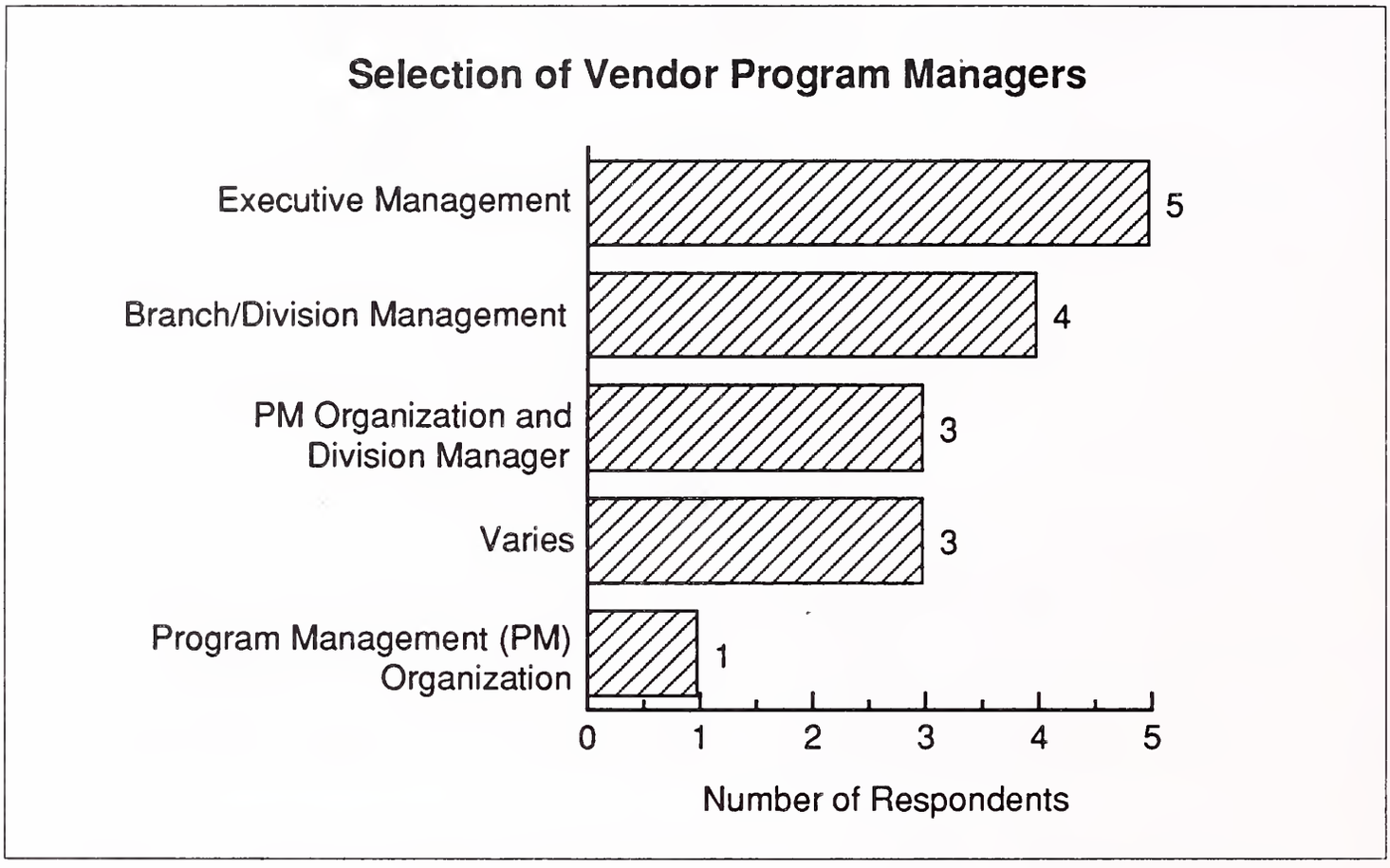
Companies proactively seek talent from many divisions or departments, because of the unique capability mix required of program managers. When the right blend of technical, managerial and other skills are found, individuals are placed in a program management track. Almost one-third of the sample indicated that their companies have already established formal program manager training programs.

The components of structured programs usually include specific training courses, skill assessment procedures, and on-the-job training at progressive levels of responsibility.

Exhibit V-3 shows who selects program managers at the vendor companies in this study. There is little uniformity in the responses given, with one exception. When a structured program manager training track exists, the program management organization is involved in making the assignment.

In other instances, executive management or branch/divisional management makes the selection. No correlation between company size and executive management involvement is evident among respondents. Some vendors indicated that executive management-level staff selects program managers only when large, complex, or highly visible contracts are won.

EXHIBIT V-3



Vendors in this study were asked to rate the importance of several criteria their companies use to evaluate program managers for SI contracts. Their average ratings are listed in Exhibit V-4.

The high ratings given to most of the criteria underlie overall requirements for a wide range of skills in SI program managers. Only one characteristic received a rating below 3.0. "Time with vendor company" received an average score of 2.9, reflecting the reality of staffing practices for many of the vendors.

Companies hire talent when and where they find it. An individual's skills are more important to becoming a qualified program manager than length of employment with a company. As noted earlier, most individuals with previous program management experience usually receive program management responsibility within one to two years of their start date with a new company.

EXHIBIT V-4

Vendor View of the Importance of Program Manager Characteristics

Characteristic	Average Rating*
Understand specific user's environment	4.5
Communication skills	4.5
People skills	4.3
Knowledge of own company's contracting practices	4.1
Knowledge of client organization's procedures	4.0
Program financial management experience	3.9
General ADP/IS knowledge	3.9
Management skills	3.9
Negotiation skills	3.6
Technical skills	3.5
History of applying TQM	3.1
Time with vendor company	2.9

* Based on a 1-5 scale; 5 = extremely important, and 1 = not important at all.

To vendors, the most critical qualification for a program manager is his understanding of the specific user's environment. This knowledge is essential to design, development, and implementation of a solution to solve a business problem for the customer.

If the vendor's program manager cannot empathize with the customer it will be difficult to build effective paths of communication between the two parties. Directly linked to communication skills are people skills. The vendor's program manager is usually the focal interface to the customer/buyer organization. If communications and personal interface relationships are poor, the SI program is doomed to fail. Vendor program managers are often removed from projects if this chemistry does not promptly develop with the customer.

In their role as "jack of all trades," vendor program managers should have a strong knowledge of contracting practices.

Negotiation skills are considered an important aptitude that will be applied at some point during a contract. Some vendors in the commercial sector involve program managers in the proposal and bidding phases of a project. Those that rely on negotiation teams during the pre-award phases note that their program managers eventually negotiate contract modifications during the program performance phase.

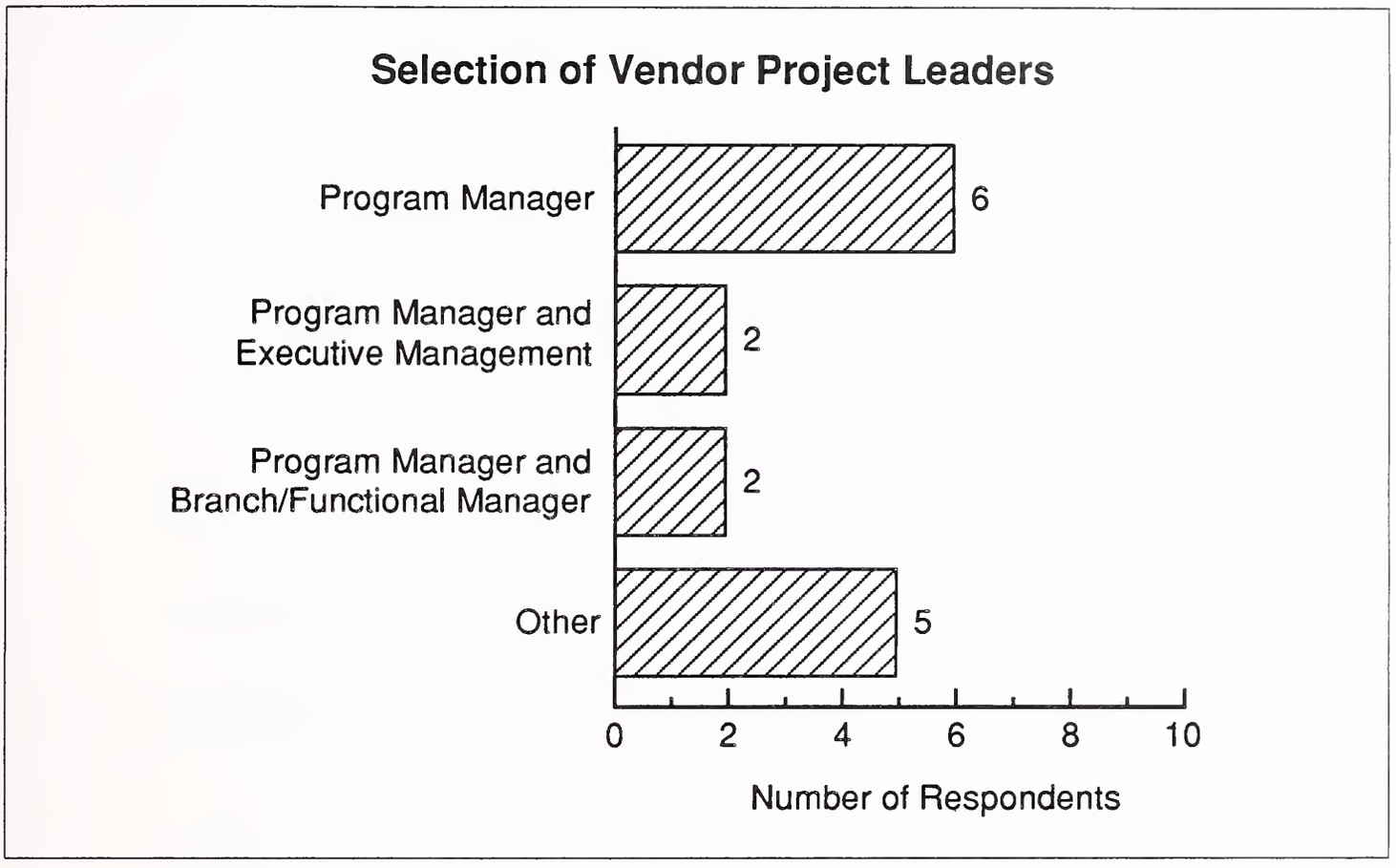
Although technical skills and a history of applying TQM received some of the lowest overall importance scores from respondents, this was only as related to the other characteristics. Respondents considered all characteristics important to a well-qualified program manager.

2. SI Management Team Selection

A diverse vendor staff is necessary to manage, design, and implement a systems integration program. Project leaders are assigned to handle specific project components. The supporting staff members perform the required services (tasks) to fulfill the contract. For approximately 75% of the companies interviewed, program managers participate in the selection of project leaders. At 40% of the companies, program managers have sole responsibility to select the individuals, as shown in Exhibit V-5.

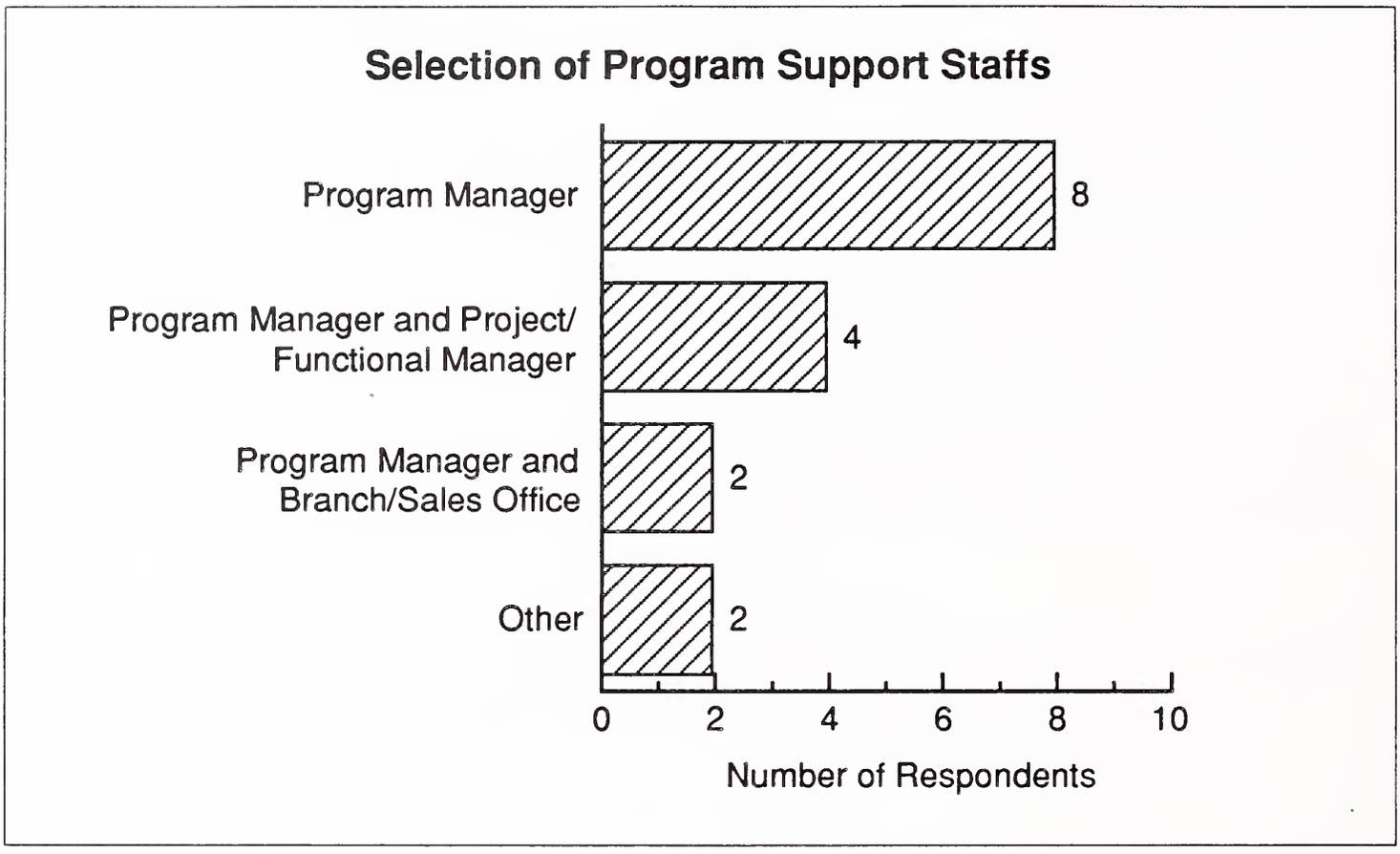
It is critical for program managers to choose their supporting management, senior technical staff and other team players carefully. The program manager is ultimately responsible for the success or failure of a program based on the team's performance. Vendor program managers make it their business to be well versed in the strengths and weaknesses of available talent within their companies.

EXHIBIT V-5



Program managers are always involved in the selection of program support staff at 90% of the companies in this study, as shown in Exhibit V-6.

EXHIBIT V-6

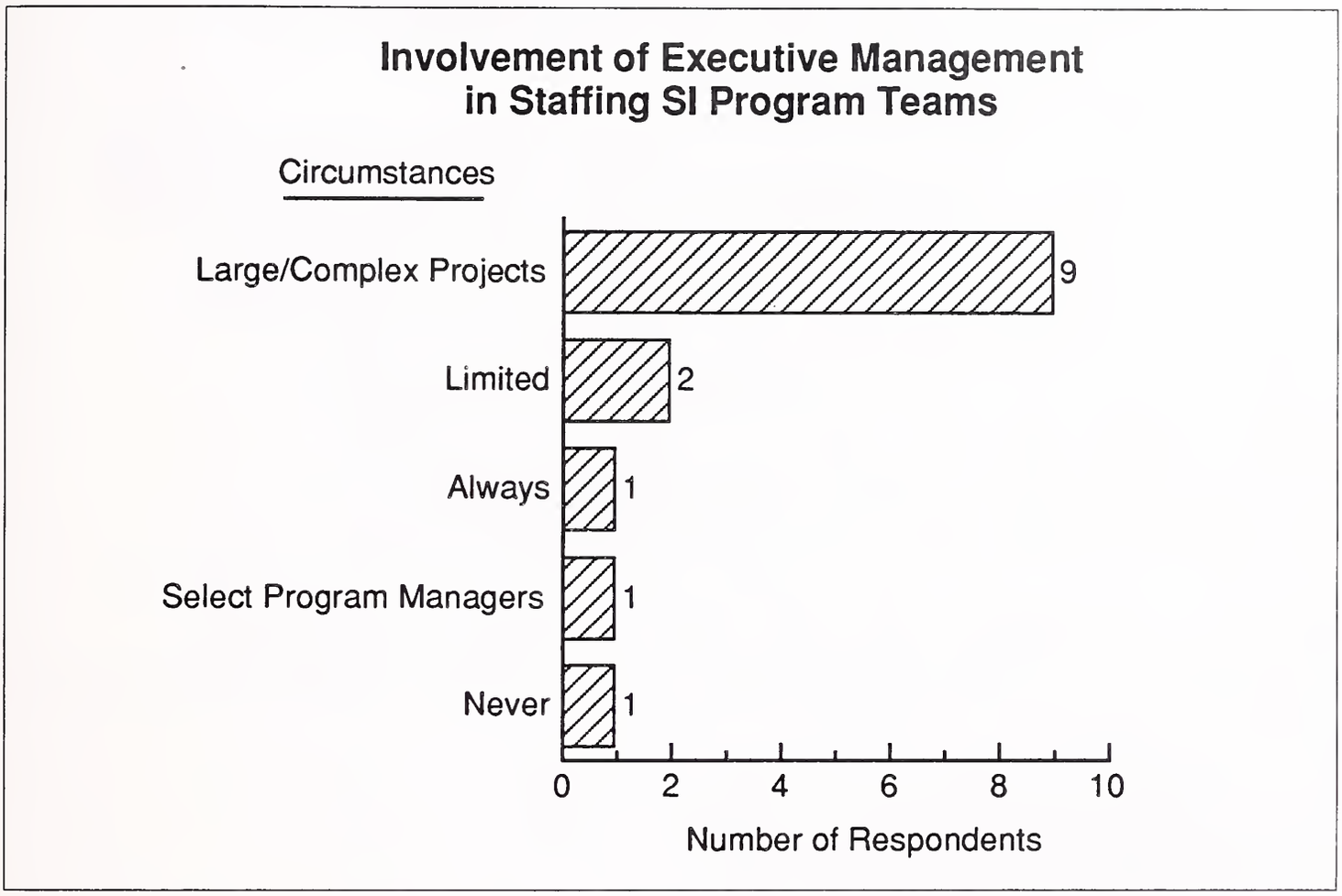


INPUT asked vendors to identify the circumstances under which executive management and personnel departments get involved in staffing SI management teams. As illustrated in Exhibit V-7, almost 65% of the vendors indicated that executive management's involvement was limited to large, complex contracts.

Large, complex projects often promise high revenue potential for vendors. The presence of executive management in these circumstances is believed to ensure a program's viability, and minimize associated risks.

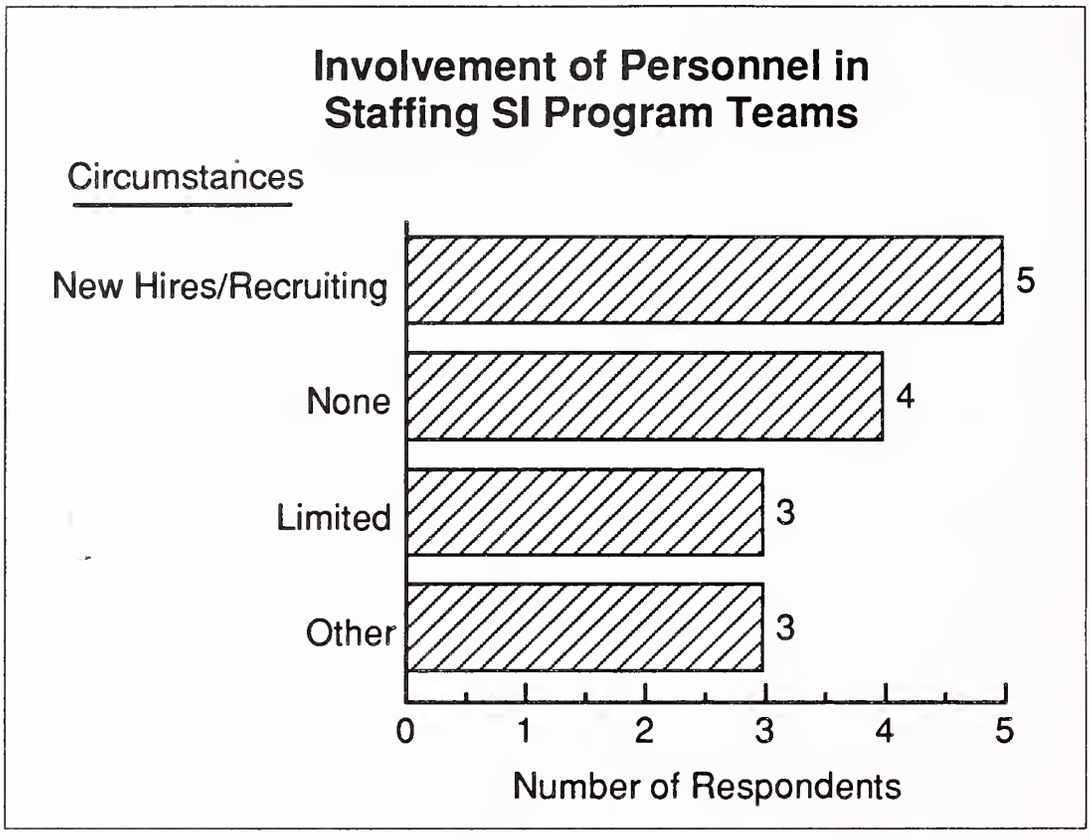
Executive management rarely gets involved in staffing SI project teams at the remaining vendor companies interviewed for this study.

EXHIBIT V-7



Evidently, personnel or human resource departments have little or no input in fulfilling staffing needs on SI contracts. As shown in Exhibit V-8, personnel functions are limited to recruitment and processing of new hires or maintaining and supplying employee files. Most program managers are responsible for screening and selecting current employees to complete their program teams.

EXHIBIT V-8



B

Risk Containment/Reduction Methods

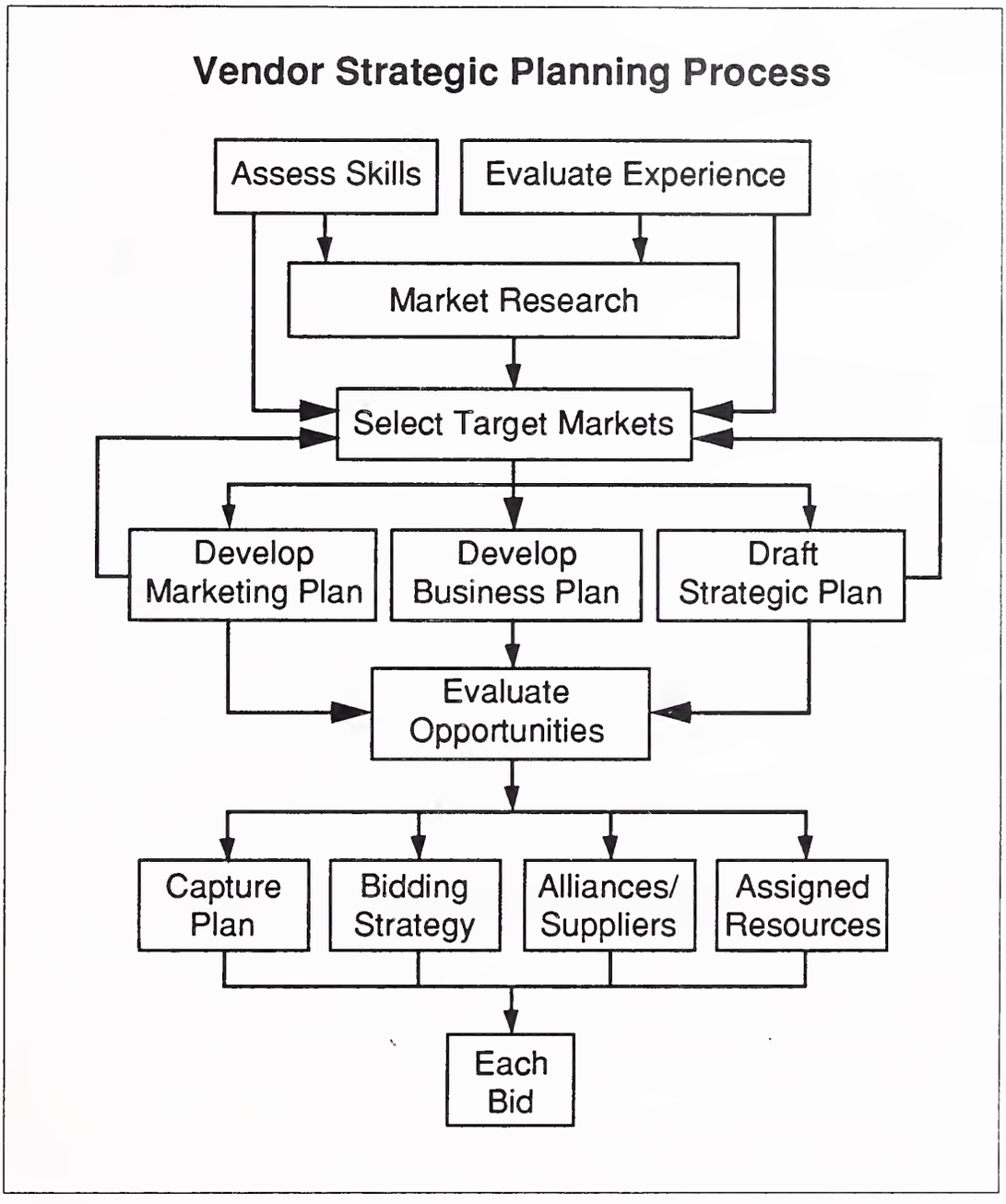
1. Vendor Strategic Planning Process

Systems integration is a highly competitive business. The first step successful vendors in this market take is to define a strategic planning process to provide ongoing guidance and minimize risks in the business capture process, as shown in Exhibit V-9.

First, vendors assess internal skills and experience levels before determining desirable markets (industry-specific, cross-industry, or a combination). Initially, new entrants into the market limit their target markets to one or two, based on internal availability of resources. As they develop their reputations and revenues, diversification and expansion into other market areas are made if they coincide with strategic goals.

The process allows for feedback and for the vendor to critically evaluate markets and opportunities as mapped against long-range goals.

EXHIBIT V-9



Vendors employ various risk management methods and procedures to ease the path of system development on schedule and at agreed costs. In reality vendors experience difficulty keeping these elements on track. The functionality of a system is often compromised if the original schedule and budget are not met.

As Exhibit V-10 illustrates, a formal risk management process is not followed by vendors for every SI contract. The size and complexity of a proposed system dictate the complexity of risk management procedures applied.

EXHIBIT V-10

Vendor Use of Risk Management Tools

Tool	Number of Respondents Indicating Frequency of Use		
	Most Often	Sometimes	Never
Budget planning	14	1	
Schedule planning	14		
Progress reviews	14	1	
Financial controls	13	1	
Schedule controls	12	2	
Sensitize all employees to risks	11	3	1
Technical achievement measures	10	4	
Internal quality reviews	9	5	1
Bid/No bid models	8	6	1
Share risks with subcontractors	8	6	
Change impact models	6	8	1
Risk management model	5	10	1
Liability insurance	4	7	3
Independent quality reviews	3	8	4
Rapid prototyping	2	10	1
Subcontractor performance bonds	2	9	4

Basic forms of risk management are practiced in most SI situations. Budget and schedule planning, control tools, and progress reviews must be applied to all projects of significant size and complexity.

Bid/no bid models are used most of the time by half of the vendors in this study. Rapid prototyping, risk management models, change impact models, and independent quality reviews are more dependent on technical complexity, specifications and the general circumstances affecting the contract.

Vendors are growing more astute in management of their subcontractor relationships. Increasingly, subcontractors are required to share risks with their primes, or post performance bonds.

However, performance bonds offer little guarantee to a prime contractor, especially when dealing with very small companies. If a subcontractor goes bankrupt or does not perform adequately, performance bonds allow for the replacement of the subcontractor. The prime has no input into the selection of the replacement vendor. Vendors in this study emphasize knowing a subcontractor's performance history, and detailing contractual responsibilities to improve subcontractor management. Program managers should keep backup contractors in mind.

Depending on the circumstances, vendors may hire another contractor to perform a quality review on their system. This practice helps demonstrate the prime contractor's professionalism. It contributes to development of an atmosphere of mutual trust between the prime and his customer.

Liability insurance is traditionally carried by major corporations. Some smaller vendors take out policies for specific contracts viewed as high risks.

Most vendors regularly conduct campaigns to educate appropriate employees to the potential risks associated with each contract. All employees should be aware of risk management procedures to avoid miscommunicating vendor intentions to a client.

Vendors now use a variety of automated tools to manage SI programs. In an INPUT study conducted in 1989, respondents did not indicate a preferred set of standard tools. However, in this study the majority of respondents report that their companies customarily use the tools listed in Exhibit V-11. The new data suggests that vendors are approaching SI management from a more structured and automated focus. Productivity gains and successful implementation goals are more easily met. A "waterfall" or a "whatever happens, happens" management approach is no longer tolerated in this high-risk, competitive market. In the early days of systems integration, vendors obviously performed SI services without experience.

Vendors did/do not use computer-aided systems engineering (CASE) tools as frequently as was expected. Applying CASE technology is more project dependent. INPUT also suspects that program managers in this study have very little experience using CASE in software development cycles.

EXHIBIT V-11

Vendor Use of Program Management/ Development Tools

Tool	Rank*
Budget tracking	1
Change management and tracking	2
Schedule and event tracking	2
Trouble reporting and tracking	4
Development methods	4
Life cycle methodologies	6
CASE tools	7

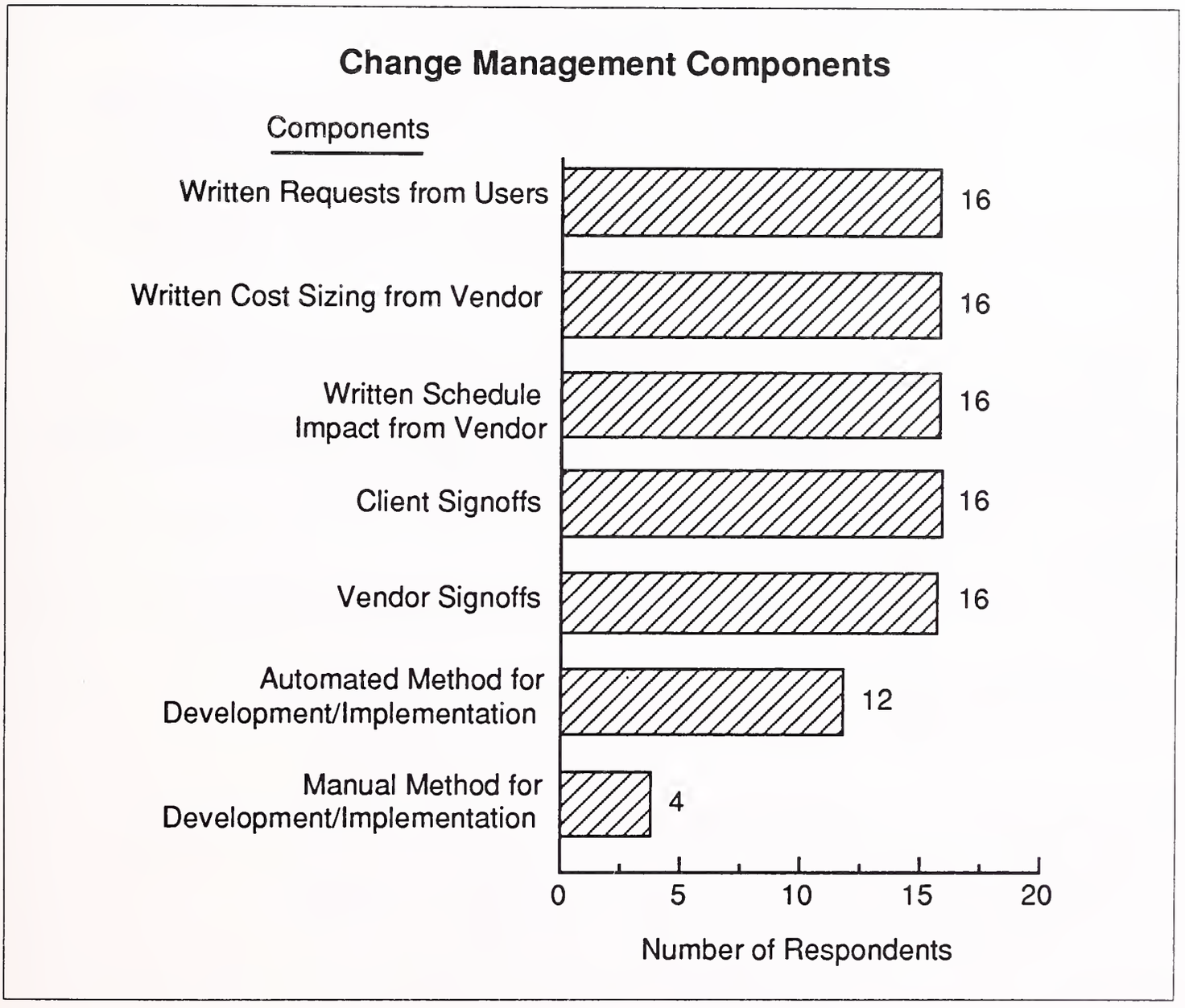
*Rank based on frequency of use

For this study, INPUT asked vendors to specify standard components included in their change management systems. Their responses are illustrated in Exhibit V-12.

It is not surprising that little deviation is apparent from their responses. Change is inherent in systems integration. It results from misunderstood, unclear, or dynamic requirements, as well as from problems and new requirements encountered during systems development and testing. Lessons learned in contracts prompt SI vendors to process changes carefully. It is to the advantage of vendors and customers alike to institute change management procedures. Mismanaged changes have the propensity to damage the success of a program for both the vendor and the

customer. In the past, some vendors have had to sacrifice profits because small changes eventually had significant impact on the schedule and costs or were accepted without adequate planning.

EXHIBIT V-12



All of the vendors in this study require their customers to submit written change requests. Vendors' responses are written, including the anticipated impact on existing schedules and additional cost estimates. In addition, vendors may offer alternatives to the suggested changes, and assess new possible risks.

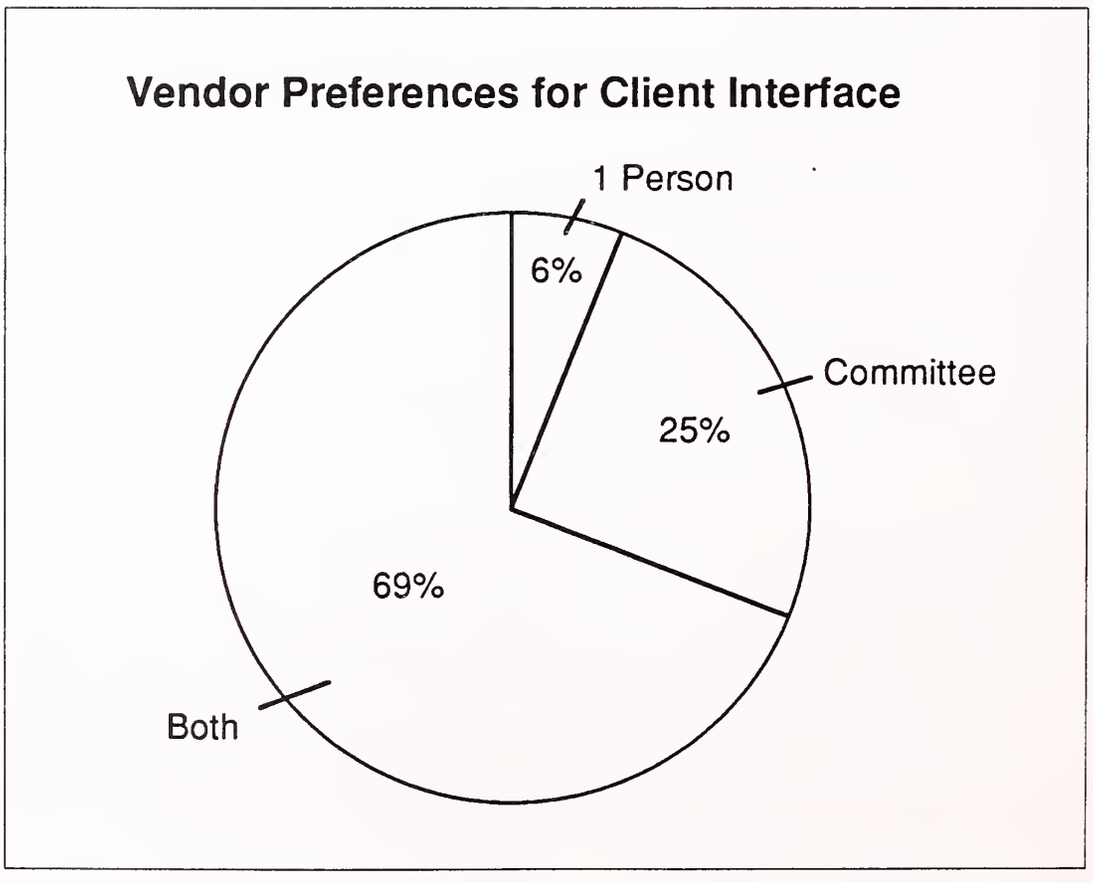
Once changes are agreed on, both parties state in writing that the changes are understood and will be implemented, and note all schedule and cost impacts. If applicable, additional system acceptance criteria may also be defined at this point.

To ensure that a change is introduced and incorporated into the program, either an automated or a manual tool is used to track it. Vendors in the federal SI market are long acquainted with using formal change processes dictated by the federal government.

Essential to risk minimization/containment is the structure of the vendor-client interface. Approximately 70% of vendors in this study favor a combination of single point of contact and committee/group as the client interface structure (see Exhibit V-13). Only one vendor prefers a single point of contact to represent the customer organization. This finding is totally the reverse of vendor preferences expressed in a 1989 INPUT study.

End users, not IS departments, are the ultimate consumers of information technology. IS departments are losing control and power over information processing in their organizations, as information processing is extended to the end-user community. If end users object to a system, it will never be successful. Most likely it won't be used.

EXHIBIT V-13



Although more participants add new dimensions and possible complications to an SI relationship, vendors prefer to interface with as many members of the customer organization as possible. Communications on requirements, needs and problems are improved. In addition, final acceptance of the new system is enhanced if the customer's program management team includes many levels of the organization.

It is an advantage to vendors to involve the ultimate end users early in the requirements process, and allow them to observe during the development and testing phases of a system. It is also helpful if the vendor's personnel work side by side with customer personnel. Mutual trust and communications are enhanced through the daily interaction of both parties. Fewer surprises occur when communications are maximized.

However, vendors pointed out that it is necessary for one individual from both the vendor and customer teams to ultimately control direction and have contractual signatory authority.

Vendors in the federal SI sector have little say in recommending interface structure. The federal process specifies a contracting officer and a project manager (the contracting officer's technical representative) to manage each project during the procurement process. These individuals are reassigned after the contract is awarded. Committee approval is required during the program design phase.

C

Vendor-Client Interaction Guidelines

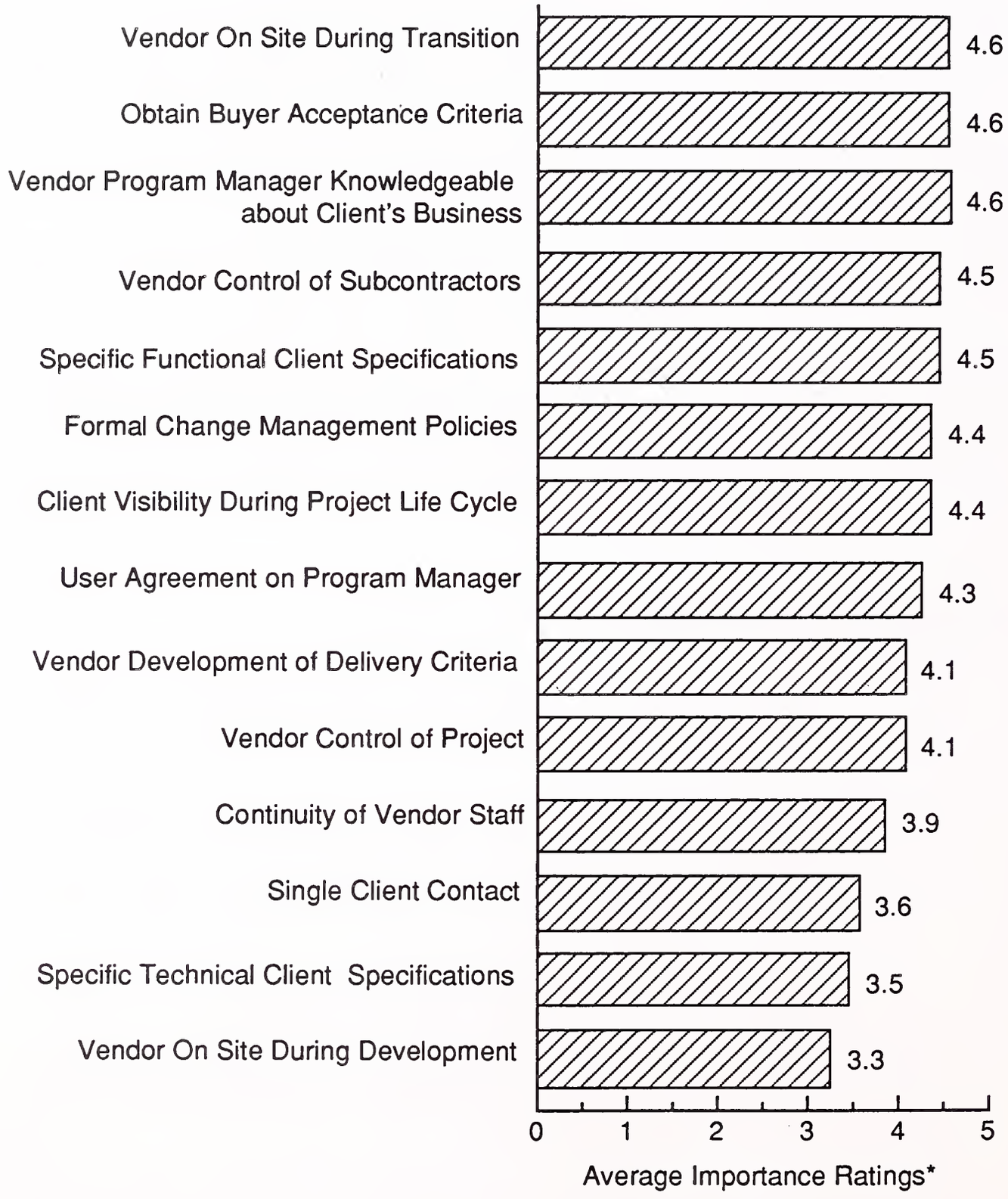
For this study, INPUT asked vendors to rate the importance of several factors in developing a workable relationship with their customers. Their average ratings are listed in order of importance in Exhibit V-14.

All of the factors received relatively high ratings. Ten out of thirteen were rated above 4.0. The relatively close ratings of the factors suggest that all contribute to a successful vendor-client relationship. It is not surprising that many factors are important in such a relationship, considering the size, complexity and number of components in most SI programs.

Based on the average ratings, vendors place more importance on receiving specific functional specifications from their customers than technical specifications. Vendors want to be told what type of system they should design, but don't want to receive instructions on how they should deliver it. After all, an SI contractor is hired to fill a lack of technical expertise within an organization.

EXHIBIT V-14

Vendor Perception of SI Relationship Factors



*Based on a 1-5 scale; where 5 = extremely important and 1 = not important at all

Fundamental to all SI relationships are the communication channels between the vendor and the client. The extent and levels of communication will directly impact the day-to-day realities of building a system, and lay the framework for ultimate program acceptance by the customer. Often the contract vehicle will define formal communication types and their frequencies between the two parties. Typical forms of communication used by vendors are listed below:

- Meetings (formal and informal)
- Progress reviews
- Written reports, problem summaries, status reports
- Newsletters
- E-mail
- Fax machines
- Teleconferences

INPUT hoped to find some associations by meeting type, frequency and audiences. But respondents stated that communication methods are dependent on each SI relationship. Formal and informal meetings, progress reviews, and some form of written reports are standard for each contract. Meetings may occur daily, weekly, monthly or quarterly. The audiences for meetings and written forms of communication are dependent on the subject and may include any of the following: program managers, steering committees, executive management, end users, or technical staffs.

Vendors utilize technology to communicate internally and with client companies. Electronic mail (E-mail) and fax machines speed notification of problems and other issues. Use of teleconferencing makes it easier to include participants from various locations.

Vendors often find themselves conducting sales promotion campaigns directed at end users to gain ultimate support for their systems, as shown in Exhibit V-15.

Some of the approaches aim at encouraging users to view themselves as part of the system's team. Demonstrations and workshops conducted at various stages of product development are regularly used by some vendors. Involving customers through observation, or soliciting their opinions during any of the development stages, makes customers feel important, whether or not their suggestions are incorporated.

Actively stressing the quality of a system, from the proposal phase through development and testing, helps to obtain customer acceptance. The desire of people to associate themselves with "quality" and "success" is part of human nature.

EXHIBIT V-15

Vendor Strategies to Promote Client Support

- Demonstrate system/conduct workshops
- Involve client in prototyping
- Obtain client opinions through all phases
- Publicize quality approach
- Involve customer in design reviews
- Conduct customer satisfaction surveys
- Offer technical/management advice

One vendor cited using customer satisfaction surveys as a vehicle to promote support. It is a good public relations tactic to demonstrate concern for the customer's satisfaction. Vendors who appear product—not profit—oriented will lay the groundwork for final product acceptance, and may win repeat business from a customer.

- Offering free consulting services on technical or management issues through advisory boards or corporate gurus improves the customer's perception of a vendor.

Vendors state that they are successful in obtaining satisfied customers when they maximize client interaction. Vendor teams must identify all possible players in a client organization. This is not always easily accomplished, especially in large organizations with multiple layers of infrastructure. Each SI contract is different.

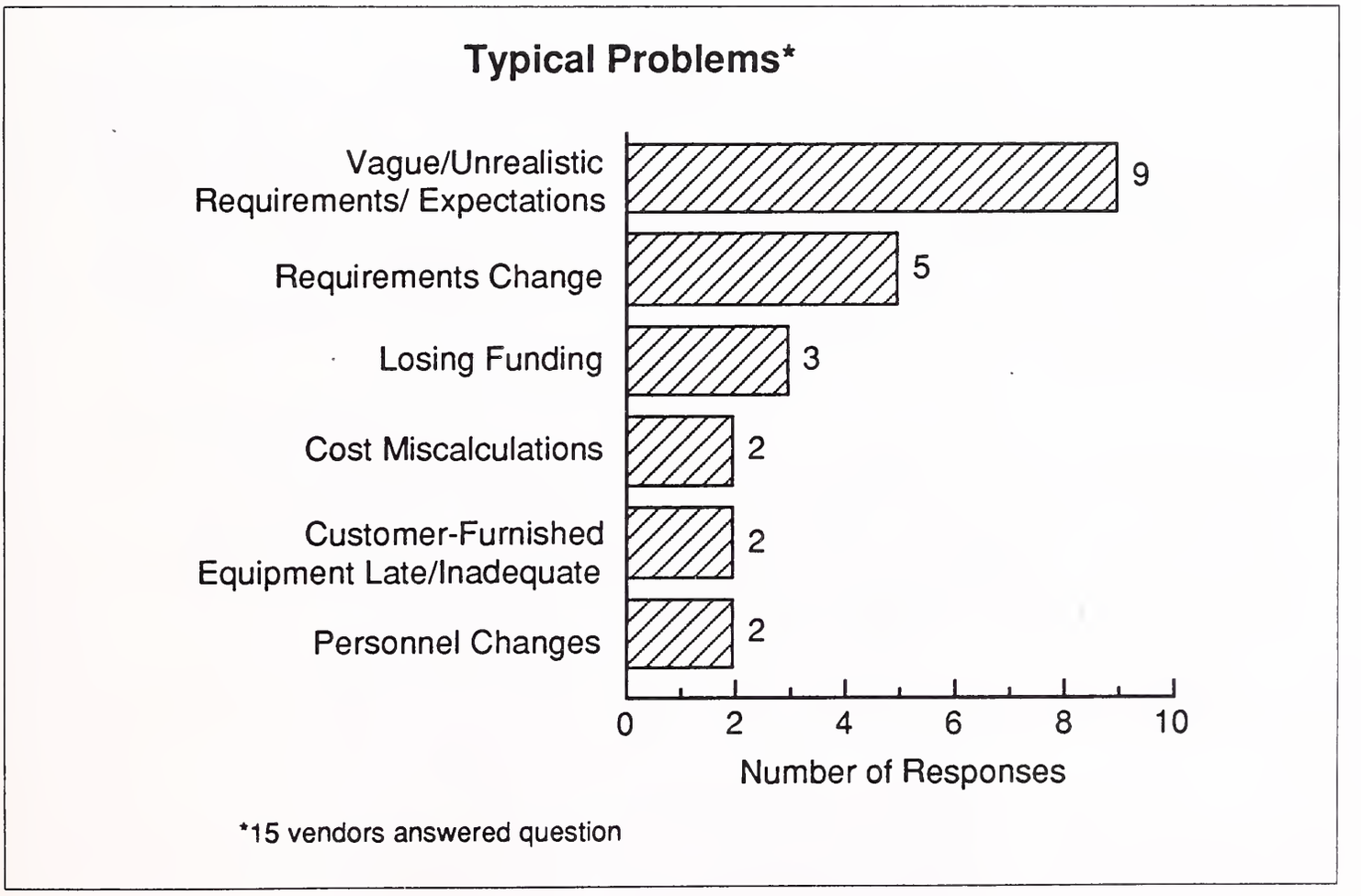
A unique campaign designed for each client relationship is mandatory.

D

Common Problems and Resolution Methods

The major problem encountered by vendors in SI contracts deals with customer requirements, as shown in Exhibit V-16. Vendors complain that customer requirements are often expressed in vague terms, and that expectations are frequently unrealistic. These complications are further exacerbated as requirements change during the performance of the contract. Vendors are placed in the position of trying to produce a deliverable solution that is often a "moving target." It is difficult to adhere to schedule and remain within budget under these conditions. This problem is only countered by opening up the lines of communication as early as possible in the SI relationship. Vendors should lay the groundwork for this eventuality prior to contract award.

EXHIBIT V-16



Another problem encountered by vendors, especially in the federal SI arena, is that programs can lose funding. In the federal government proposed spending must be approved on a yearly basis. As the federal deficit and budget problems continue, program manager could find themselves without appropriations during the course of a contract.

In the commercial arena, a program could lose management support or could be determined not to meet the business needs and be canceled.

When vendors underestimate the cost of producing a deliverable due to their own miscalculations, they usually cannot pass on additional costs to their customers. Vendors try to build into their contracts safeguards against absorbing costs associated with requirements changes.

In SI contracts, it is common for the customer to furnish equipment, or to expect the new system to operate in an existing hardware environment. The customer or vendor may underestimate the capacity requirements of the new system and the hardware can be inadequate. Also, if the customer purchased new equipment, delays in availability and shipping schedules will influence whether or not the SI contractor can perform to schedule.

Another common problem encountered during the life cycle of a contract is the issue of vendor and customer personnel changes. SI contracts are often long-term engagements. Personnel turnover due to job changes, retirement, promotion, or leaving the company is a problem that both vendors and customers face. Vendors attempt to curtail the continuity problem by rotating personnel on a scheduled basis. More staff members get experience on a contract. Some vendor personnel, such as program managers, are asked to contractually commit to a specified period of time.

Vendors expressed more fear of customer personnel turnover than shifts within their own staffs. Significant personnel turnover in the customer interface team often translates into new expectations and requirements of the vendor. Contracts may be terminated or rescoped at this point, depending on the severity of the changes. Although a loss of personnel within a vendor's staff is considered grievous, the overall contract performance can be regulated.

Other problems receiving singular mention by respondents are listed below:

- Subcontractor non-performance
- Lack of change management procedures
- Federal procurement process
- Poor vendor program manager
- End users not identified until end
- Customer control

Vendors should manage their subcontractors through strict contracts to ensure performance. Roles, responsibilities and rewards/penalties of the prime and the subcontractors should be clearly defined.

A lack of change management procedures caused one vendor to lose profits on jobs where "requirements creep" continued to escalate.

In the federal sector, SI contracts are frequently valued in the multimillion-dollar range. The lengthy procurement process itself, and the inevitable protest actions associated with contracts of this magnitude, often cause a program's requirements to be outdated before work is begun.

The chemistry between the vendor's program manager and the customer interface team could be lacking, making it difficult to work together. The vendor program manager may also perform ineffectively in a number of capacities. In either case, the individual is usually replaced.

One surprise no vendor wants to experience is discovering who end users are near the end of a contract. Even if a customer's buying organization feels that the system meets functional requirements, if end users do not accept the solution, the vendor is usually in trouble.

Another vendor mentioned that when a customer attempts to micromanage, conflict is sure to develop.

Attempts at resolving the above problems are not solved in revolutionary ways, according to vendors. The communications cornerstone of the relationship between the vendor and client often determines the resolution of a problem. It is to the vendor's advantage to work out a solution to the situation. Vendors want to bring their projects in on budget and schedule. It is vital to vendors to have satisfied customers.

It is not always clear to a customer that refusal to work out problems with the vendor can result in a no-win situation for all parties. In firm fixed-price situations, vendors prefer to renegotiate contract terms addressing requirements changes, and schedule and cost impacts. If the customer is unwilling to do so, the vendor is placed in the position of absorbing the additional costs, or producing a product that will not meet customer expectations. Both parties should be sensible and open to making the relationship work. The process must be included in the contract for protection of both parties.

A completely canceled SI program is rare. Vendors were asked to specifically comment on any problems that have caused SI contracts to be canceled, or significantly delayed. Most vendor respondents did not have first-hand knowledge of this type of situation. Of those that had, the situations are listed below:

- No agreement on requirements in a multi-user environment
- Requirements changed totally
- Requirements were totally misunderstood
- Customer sponsoring organization changed
- User never wanted solution

If users cannot agree on requirements, a vendor cannot produce a solution. If requirements change totally over time, or are completely misunderstood by the vendor, work on a contract is usually halted. A new user sponsoring organization may decide there is no need for the proposed system.

In one case in the federal government, Congress forced an agency to use a system on a trial basis. The agency never intended to adopt the system nationwide. A relationship or system is doomed from the start, if end-user support of a system is not evident.

E

Lessons Learned from Successful SI Projects

The lessons vendors have learned from their previous SI relationships offer practical advice for SI program managers:

- Identify all customer levels early
- Communicate to all customer levels
- Agree on requirements
- Use formal management tools and processes
- Avoid fixed-price contracts
- Improve subcontractor management

From the vendors' view, a key element in developing a successful SI relationship with a customer is to identify all levels of the customer organization involved in the project. Vendors should know "who their customers are within the client organization" to fully develop a system satisfying varying needs. Early identification of all users is necessary to strategize and channel communication to appropriate levels within the organization.

Mutual trust is built between the two parties through repeated exchanges of information. Vendors expressed a desire to be included in discussions of their customers' systems problems and business directions. Non-expressed customer agendas and needs become apparent to vendors through frequent interaction. Vendors who achieve a business-partner-like status with their customers will improve the likelihood of successful contracts and build solid reputations.

The atmosphere of mutual trust is also enhanced when communications between the two parties are not restricted to single point of contact for each side. Vendor marketing campaigns to promote a system's acceptance should be aimed at all user levels. In today's SI relationship, the usefulness of a single point of contact in both the vendor and customer organizations is limited to contractual issues and signatory authority.

Communication must be managed, not stifled; the same story should be presented to the vendor organization that is communicated to the customer.

An open communications framework allows for the visibility and opportunity to resolve cost, schedule and technical performance issues.

The systems integration process naturally includes change associated with development problems and variances in requirements. The lines of communication should be open at all times to address the demands of change.

Communication between the vendor and the customer is central to clarifying requirements and coming to agreement on realistic expectations of the finished systems solution.

For commercial clients, the vendor usually takes on the task of attempting to clarify customer requirements and acceptance criteria. It is to his advantage to straighten out any misunderstanding of the requirements. A dissatisfied customer may default on the contract.

Conversely, federal contracts tend to have more explicit definitions of functional and technical specifications, leaving little room for the vendor to offer alternative solutions.

Many buyers and federal contracting officers feel safer with fixed-price contracts. This type of contract is not favored by vendors. Systems integration is a "service" deliverable, not a commodity item. The difficulty in obtaining clear requirements and final acceptance criteria from the customer makes fixed-price payment a poor risk for vendors.

Small changes to a system often add up, and can significantly impact a vendor's profitability and the project schedule. In the past, vendors often sacrificed profits to keep their customers happy. Now however, some are refusing to perform SI services under fixed-price conditions. It is a no-win situation for the vendor and, ultimately, for the customer.

Another reason vendors avoid fixed-price contracts is that on long-term projects it is difficult to estimate and bid labor costs years in advance. Cost-escalation clauses attempt to alleviate this problem.

Most vendors advocate the use of formal management tools and procedures to develop and control systems integration projects. The complexity and the number of vendor and customer personnel involved in engagements drive the need for this practice. Following formal risk management and control procedures minimizes surprises for the vendor and ultimately for the customer.

The importance of subcontractor management is a critical aspect in most SI contracts. The Statement Of Work (S.O.W.) and the final contract document should clearly delineate the subcontractors' roles, responsibilities and expected measures of achievement. Most prime contractors also expect their subcontractors to share in the risks associated with a system.

How and when communication occurs between vendors and their SI customers has a direct impact on producing a successful contract for both parties. Other issues also play roles in creating an environment geared toward success. Flexible contracts, the use of formal management tools and processes, and the prime contractor's strict control over subcontractors are equally important.

Conclusions and Recommendations

This chapter focuses on the conclusions drawn from the management processes employed by SI vendors and customers of SI services. Recommendations are offered to vendors and customers to improve relationships in a changing technology environment and economy.

A
Conclusions

The following conclusions are based on the experiences of respondents in this study:

- Program management needs drive the processes employed by vendors and customers.
- Program management needs and processes increase with experience.
- Customers and vendors are forging more business-partner-like relationships.
- Customers and vendors share similar views of success factors.
- For some vendors, presence in the SI market is a result of migrating from their traditional line of business.

The scope of each SI engagement determines the extent of program management tools and procedures adopted by the vendor and the customer. Vendor approaches are normally more complex. The vendor assumes more risk, especially if payment does not occur until the project is complete. Vendors are responsible for development of the system and utilize program development tools and methodologies to streamline the process. Well-documented, repeatable processes provide essential discipline that will improve overall program success. Repeatable processes also reduce risk. Vendors feel that their repertoire is increased with each SI contract completed. In addition to enhancing technical skills, "what to do" and "what not to do" lessons are transmitted within the organization.

Users too, enact similar processes to manage the vendor relationship. However, at this time, formal training of program managers and the development of written program management procedures are not as prevalent in customer organizations. For many users, SI services are solicited infrequently. Companies anticipating negotiating future SI contracts appear to be making plans to improve training of their program managers or management team. They are also implementing more stringent program management techniques.

Vendors and customers agree that relationships that position the parties as opponents do not foster the development of a satisfactory solution. In the past, SI scenarios cast contractors and customers in rigid roles. Each side tried to protect its interests by not deviating from contract terms. Now, open communication is advocated by both parties.

Users and vendors are adopting postures which at first glance seem contradictory. Newer contracts include additional safeguards and specific requirements and expectations. But both parties agree that communicating on these issues in written and verbal forms fosters an open relationship, building mutual trust.

Vendors and customer organizations share mutual goals of bringing in a system on time, within budget, that satisfies the customer. The only critical difference in the goals of the two groups is that vendors need to make a profit.

Many of the vendors in the systems integration market entered it to stem losses occurring from their traditional lines of business. Users' demands for new products developed according to OSI guidelines, and connectivity of existing disparate—and often proprietary—systems have been hurting professional services firms and hardware and software vendors. To remain in business, let alone make a profit, most IS vendors have expanded from their traditional lines of business. Vendors have adopted service marketing and selling strategies, instead of emphasizing tangible products. This new approach has caused many vendors to totally reorganize their corporate structures and support organizations.

B
Recommendations

1. Vendor Recommendations

INPUT offers the advice below to vendors in the systems integration marketplace:

- Continue to formally develop program management processes and tools.

- Use program management processes as marketing tools.
- Persevere in obtaining detailed specifications and expectations from customers.
- Educate potential customers on expected relationship dynamics prior to contract award.
- Demand to interface with parties that will be impacted by the SI solution.
- Avoid fixed-price contracts.
- Push for incremental delivery, acceptance and payment terms from the customer.

For existing SI vendors, continued development and improvement of SI program management processes is a must. Just as systems integration is evolutionary, so are the processes that support it. New entrants into the market must establish their own processes in order to become competitive. Hiring program management talent from competitors assists in solving this problem, and rapidly builds SI skill qualifications.

Program management tools and procedures should be touted in the sales cycle to a buying organization. Many vendors already employ this tactic. Because SI is a service, descriptions and demonstrations of how the service will be managed has proved particularly effective in winning contracts. The practice demonstrates the professional approach the contractor will apply to developing a solution.

The first rule governing any SI contract is to make sure that all customer requirements and expectations are communicated, documented and understood by the vendor. This is not an easily accomplished task, nor is it ever totally finished until the customer is satisfied. Vendors must guard against requirements creep due to varying circumstances: new personnel in the customer organization, new business lines, unexpected needs, problems in development, etc. Management of requirements and expectations can only effectively be accomplished through open communication paths with all levels of the customer organization.

Prior to contract award it is important to stress to buyers the expected vendor and customer roles in the relationship. The stage should be set early, to avoid possible misunderstandings.

In order to deliver a satisfactory solution that will actually be used by the customer organization, vendors prefer to consult end users directly. One cannot assume that the customer interface organization always represents the best interests of end users.

Fixed-price contracts prevent vendors from delivering a solution that the customer may find unsatisfactory. Changes are invariably made during system development. Adherence to a rigid price ceiling does not allow the vendor and the customer to respond to revised requirements over the course of the contract.

Vendors no longer find it economically expedient to sacrifice profits to make a customer happy. Vendors should market acceptable contract terms to potential customers by explaining the pitfalls of fixed-price contracts. Incentive-based contracts stimulate vendor services.

Vendors ought to negotiate incremental acceptance and payment terms from their SI customers. System problems are managed more easily if a modular approach is used to provide deliverables. Incremental payments based on milestone delivery dates for components are preferable to vendors. SI development costs are often high, especially for long-term contracts. The vendor assumes more risk when paid at the successful completion of a contract. When the customer does not accept the vendor's solution, the vendor shoulders all costs.

2. Customer Recommendations

INPUT recommends the following to customers of SI vendor services:

- Evaluate the vendor's program management personnel, processes and procedures.
- Involve end users in defining requirements.
- Thoroughly evaluate vendors' SI reputations and current credentials prior to contract award.
- Structure incentive-based contracts.
- Foster open communication with the vendor as early as possible.
- View the relationship as a business partnership.
- Establish and evolve SI program management processes.
- Prepare for change during the contract.

Evaluate and compare potential vendors thoroughly. Vendors should be asked to submit a detailed program management proposal that includes a strategic MIS plan and a functional assessment. Also examine the methodologies, processes and procedures that will be used by the vendor organization during the course of the contract. Rely on the vendor's reputation and check references from previous engagements before selecting a vendor.

SI customers should avoid the mistake of excluding end users from assisting in the requirements definition phase. A system is doomed to fail if this group's requirements and input are not incorporated into the specifications given to the SI contractor. End users should also be involved in testing the developed system. By involving end users in the various stages of an SI contract, final acceptance and ultimate use of the system is guaranteed.

Buyers need to thoroughly investigate potential vendors before signing a contract. How a contractor performs can have positive or negative effects on a customer's business. The vendor's reputation and experience in previous SI contracts are usually reliable indicators of future performance. Check references! The company's financial condition is a consideration if long-term support is anticipated.

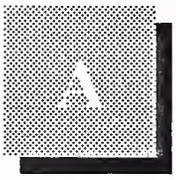
Offer incentive-based contracts to vendors. SI users have found that vendors will deliver the solution quicker if additional incentives are built into the contract.

Try to develop an atmosphere of open communication with the vendor. Involve all customer personnel impacted by the proposed system. If possible, begin honest discussions prior to contract award. Discussion of daily business operations with the vendor will help vendor personnel tailor a system to the user's environment.

An atmosphere of open communication is conducive to the development of mutual trust between the two parties. Once this point is reached, the potential exists to build a business-partner-like relationship between the two parties.

Before making the decision to contract with an SI vendor, the customer organization needs to critically evaluate and establish program management processes. Risks to the customer are reduced when buyers monitor vendor processes. Customers should be ready to modify and initiate additional procedures as situations evolve.

Enter SI contracts with the anticipation that change is inherent in the systems integration process. SI produces a custom service deliverable. Problems associated with development and new business requirements may induce changes to the system originally envisioned. A flexible customer will be a satisfied customer.



Definition of Terms

A
Introduction

INPUT's *Definition of Terms* provides the framework for all of INPUT's market analyses and forecasts of the information services industry. It is used for all U.S. programs. The structure defined in Exhibit A-1 is also used in Europe and for the worldwide forecast.

One of the strengths of INPUT's market analysis services is the consistency of the underlying market sizing and forecast data. Each year INPUT reviews its industry structure and makes changes if they are required. When changes are made they are carefully documented and the new definitions and forecasts reconciled to the prior definitions and forecasts. INPUT clients have the benefit of being able to track market forecast data from year to year against a proven and consistent foundation of definitions.

For 1992 INPUT has added one delivery mode and defined three new submodes to its Information Services Industry Structure:

- *Equipment Services* has been added as the ninth delivery mode. INPUT has forecasted the equipment maintenance, support and related services market through its Customer Services Programs for a number or years. Starting in 1992, the equipment services portion of the customer services market will be included in the total information services industry as defined by INPUT. Other portions of this market (such as software support) are already included.

- Two new submodes have been defined in the *Systems Operations* delivery mode - *desktop services* and *network management*. They are defined on pages 5 and 6.

- A fourth submode has been defined within the Professional Services delivery mode—*applications management*. This change reflects a shift in the way some software development and maintenance services are purchased. A complete definition is provided on page 6.

A series of definitions for computer equipment have also been added.

Changes from the 1991 INPUT *Definition of Terms* are indicated with a ☆.

B
Overall Definitions and Analytical Framework

1. Information Services

Information Services are computer/telecommunications-related products and services that are oriented toward the development or use of information systems. Information services typically involve one or more of the following:

- Use of vendor-provided computer processing services to develop or run applications or provide services such as disaster recovery or data entry (called *Processing Services*)
- A combination of computer equipment, packaged software and associated support services which will meet an application systems need (called *Turnkey Systems*)
- Packaged software products, including systems software or applications software products (called *Software Products*)
- People services that support users in developing and operating their own information systems (called *Professional Services*)
- The combination of products (software and equipment) and services where the vendor assumes total responsibility for the development of a custom integrated solution to an information systems need (called *Systems Integration*)
- Services that provide operation and management of all or a significant part of a user's information systems functions under a long-term contract (called *Systems Operations*)
- Services that support the delivery of information in electronic form—typically network-oriented services such as value-added networks, electronic mail and document interchange (called *Network Applications*)
- Services that support the access and use of public and proprietary information such as on-line data bases and news services (called *Electronic Information Services*)
- Services that support the operation of computer and digital communication equipment (called *Equipment Services*)

In general, the market for information services does not involve providing equipment to users. The exception is where the equipment is part of an overall service offering such as a turnkey system, a systems operations contract, or a systems integration project.

The information services market also excludes pure data transport services (i.e., data or voice communications circuits). However, where information transport is associated with a network-based service (e.g., electronic data interchange services), or cannot be feasibly separated from other bundled services (e.g., some systems operations contracts), the transport costs are included as part of the services market.

The analytical framework of the information services industry consists of the following interacting factors: overall and industry-specific business environment (trends, events and issues); technology environment; user information system requirements; size and structure of information services markets; vendors and their products, services and revenues; distribution channels; and competitive issues.

2. Market Forecasts/User Expenditures

All information services market forecasts are estimates of *User Expenditures* for information services. When questions arise about the proper place to count these expenditures, INPUT addresses them from the user's viewpoint: expenditures are categorized according to what users perceive they are buying.

By focusing on user expenditures, INPUT avoids two problems which are related to the distribution channels for various categories of services:

- Double counting, which can occur by estimating total vendor revenues when there is significant reselling within the industry (e.g., software sales to turnkey vendors for repackaging and resale to end users)

- Missed counting, which can occur when sales to end users go through indirect channels such as mail order retailers

Captive Information Services User Expenditures are expenditures for products and services provided by a vendor that is part of the same parent corporation as the user. These expenditures are not included in INPUT forecasts.

Non-captive Information Services User Expenditures are expenditures that go to vendors that have a different parent corporation than the user. It is these expenditures which constitute the information services market analyzed by INPUT and that are included in INPUT forecasts.

3. Delivery Modes

Delivery Modes are defined as specific products and services that satisfy a given user need. While *Market Sectors* specify *who* the buyer is, *Delivery Modes* specify *what* the user is buying.

Of the nine delivery modes defined by INPUT, six are considered primary products or services:

- *Processing Services*
- *Network Services*
- *Professional Services*
- *Applications Software Products*
- *Systems Software Products*
- *Equipment Services*

The remaining three delivery modes represent combinations of these products and services, combined with equipment, management and/or other services:

- *Turnkey Systems*
- *Systems Operations*
- *Systems Integration*

Section C describes the delivery modes and their structure in more detail.

4. Market Sectors

Market Sectors or markets are groupings or categories of the buyers of information services. There are three types of user markets:

- *Vertical Industry* markets, such as Banking, Transportation, Utilities, etc. These are called "industry-specific" markets.

- *Functional Application* markets, such as Human Resources, Accounting, etc. These are called "cross-industry" markets.

- *Other* markets, which are neither industry- nor application-specific, such as the market for systems software products and much of the on-line data base market.

Specific market sectors used by INPUT are defined in Section E, below.

5. Trading Communities

Information technology is playing a major role in re-engineering, not just companies but the value chain or *Trading Communities* in which these companies operate. This re-engineering is resulting in electronic commerce emerging where interorganizational electronic systems facilitate the business processes of the trading community.

- A trading community is the group or organizations—commercial and non-commercial—involved in producing a good or services.

- Electronic commerce and trading communities are addressed in INPUT's EDI and Electronic Commerce Program.

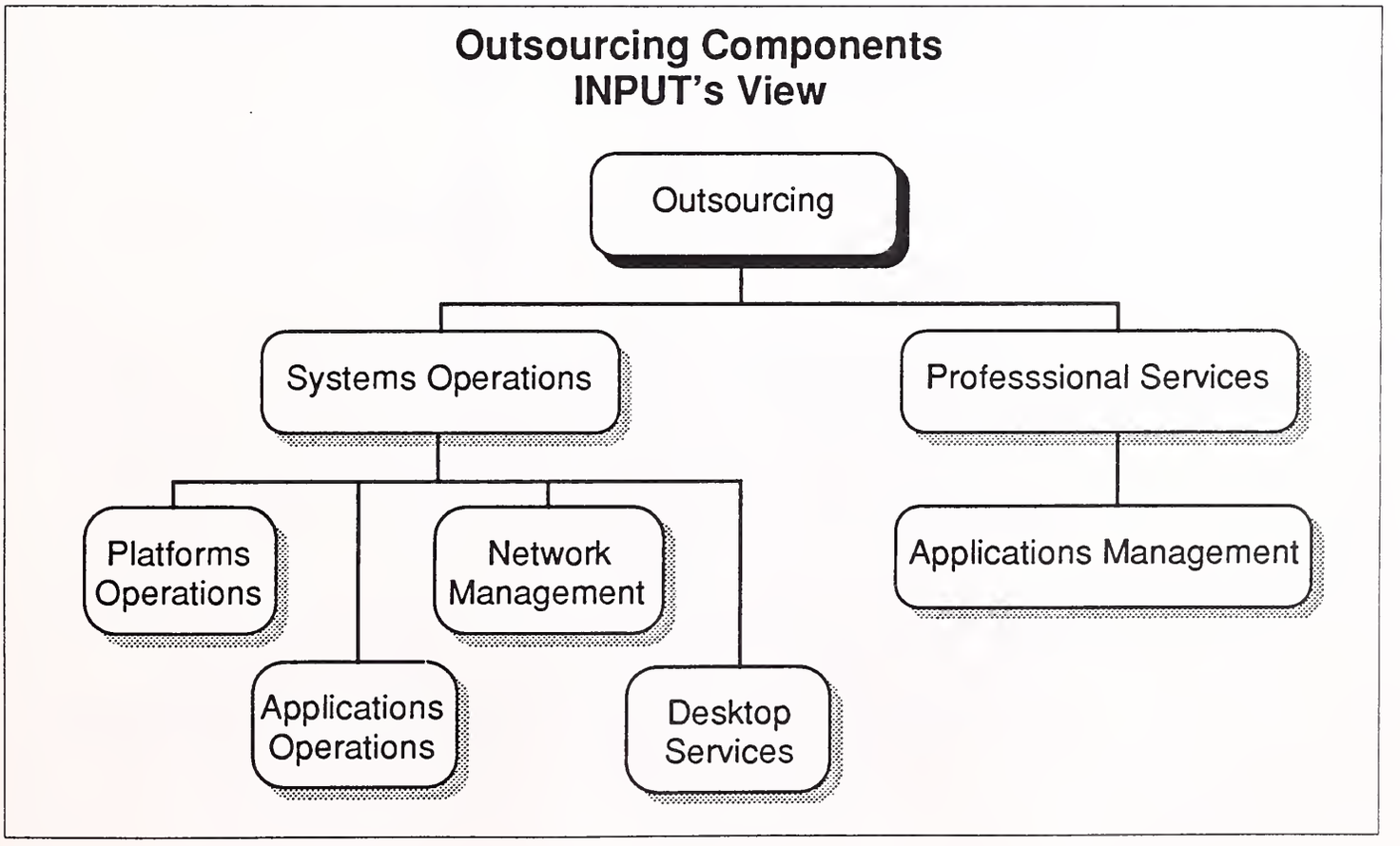
6. Outsourcing

Over the past few years a major change has occurred in the way clients are buying some information services. The shift has been labeled *outsourcing*.

INPUT views outsourcing as a change in the form of the client/vendor relationship. Under an outsourcing relationship, all or a major portion of the information systems function is contracted to a vendor in a long-term relationship. The vendor is responsible for the performance of the function.

INPUT considers the following submodes to be outsourcing-type relationships and in aggregate to represent the outsourcing market. See Exhibit A-1. Complete definitions are provided in Section C of this document. INPUT provides these forecasts as part of the corresponding delivery modes.

EXHIBIT A-1



- *Platform Systems Operations* - The vendor is responsible for managing and operating the client's computer systems.

- *Applications System Operations* - The vendor is responsible for developing and/or maintaining a client's applications as well as operating the computer systems.

☆*Network Management* - The vendor assumes full responsibility for operating and managing the client's data communications systems. This may also include the voice communications of the client.

☆*Applications Management/Maintenance* - The professional services vendor has full responsibility for developing and/or maintaining some or all of the applications systems that a client uses to support business operations. The services are provided on a long-term contractual basis.

☆*Desktop Services* - The vendor assumes responsibility for the deployment, maintenance, and connectivity between the personal computers and/or intelligent workstations in the client organization. The services may also include performing the help-desk function. The services are provided on a long-term contractual basis.

C

Delivery Modes and Submodes

Exhibit A-2 provides the overall structure of the information services industry as defined and used by INPUT. This section of *Definition of Terms* provides definitions for each of the delivery modes and their submodes or components.

1. Software Products

INPUT divides the software products market into two delivery modes: systems software and applications software.

The two delivery modes have many similarities. Both involve purchases of software packages for in-house computer systems. Included are both lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Vendor-provided training or support in operation and use of the package, if part of the software pricing, is also included here.

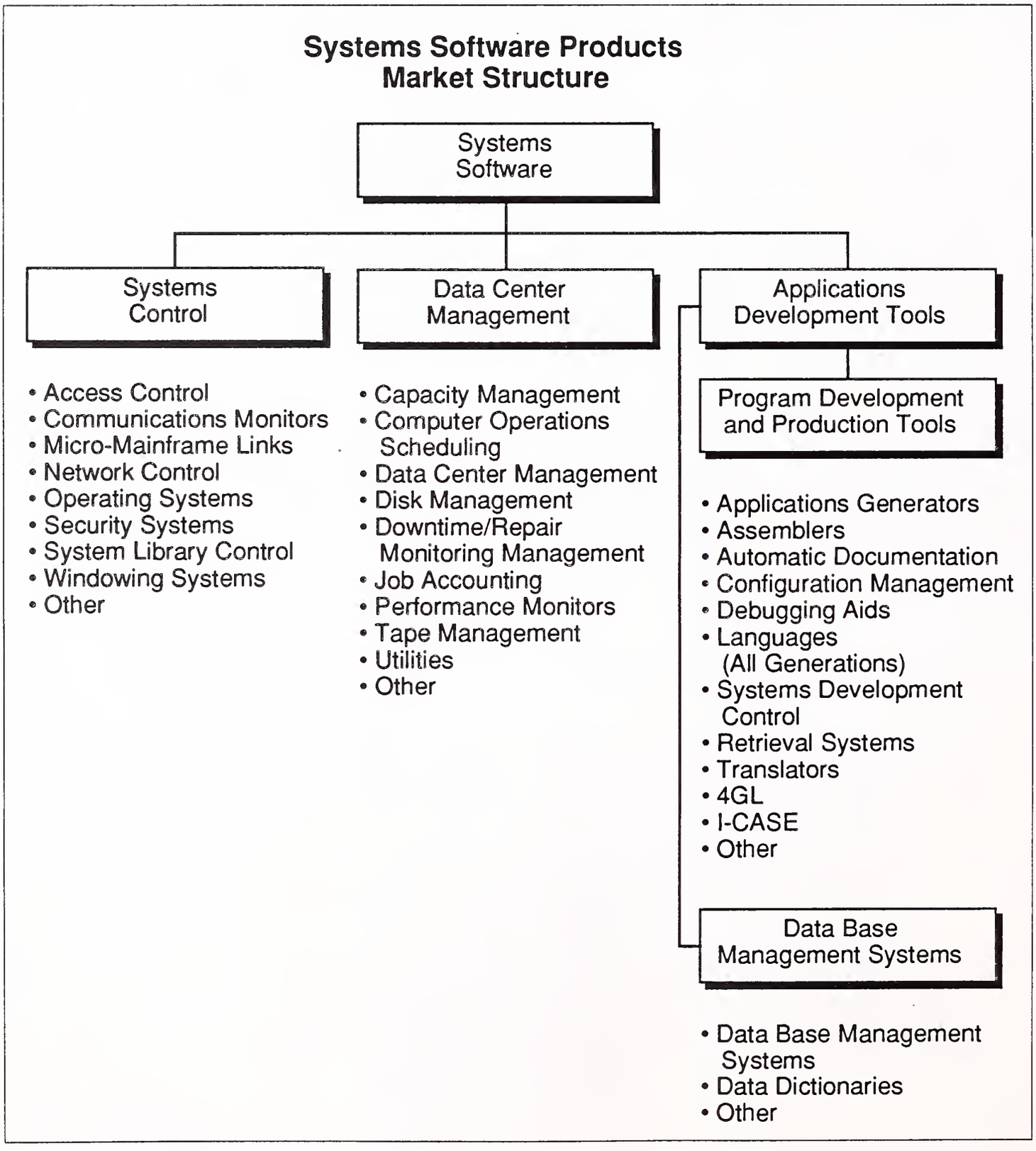
Expenditures for work performed by organizations other than the package vendor are counted in the professional services delivery mode. Fees for work related to education, consulting, and/or custom modification of software products are also counted as professional services, provided such fees are charged separately from the price of the software product itself.

EXHIBIT A-2

a. Systems Software Products

Systems software products enable the computer/communications system to perform basic machine-oriented or user interface functions. INPUT divides systems software products into three submodes. See Exhibit A-3.

EXHIBIT A-3



- *Systems Control Products* - Software programs that manage computer system resources and control the execution of programs. These products include operating systems, emulators, network control, library control, windowing, access control, and spoolers.

- *Operations Management Tools* - Software programs used by operations personnel to manage the computer system and/or network resources and personnel more effectively. Included are performance measurement, job accounting, computer operation scheduling, disk management utilities, and capacity management.

- *Applications Development Tools* - Software programs used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Included are traditional programming languages, 4GLs, data dictionaries, data base management systems, report writers, project control systems, CASE systems and other development productivity aids.

INPUT also forecasts the systems software products delivery mode by platform level: mainframe, minicomputer and workstation/PC.

b. Applications Software Products

Applications software products enable a user or group of users to support an operational or administrative process within an organization. Examples include accounts payable, order entry, project management and office systems. INPUT categorizes applications software products into two groups of market sectors. (See Exhibit A-4.)

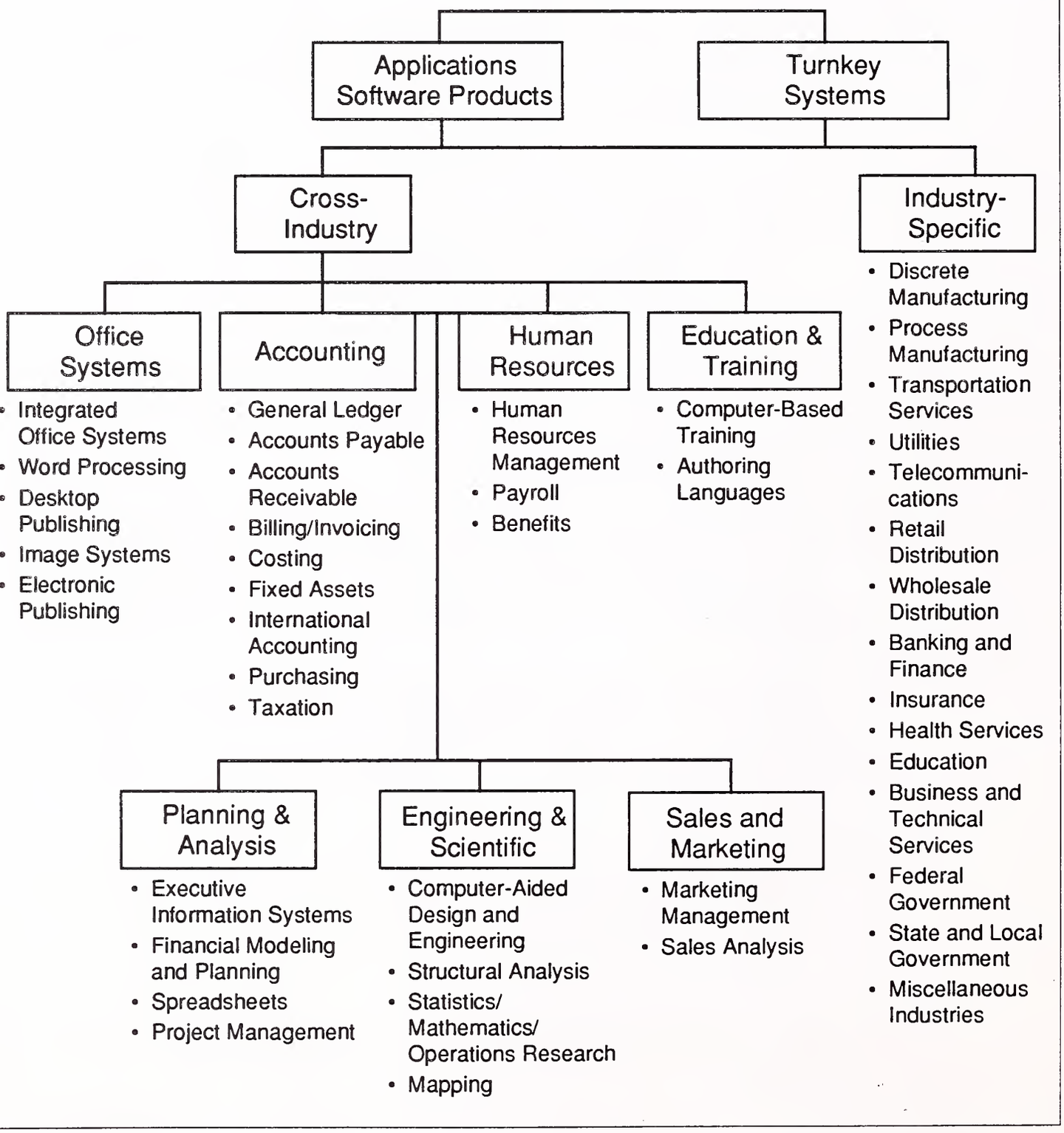
- *Industry Applications Software Products* - Software products that perform functions related to fulfilling business or organizational needs unique to a specific industry (vertical) market and sold to that market only. Examples include demand deposit accounting, MRPII, medical record keeping, automobile dealer parts inventory, etc.

- *Cross-Industry Applications Software Products* - Software products that perform a specific function that is applicable to a wide range of industry sectors. Examples include payroll and human resource systems, accounting systems, word processing and graphics systems, spreadsheets, etc.

INPUT also forecasts the applications software products delivery mode by platform level: mainframe, minicomputer and workstation/PC.

EXHIBIT A-4

Application Products and Turnkey Systems



2. Turnkey Systems

A turnkey system is an integration of equipment (CPU, peripherals, etc.), systems software, and packaged applications software into a single product developed to meet a specific set of user requirements. Value added by the turnkey system vendor is primarily in the software and professional services provided. INPUT categorizes turnkey systems into two groups of market sectors as it does for applications software products. (See Exhibit A-4.)

Most CAD/CAM systems and many small business systems are turnkey systems. Turnkey systems utilize standard computers and do not include specialized hardware such as word processors, cash registers, process control systems, or embedded computer systems for military applications.

Computer manufacturers (e.g., IBM or DEC) that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

Most turnkey systems are sold through channels known as value-added resellers.

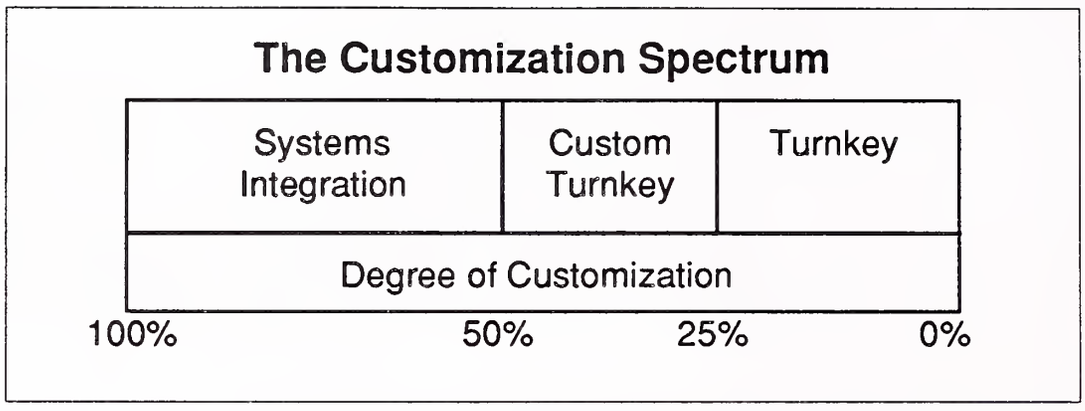
- *Value-Added Reseller (VAR):* A VAR adds value to computer hardware and/or software and then resells it to an end user. The major value added is usually applications software for a vertical or cross-industry market, but also includes many of the other components of a turnkey systems solution, such as professional services, software support, and applications upgrades.

Turnkey systems have three components:

- Equipment - computer hardware supplied as part of the turnkey system
- Software products - prepackaged systems and applications software products
- Professional services - services to install or customize the system or train the user, provided as part of the turnkey system sale

Exhibit A-5 contrasts turnkey systems with systems integration. Turnkey systems are based on available software products that a vendor may modify to a modest degree.

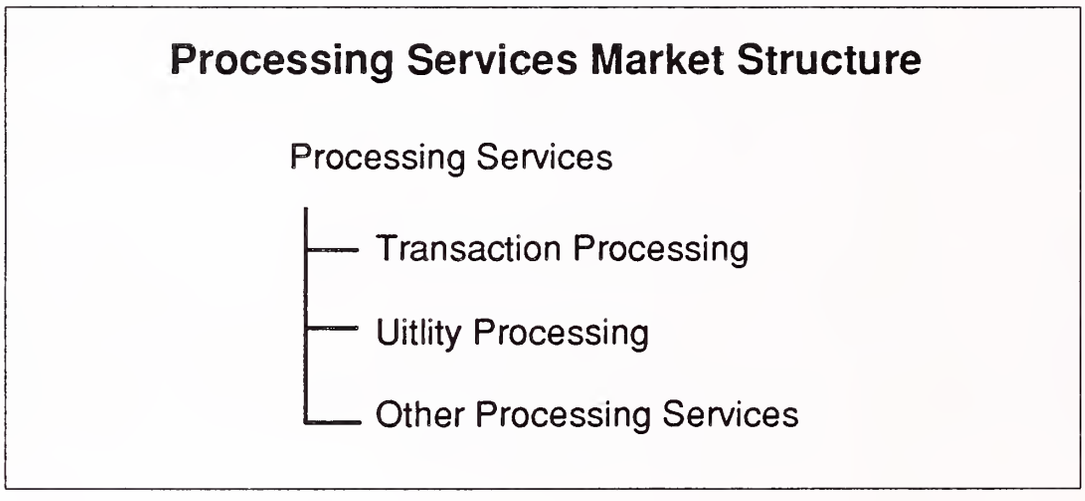
EXHIBIT A-5



3. Processing Services

This delivery mode includes three submodes: transaction processing, utility processing, and "other" processing services. See Exhibit A-6.

EXHIBIT A-6



- *Transaction Processing* - Client uses vendor-provided information systems—including hardware, software and/or data networks—at the vendor site or customer site to process specific applications and update client data bases. The application software is typically provided by the vendor.

- *Utility Processing* - Vendor provides basic software tools (language compilers, assemblers, DBMSs, graphics packages, mathematical models, scientific library routines, etc.), enabling clients to develop and/or operate their own programs or process data on the vendor's system.

- *Other Processing Services* - Vendor provides service—usually at the vendor site—such as scanning and other data entry services, laser printing, computer output microfilm (COM), CD preparation and other data output services, backup and disaster recovery, etc.

4. Systems Operations

Systems operations as a delivery mode was introduced in the 1990 Market Analysis and Systems Operations programs. Previously called Facilities Management, this delivery mode was created by taking the Systems Operations submode out of both Processing Services and Professional Services. For 1992 the submodes have been defined as follows.

Systems operations involves the operation and management of all or a significant part of the client's information systems functions under a long-term contract. These services can be provided in either of two distinct submodes where the difference is whether the support of applications, as well as data center operations, is included.

- *Platform systems operations* - The vendor manages and operates the computer systems, to perform the client's business functions, without taking responsibility for the client's application systems.

- *Applications systems operations* - The vendor manages and operates the computer systems to perform the client's business functions, and is also responsible for maintaining, or developing and maintaining, the client's application systems.

☆*Network Management* - The vendor assumes responsibility for operating and managing the client's data communications systems. This may also include the voice communications of the client. A network management outsourcing contract may include only the management services or the full costs of the communications services and equipment plus the management services.

☆*Desktop Services* - The vendor assumes responsibility for the deployment, maintenance, and connectivity among the personal computers and/or workstations in the client organization. The services may also include performing the help-desk function. Equipment as well as services can be part of a desktop services outsourcing contract.

Note: This type of client service can also be provided through traditional professional services where the contractual criteria of outsourcing are not present.

Systems operations vendors now provide a wide variety of services in support of existing information systems. The vendor can plan, control, provide, operate, maintain and manage any or all components of the client's information systems environment (equipment, networks, applications systems), either at the client's site or the vendor's site.

Note: In the federal government market, systems operation services are also defined by equipment ownership with the terms "COCO" (Contractor-Owned, Contractor-Operated), and "GOCO" (Government-Owned, Contractor-Operated).

5. Systems Integration (SI)

Systems integration is a vendor service that provides a complete solution to an information system, networking or automation development requirement through the custom selection and implementation of a variety of information system products and services. A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price. (Refer to Exhibit A-7.)

The components of a systems integration project are the following:

- *Equipment* - information processing and communications equipment required to build the systems solution. This component may include custom as well as off-the-shelf equipment to meet the unique needs of the project. The systems integration equipment category excludes turnkey systems by definition.

- *Software products* - prepackaged applications and systems software products.

- *Professional services* - the value-added component that adapts the equipment and develops, assembles, or modifies the software and hardware to meet the system's requirements. It includes all of the professional services activities required to develop, implement, and if included in the contract, operate an information system, including consulting, program/project management, design and integration, software development, education and training, documentation, and systems operations and maintenance.

- *Other services* - most systems integration contracts include other services and product expenditures that are not classified elsewhere. This category includes miscellaneous items such as engineering services, automation equipment, computer supplies, business support services and supplies, and other items required for a smooth development effort.

EXHIBIT A-7

Products/Services in Systems Integration Projects

Equipment

- Information systems
- Communications

Software Products

- Systems software
- Applications software

Professional Services

- Consulting
  - Feasibility and trade-off studies
  - Selection of equipment, network and software
- Program/project management
- Design/integration
  - Systems design
  - Installation of equipment, network, and software
  - Demonstration and testing
- Software development
  - Modification of software packages
  - Modification of existing software
  - Custom development of software
- Education/training and documentation
- Systems operations/maintenance

Other Miscellaneous Products/Services

- Site preparation
- Data processing supplies
- Processing/network services
- Data/voice communication services

6. Professional Services

This category includes four submodes: consulting, education and training, software development, and applications management. Exhibit A-8 provides additional detail.

- *Consulting:* Services include management consulting (related to information systems), information systems re-engineering, information systems consulting, feasibility analysis and cost-effectiveness studies, and project management assistance. Services may be related to any aspect of the information system, including equipment, software, networks and systems operations.

- *Education and Training:* Services that provide training and education or the development of training materials related to information systems and services for the information systems professional and the user, including computer-aided instruction, computer-based education, and vendor instruction of user personnel in operations, design, programming, and documentation. Education and training provided by school systems are not included. General education and training products are included as a cross-industry market sector.

- *Software Development:* Services include user requirements definition, systems design, contract programming, documentation, and implementation of software performed on a custom basis. Conversion and maintenance services are also included.

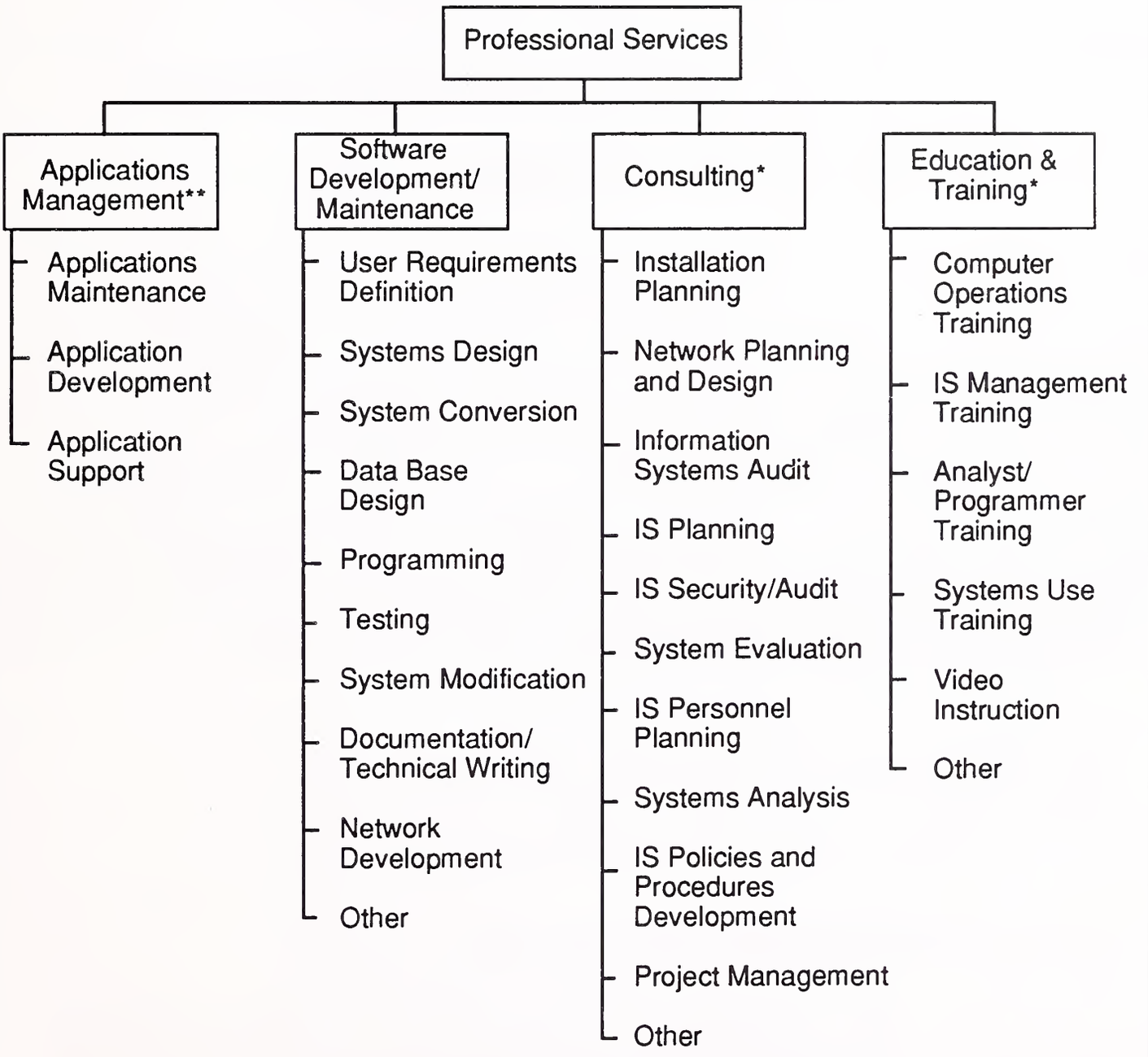
☆*Applications Management*: The vendor has full responsibility for maintaining and upgrading some or all of the application systems that a client uses to support business operations and may develop and implement new application systems for the client.

An applications management contract differs from traditional software development in the form of the client/vendor relationship. Under traditional software development services the relationship is project based. Under applications management it is time and function based.

These services may be provided in combination or separately from platform systems operations.

EXHIBIT A-8

Professional Services Market Structure



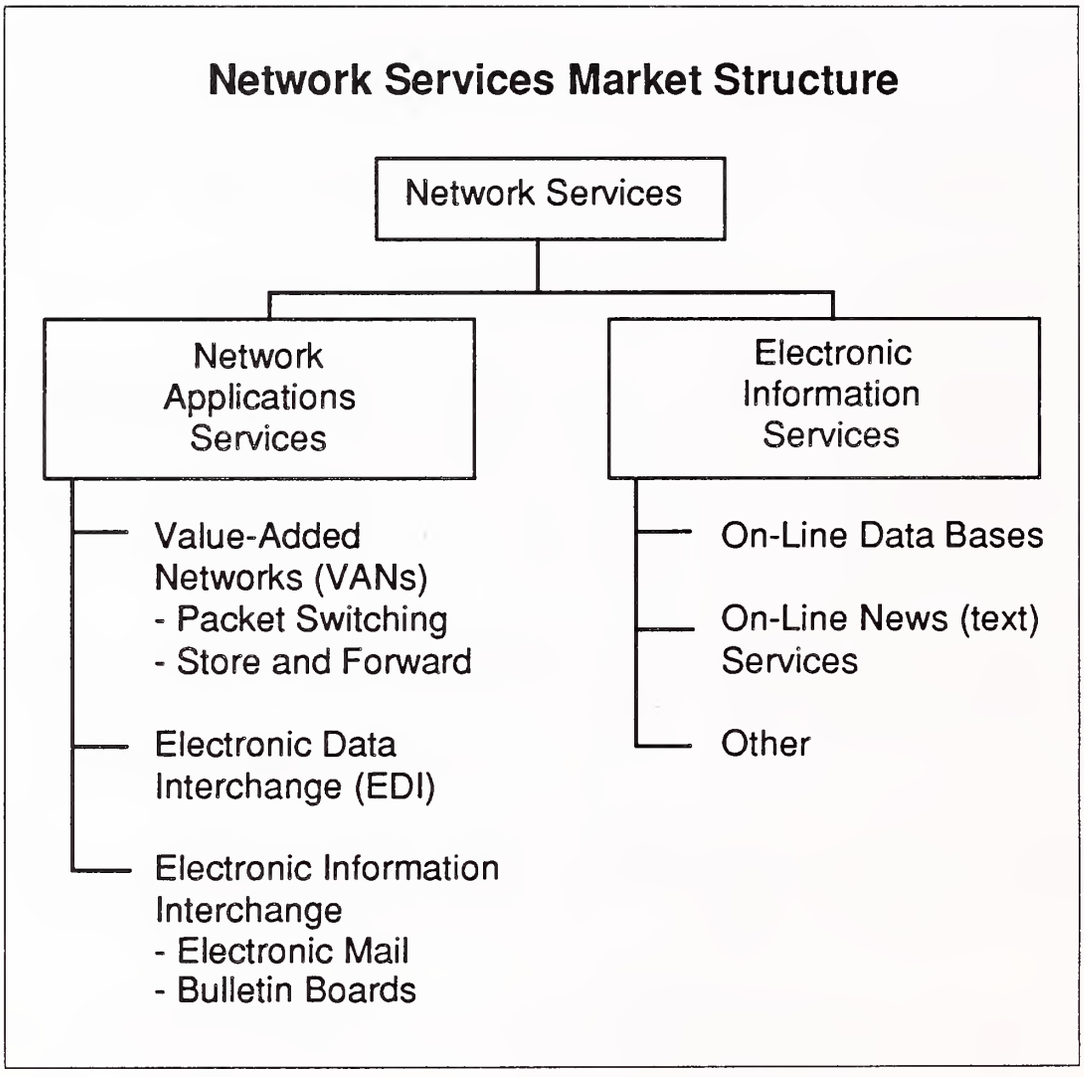
*Related to computer systems, topics, or issues

**Vendor assumes full responsibility on contracted longer term basis

7. Network Services

Network services are a variety of telecommunications-based functions and operations. Network service includes two submodes, as shown in Exhibit A-9.

EXHIBIT A-9



a. Electronic Information Services

Electronic information services are data bases that provide specific information via terminal- or computer-based inquiry, including items such as stock prices, legal precedents, economic indicators, periodical literature, medical diagnosis, airline schedules, automobile valuations, etc. The terminals used may be computers themselves, such as communications servers or personal computers.

Users inquire into and extract information from the data bases. They may load extracted data into their own computer systems; the vendor does not provide data processing or manipulation capability as part of the electronic information service and users cannot update the vendor's data bases. However, the vendor may offer other services (network applications or processing services) that do offer processing or manipulation capability.

The two kinds of electronic information services are:

- *On-line Data Bases* - Structured, primarily numerical data on economic and demographic trends, financial instruments, companies, products, materials, etc.

- Unstructured, primarily textual information on people, companies, events, etc. These are often news services.

While electronic information services have traditionally been delivered via networks, there is a growing trend toward the use of CD ROM optical disks to support or supplant on-line services, and these optical disk-based systems are included in the definition of this delivery mode.

b. Network Applications

Value-Added Network Services (VAN Services) - VAN services are enhanced transport services which involve adding such functions as automatic error detection and correction, protocol conversion, and store-and-forward message switching to the provision of basic network circuits.

While VAN services were originally provided only by specialized VAN carriers (Tymnet, Telenet, etc.), today these services are also offered by traditional common carriers (AT&T, Sprint, etc.). Meanwhile, the VAN carriers have also branched into the traditional common carriers' markets and are offering unenhanced basic network circuits as well.

Electronic Data Interchange (EDI) - Application-to-application electronic exchange of business data between trade partners or facilitators using a telecommunications network.

Electronic Information Interchange- The transmission of messages across an electronic network managed by a services vendor, including electronic mail, voice mail, voice messaging, and access to Telex, TWX, and other messaging services. This also includes bulletin board services.

8. Equipment Services

☆The equipment services delivery mode includes two submodes. Both deal with the support and maintenance of computer equipment.

☆*Equipment Maintenance* - Services provided to repair, diagnose problems and provide preventive maintenance both on-site and off-site for computer equipment. The costs of parts, media and other supplies are excluded. These services are typically provided on a contract basis.

☆*Environmental Services* - Composed of equipment and data center related special services such as cabling, air conditioning and power supply, equipment relocation and similar services.

D
Computer Equipment

☆These definitions have been included to provide the basis for market segmentation in the software products markets.

☆*Computer Equipment* - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system. Unless otherwise noted in an INPUT forecast, computer equipment is only included where it is part of the purchase of services or software products (e.g., turnkey systems and systems integration).

☆*Peripherals* - Includes all input, output, communications, and storage devices (other than main memory) that can be channel connected to a processor, and generally cannot be included in other categories such as terminals.

☆*Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

☆*Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters

☆*Communication Devices* - Includes modem, encryption equipment, special interfaces, and error control

☆*Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories

☆*Computer Systems* - Includes all processors from personal computers to supercomputers. Computer systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices and processors or CPUs not provided as part of an integrated (turnkey) system.

☆*Personal computers* - Smaller computers using 8-, 16-, or 32-bit computer technology. Generally designed to sit on a desktop and are portable for individual use. Price generally less than $5,000.

☆*Workstations* - High-performance, desktop, single-user computers often employing Reduced Instruction Set Computing (RISC). Workstations provide integrated, high-speed, local network-based services such as data base access, file storage and back-up, remote communications, and peripheral support. These products usually cost from $5,000 to $15,000.

☆*Minicomputer or midsize computers* - Minicomputers are generally priced from $15,000 to $350,000. Many of the emerging client/server computers are in this category.

☆*Mainframe or large computers* - Traditional mainframe and supercomputers costing more than $350,000.

E
Sector Definitions

1. Industry Sector Definitions

INPUT structures the information services market into industry sectors such as process manufacturing, insurance, transportation, etc. The definitions of these sectors are based on the 1987 revision of the Standard Industrial Classification (SIC) code system. The specific industries (and their SIC codes) included under these industry sectors are detailed in Exhibit A-10.

INPUT includes all delivery modes except systems software products and equipment services in industry market sectors. See Exhibit A-9 and section E-3 (Delivery Mode Reporting by Sector).

Note: SIC code 88 is Personal Households. INPUT does not currently analyze or forecast information services in this market sector.

EXHIBIT A-10

Industry Sector Definitions

Industry Sector	SIC Code	Description
Discrete Manufacturing	23xx	Apparel and other finished products
	25xx	Furniture and fixtures
	27xx	Printing, publishing and allied industries
	31xx	Leather and leather products
	34xx	Fabricated metal products, except machinery and transportation equipment
	35xx	Industrial and commercial machinery and computer equipment
	36xx	Electronic and other electrical equipment and components, except computer equipment
	37xx	Transportation equipment
	38xx	Instruments; photo/med/optical goods; watches/clocks
	39xx	Miscellaneous manufacturing industry
Process Manufacturing	10xx	Metal mining
	12xx	Coal mining
	13xx	Oil and gas extraction
	14xx	Mining/quarrying nonmetalic minerals
	20xx	Food and kindred products
	21xx	Tobacco products
	22xx	Textile mill products
	24xx	Lumber and wood products, except furniture
	26xx	Paper and allied products
	28xx	Chemicals and allied products
	29xx	Petroleum refining and related industries
	30xx	Rubber and miscellaneous plastic products
	32xx	Stone, clay, glass and concrete products
	33xx	Primary metal industries
Transportation Services	40xx	Railroad transport
	41xx	Public transit/transport
	42xx	Motor freight transport/warehousing
	43xx	U.S. Postal Service
	44xx	Water transportation
	45xx	Air transportation (including airline reservation services in 4512)
	46xx	Pipelines, except natural gas
	47xx	Transportation services (including 472x, arrangement of passenger transportation)

EXHIBIT A-10 (CONT.)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Telecommunications	48xx	Communications
Utilities	49xx	Electric, gas and sanitary services
Retail Distribution	52xx 53xx 54xx 55xx 56xx 57xx 58xx 59xx	Building materials General merchandise stores Food stores Automotive dealers, gas stations Apparel and accessory stores Home furniture, furnishings and accessory stores Eating and drinking places Miscellaneous retail
Wholesale Distribution	50xx 51xx	Wholesale trade - durable goods Wholesale trade - nondurable goods
Banking and Finance	60xx 61xx 62xx 67xx	Depositary institutions Nondepositary institutions Security and commodity brokers, dealers, exchanges and services Holding and other investment offices
Insurance	63xx 64xx	Insurance carriers Insurance agents, brokers and services
Health Services	80xx	Health services
Education	82xx	Educational services

EXHIBIT A-10 (CONT.)

Industry Sector Definitions

Industry Sector	SIC Code	Description
Business Services	65xx	Real estate
	70xx	Hotels, rooming houses, camps, and other lodging places
	72xx	Personal services
	73xx	Business services (except hotel reservation services in 7389)
	7389x	Hotel reservation services
	75xx	Automotive repair, services and parking
	76xx	Miscellaneous repair services
	78xx	Motion pictures
	79xx	Amusement and recreation services
	81xx	Legal services
	83xx	Social services
	84xx	Museums, art galleries, and botanical/zoological gardens
	86xx	Membership organizations
	87xx	Engineering, accounting, research, management, and related services
	89xx	Miscellaneous services
Federal Government	9xxx	
State and Local Government	9xxx	
Miscellaneous Industries	01xx	Agricultural production - crops
	02xx	Agricultural production - livestock/animals
	07xx	Agricultural services
	08xx	Forestry
	09xx	Fishing, hunting and trapping
	15xx	Building construction - general contractors, operative builders
	16xx	Heavy construction - contractors
	17xx	Construction - special trade contractors

2. Cross-Industry Sector Definitions

INPUT has identified seven cross-industry market sectors. These sectors or markets involve multi-industry applications such as human resource systems, accounting systems, etc.

- In order to be included in an industry sector, the service or product delivered must be specific to that sector only. If a service or product is used in more than one industry sector, it is counted as cross-industry.

- INPUT only includes the turnkey systems, applications software products, and transaction processing services in the cross-industry sectors.

The seven cross-industry markets are:

Accounting - consists of applications software products and information services that serve such functions as:

- General ledger
- Financial management
- Accounts payable
- Accounts receivable
- Billing/invoicing
- Fixed assets
- International accounting
- Purchasing
- Taxation
- Financial consolidation

- Excluded are accounting products and services directed to a specific industry, such as tax processing services for CPAs and accountants within the business services industry sector.

Human Resources - consists of application solutions purchased by multiple industry sectors to serve the functions of human resources management and payroll. Examples of specific applications within these two major functions are:

- Employee relations
- Benefits administration
- Government compliance
- Manpower planning
- Compensation administration
- Applicant tracking
- Position control
- Payroll processing

Education and Training - consists of education and training for information systems professionals and users of information systems delivered as a software product, turnkey system or through processing services. The market for computer-based training tools for the training of any employee on any subject is also included.

Office Systems consists of the following:

- Integrated office systems (IOS)
- Word processing
- Desktop publishing
- Electronic publishing
- Image systems

- IOSs—such as IBM's OfficeVision, HP's NewWave Office and DEC's All-In-1—typically include the following core functions, all of which are accessed from the same desktop: electronic mail, decision support systems, time management and filing systems.

- Office systems graphics include presentation graphics (which represent the bulk of office systems graphics), paint and line art, page description languages, and electronic form programs.

- The fundamental difference between electronic publishing and desktop publishing (within the office systems sector) is that electronic publishing encompasses a method of document management and control from a single point—regardless of how many authors/locations work on a document—whereas desktop publishing is a personal productivity tool and is generally a lower end product residing on a personal computer.

- Electronic or computer publishing systems that are sold strictly and specifically to commercial publishers, printers, and typesetters are excluded from cross-industry consideration and are included in the discrete manufacturing industry.

Engineering and Scientific encompasses the following applications:

- Computer-aided design and engineering (CAD and CAE)
- Structural analysis
- Statistics/mathematics/operations research
- Mapping/GIS

- Computer-aided manufacturing (CAM) or CAD that is integrated with CAM is excluded from the cross-industry sector as it is specific to the manufacturing industries. CAD or CAE that is dedicated to integrated circuit design is also excluded because it is specific to the semiconductor industry.

Planning and Analysis consists of software products and information services in four application areas:

- Executive Information Systems (EIS)
- Financial modeling or planning systems
- Spreadsheets
- Project management

Sales and Marketing encompasses marketing management and sales analysis application solutions.

- Sales and marketing includes:

  - Sales analysis
  - Marketing management
  - Demographic market planning models

3. Delivery Mode Reporting by Sector

This section describes how the delivery mode forecasts relate to the market sector forecasts. Exhibit A-11 summarizes the relationships.

- *Processing services* - The transaction processing services submode is forecasted for each industry and cross-industry market sector. The utility and other processing services submodes are forecasted in total market in the general market sector.

- *Turnkey systems* - Turnkey systems is forecasted for the 15 industry and 7 cross-industry sectors. Each component of turnkey systems is forecasted in each sector.

- *Applications software products* - The applications software products delivery mode is forecasted for the 15 industry and 7 cross-industry sectors. In addition, each forecast is broken down by platform level: mainframe, minicomputer and workstation/PC.

- *Systems operations* - Each of the systems operations submodes is forecasted for each of the 15 industry sectors.

- *Systems integration* - Systems integration and each of the components of systems integration are forecasted for each of the 15 industry sectors.

- *Professional services* - Professional services and each of the submodes is forecasted for each of the 15 industry sectors.

EXHIBIT A-11

Delivery Mode versus Market Sector Forecast Content

Delivery Mode	Submode	Market Sectors		
		Industry Sectors	Cross-Industry Sectors	General
Processing Services	Transaction Utility Other	X	X	 X X
Turnkey Systems		X	X	
Applications Software Products		X	X	
Systems Operations	Platform Applications	X X		
Systems Integration		X		
Professional Services		X		
Network Services	Network Applications Electronic Information Services	X X		X
Systems Software Products				X
Equipment Services				X

- *Network services* - The network applications submode of network services forecasted for each of the 15 industry sectors.

  Industry and cross-industry electronic information services are forecast in relevant market sectors. The remainder of electronic information services is forecasted in total for the general market sector.

- *Systems software products* - Systems software products and its submodes are forecasted in total for the general market sector. Each submode forecast is broken down by platform level: mainframe, mini-computer and workstation/PC.

- *Equipment services* - Equipment services and its submodes are forecasted in total in the general market sectors.

F

Vendor Revenue and User Expenditure Conversion

The size of the information services market may be viewed from two perspectives: vendor (producer) revenues and user expenditures. INPUT defines and forecasts the information services market in terms of user expenditures. User expenditures reflect the markup in producer sales when a product such as software is delivered through indirect distribution channels (such as original equipment manufacturers (OEMs), retailers and distributors). The focus on user expenditure also eliminates the double counting of revenues that would occur if sales were tabulated for both producer (e.g., Lotus) and distributor (e.g., ComputerLand).

For most delivery modes, vendor revenues and user expenditures are fairly close. However, there are some areas of significant difference. Many microcomputer software products, for example, are marketed through distribution channels. To capture the valued added through these distribution channels, adjustment factors are used to convert estimated information services vendor revenues to user expenditures.

For some delivery modes, including software products, systems integration and turnkey systems, there is a significant volume of intra-industry sales. For example, systems integrators purchase software and subcontract the services of other professional services vendors. Turnkey vendors incorporate purchased software into the systems they sell to users.

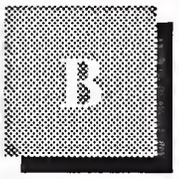
To account for such intra-industry transactions, INPUT uses conversion ratios to derive the estimate of end-user expenditures.

Exhibit A-12 summarizes the net effect of the various ratios used by INPUT to convert vendor revenues to user expenditure (market size) figures for each delivery mode.

EXHIBIT A-12

Vendor Revenue to User Expenditure Conversion

Delivery Mode	Vendor Revenue Multiplier
Applications Software Products	1.18
Systems Software Products	1.10
Systems Operations	0.95
Systems Integration	0.95
Professional Services	0.99
Network Services	0.99
Processing Services	0.99
Turnkey Systems	0.95
Equipment Services	0.99



Questionnaires

The following definitions were used for the purposes of this study:

INPUT defines *systems integration* in the commercial and government sectors as a vendor service providing a complete solution to an information system, networking or automation requirement through the custom selection and implementation of a variety of information system products and services.

A systems integrator is responsible for the overall management of a systems integration contract and is the single point of contact and responsibility to the buyer for the delivery of the specified system function, on schedule and at the contracted price.

Systems integration projects must involve some application processing component. In addition, the majority of cost must be associated with the following information systems products and/or services:

- Equipment—Information processing and communications equipment required to build the systems solution. Includes custom, off-the-shelf and turnkey systems.

- Software products—Prepackaged applications and systems software products.

- Professional services—Includes all of the professional services required to develop and, if included in the contract, operate an information system, including consulting, program/project management, design and integration, software development, education and training, documentation, and systems operations and maintenance.

- Other services—Includes miscellaneous items such as engineering services, automation equipment, computer supplies, business support services, and supplies and other items required for a smooth development effort.

INPUT defines the term *user* as the client or customer of vendor products or services. It should not be confused with the term *end user*, which may or may not also apply to users.

The term *program manager* applies to the person ultimately in charge of an SI contract. For the duration of an SI contract, both vendor and customer organizations appoint respective program managers who often also function as the interface points between the two organizations.

I

Vendor Questionnaire

1. Does your company have a formal systems integration program management system or procedure? (*Check one*)

   Yes ___
   No ___ (*Go to Q3*)

2. Does the SI program management system/process include.....? (*Read each item, check all that apply*)

   Program management tools & methodologies _____
   A procedure book _____
   Risk assessment/containment procedures _____
   Change control procedures _____
   Training & development of program managers _____
   What else.....? (*Specify below*)

   _____

   _____

3. Please rate the importance of each of the following criteria/characteristics in selecting your program managers. Use a 1-5 scale, where 5=extremely important, and 1=not important at all *(Read each item, circle one number per item)*

	Circle One
Knowledge of client organization's procedures	1 2 3 4 5
Knowledge of your organization's contracting practices	1 2 3 4 5
Understand specific user's environment	1 2 3 4 5
General ADP/IS knowledge	1 2 3 4 5
Time with your company	1 2 3 4 5
Program financial management experience	1 2 3 4 5
Negotiation skills	1 2 3 4 5
People skills	1 2 3 4 5
Communication skills	1 2 3 4 5
Technical skills	1 2 3 4 5
Broad management skills	1 2 3 4 5
History of applying TQM	1 2 3 4 5
Other (*Specify*) _____	1 2 3 4 5
_____	1 2 3 4 5

4. Specifically, how does your company hire, train or develop its SI program managers?

_____

_____

5a. Who within your company selects the following personnel to work on SI project teams?

Indicate title/organization

Program managers _____
Project leaders _____
Supporting staff _____

5b. Please explain under what circumstances, if any, executive management and your company's personnel department get involved in staffing SI project teams.

Executive management: _____

_____

Personnel: _____

_____

6. Of the following risk management tools or procedures, would you say your company mostly uses, sometimes uses, or never uses them in SI projects? (*Read each item, circle one response*)

	Most Often	Sometimes	Never
	(Circle One)		
Bid/no bid models	1	2	3
Rapid prototyping	1	2	3
Risk management models	1	2	3
Change impact models	1	2	3
Budget planning	1	2	3
Schedule planning	1	2	3
Schedule controls	1	2	3
Financial controls	1	2	3
Technical achievement measures	1	2	3
Progress reviews	1	2	3
Internal quality reviews	1	2	3
Independent quality reviews	1	2	3
Subcontractor performance bonds	1	2	3
Liability insurance	1	2	3
Share risks with subcontractors	1	2	3
Sensitize all employee levels to risks	1	2	3
Other (*Specify*):_____	1	2	3

7. Now, indicate how frequently the following program management or development tools are used by your company during an SI project. (*Use the same frequency categories as in Q6 above.*)

	Most Often	Sometimes	Never
	(Circle One)		
Life cycle methodologies	1	2	3
Development methods	1	2	3
Schedule & event tracking	1	2	3
Budget tracking	1	2	3
Change management & tracking	1	2	3
Trouble reporting & tracking	1	2	3
CASE tools	1	2	3
Other (*Specify*):_____	1	2	3

8. Which of the following are generally used by your company in SI projects to manage change? (*Read each item, check all that apply*)

Written requests from users	_____
Written cost sizing from vendor	_____
Written schedule impact from vendor	_____
Vendor signoffs	_____
Client signoffs	_____
Automated method for development & incorporation into system	_____
Manual method for development & incorporation into system	_____
Other (*Specify*):_____	_____
Other (*Specify*):_____	_____
None	_____

9. Describe a few typical problems that develop in systems integration projects. Please explain how they were resolved with the user/buyer.

Problem 1—Description

_____

_____

_____

Problem 1—Resolution

_____

_____

_____

Problem 2—Description

_____

_____

_____

Problem 2—Resolution

_____

_____

_____

Problem 3—Description

_____

_____

_____

Problem 3—Resolution

_____

_____

_____

10. Following a bid decision, or after a contract has been signed, has there ever been a problem so large or difficult to resolve that the project was eventually canceled, or significantly delayed? *Please explain.*

_____

_____

_____

11. In dealing with the client on SI projects, what is your company's preference for a particular type of client interface? (*Check one*)

	Check One	*Specify Why*
Single point/person	_____	_____
Committee/joint	_____	_____
No preference	_____	_____
Other (*Specify*):		
_____	_____	_____

12. In your opinion, what are the measures of success for systems integration projects for both the vendor and the client?

Vendor	Client
_____	_____
_____	_____
_____	_____

13. How important do you think each of the following factors are in building a workable vendor-client SI relationship? (*Use a 1-5 scale, where 5=extremely important, and 1=not important at all*)

Factor	*Circle One*
Vendor program manager knowledgeable about client's business	1 2 3 4 5
Buyer/user agreement on vendor program manager	1 2 3 4 5
Single client contact	1 2 3 4 5
Obtain buyer acceptance criteria	1 2 3 4 5
Formal change management policies	1 2 3 4 5
Vendor control and interface with subcontractors	1 2 3 4 5
Vendor on client's site during development	1 2 3 4 5
Vendor on client's site during transition	1 2 3 4 5
Vendor involvement in delivery criteria	1 2 3 4 5
Continuity of vendor staff	1 2 3 4 5
Vendor control of project	1 2 3 4 5
Client visibility during project life cycle	1 2 3 4 5
Specific functional client specifications	1 2 3 4 5
Specific technical client specifications	1 2 3 4 5
Other (*Specify*): _____	1 2 3 4 5

Comments: _____

_____

14. What unique methods does your company use to obtain client support for a project (during any phase)?

Stage	*Indicate Client Support Method (if solicited)*
Requirements	_____
RFP/S.O.W.	_____
Vendor selection/negotiation	_____
Project design	_____
Project development	_____
Integration and testing	_____
Client training	_____
Installation & maintenance	_____

15. Describe the forms of communication your company has found to be effective regarding the management of SI projects. *Indicate the type of communication, frequency, and who's involved.*

Communications Type	Frequency	Attendees/Audience

16. What are some of the major lessons learned by your company from bidding and managing SI projects?

17. Aside from the typical arrangements included in systems integration contracts, has your company made any unusual or special contractual arrangement to win SI contracts? *Please explain.*

Additional Comments:

Thank you for your assistance

You will receive an executive overview summarizing the results of this study.

II

Customer/Buyer/User Questionnaire

1. What type of service was the systems integrator hired to perform? (*Describe the project*)

_____

2a. For this SI project, has your organization selected a program manager or a project team to interface with the vendor? (*Check all that apply*)

Designated one program manager _____
Selected a project team _____

2b. Why was this management approach selected? *Please explain.*

_____

_____

3a. Which department was the major interface to the integrator during the proposal and selection process? (*Check one)*

Buyer/user organization _____
Purchasing/procurement _____
Information systems management _____
Other (*Specify*):_____ _____

3b. Is the designated interface remaining the same for the duration of the systems integration project? (*Check one)*

Yes _____ (*Go to Q4*)
No _____

3c. What department is the designated interface for the duration of the project? (*Check one*)?

Buyer/user organization _____
Purchasing/procurement _____
Information systems management _____
Other (*Specify*):_____ _____

4. Does your organization have a program management system or procedure to complement the vendor's program management approach? (*Check one*)

Yes _____
No _____ (*Go to Q6*)
Don't know _____ (*Go to Q6*)

5. Briefly describe the components of your organization's SI management procedure. Does it include.....? (*Read each item, check all that apply*)

Program management tools & methodologies _____
A procedure book _____
Risk assessment/containment procedures _____
Change control procedures _____
Training and development of program managers _____
Anything else.....(*Specify below*)

_____

_____

6. Of the following risk management tools or procedures, would you say your organization mostly uses, sometimes uses, or never uses them in SI projects? (*Read each item, circle one response*)

	Most Often	Sometimes	Never
	(Circle One)		
Risk management models	1	2	3
Change impact models	1	2	3
Budget, planning	1	2	3
Schedule planning	1	2	3
Schedule controls	1	2	3
Financial controls	1	2	3
Technical achievement measures	1	2	3
Progress reviews	1	2	3
Internal quality reviews	1	2	3
Independent quality reviews	1	2	3
Contractor performance bonds	1	2	3
Modular contracts	1	2	3
Sensitize all employee levels to risks	1	2	3
Other (*Specify*):_____	1	2	3

7a. Would your organization use the same SI management process to perform an in-house SI project? (*Check one*)

Yes _____ (*Go to Q8*)
No _____
Don't know _____ (*Go to Q8*)

7b. What differences exist between how your organization approaches a contractor-performed integration project versus using in-house personnel?

_____

_____

8. How important are each of the following characteristics to making the vendor SI program manager well qualified? Use a 1-5 scale, where 5=extremely important, and 1=not important at all (*Read each item, circle one number per item)*

	Circle One
Knowledge of your organization's procedures	1 2 3 4 5
Knowledge of his company's contracting practices	1 2 3 4 5
Understand specific user's environment	1 2 3 4 5
General ADP/IS knowledge	1 2 3 4 5
Time with his company	1 2 3 4 5
Program financial management experience	1 2 3 4 5
Negotiation skills	1 2 3 4 5
People skills	1 2 3 4 5
Communication skills	1 2 3 4 5
Technical skills	1 2 3 4 5
Broad management skills	1 2 3 4 5
History of applying TQM	1 2 3 4 5
Other (*Specify*):_____	1 2 3 4 5
_____	1 2 3 4 5

9a. Are the qualifications of your organization's SI program managers or interface team the same or different than those you expect from a vendor? (*Check one*)

Same _____ (*Go to Q10*)
Different _____
Don't know/Not applicable _____ (*Go to Q10*)

9b. Please explain the differences.

_____

_____

10. Specifically, how does your organization hire, train or develop its SI program managers?

_____

_____

11. In your opinion, is your organization satisfied with the vendor's approach to program management? (*Use a 1-5 scale, where 5=extremely satisfied, and 1=not satisfied at all*)

Circle one 1 2 3 4 5

12. Who would you say controls the current vendor SI project? (*Check one*)

The vendor project team	____
Your company's program manager/project team	____
A combination of the above	____

Comments:

_____

_____

13. How does your organization manage the vendor interface? Does it include.....(*Check all that apply*)

Recommending, monitoring & controlling changes	____
Budget control	____
Contract administration	____
Problem ID/tracking	____
Definition of acceptance criteria	____
Plans to integrate into the existing system	____
Education of the buyer/user	
What else.....? (*Specify below*)	

_____

_____

14. Describe the forms of communication your organization has found to be most effective regarding the management of SI projects. *Indicate the type of communication, frequency, and who's involved.*

Communications Type	Frequency	Attendees/Audience
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

15. Describe some problems that developed in the systems integration project. Please explain how they were resolved with the vendor.

Problem 1—Description

Problem 1—Resolution

Problem 2—Description

Problem 2—Resolution

16. In your opinion, what are the measures of success for systems integration projects for both the vendor and the customer?

Vendor	Customer

17. How important do you think each of the following factors are in building a workable vendor-customer SI relationship? (*Use a 1-5 scale, where 5=extremely important, and 1=not important at all*)

Factor	*Circle One*
Vendor program manager knowledgeable about customer's business	1 2 3 4 5
Buyer/user agreement on vendor program manager	1 2 3 4 5
Customer development of acceptance criteria	1 2 3 4 5
Formal change management policies	1 2 3 4 5
Vendor on customer site during development	1 2 3 4 5
Vendor on customer site during transition	1 2 3 4 5
Vendor involvement in developing delivery criteria	1 2 3 4 5
Continuity of vendor's staff	1 2 3 4 5
Vendor control of project	1 2 3 4 5
Customer visibility during project life cycle	1 2 3 4 5
Specific functional customer-developed specifications	1 2 3 4 5
Specific technical customer-developed specifications	1 2 3 4 5
Other (*Specify*): _____	1 2 3 4 5

Comments:

_____

_____

18. What are some of the major lessons your organization has learned from hiring a systems integrator?

_____

_____

_____

Additional Comments:

_____

_____

Thank you for your assistance

You will receive an executive overview summarizing the results of this study.