



**DATA PROCESSING
MANAGERS' ACADEMY V**

**A REPORT ON
TRENDS AND ISSUES AFFECTING
INFORMATION TECHNOLOGY
IN
CALIFORNIA
STATE GOVERNMENT**

JUNE 30, 1994



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ACKNOWLEDGMENTS

The members of Data Processing Managers' Academy V give special thanks to:

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- The Employment Development Department for printing this report;
- Our sponsoring managers and departments;
- Our class sponsors; and
- The 495 information systems professionals who took the time to respond to our survey.

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EXECUTIVE SUMMARY

The enclosed report on information technology trends and issues was prepared by the members of the fifth Data Processing Managers Academy. This report provides a snapshot image of the current state of technology trends and issues important to State information systems (IS) professionals. Academy V expects that the information presented will be used for making comparisons among departments, assessments of the use of emerging technologies and techniques, and assessments of important management issues.

To assess technology trends and issues, Academy V conducted a written survey to obtain the opinions of the State's IS leaders. The survey was mailed to 1450 state IS professionals and the results presented in this report are based on 495 responses received. The survey consisted of a series of questions addressing several key areas important to today's IS professional.

Some of the important findings are summarized below.

Strategic Planning: Seventy-one percent of respondents were aware of their organization's strategic planning efforts but only 36 percent felt strategic planning has been very beneficial to their organization; however, 62 percent of senior managers felt strategic planning was beneficial.

Project Management: Overall, only 27 percent of respondents rated their organization very effective in planning and managing projects. Correspondingly, 45 percent of respondents indicated their organization did not use a structured project management methodology. At least half of all respondents using a structured project management methodology, automated project management tools, and metrics rated their organization moderately to very successful at managing projects. The survey confirmed our assumptions that the use of these tools contributes to an organization's success at planning and managing projects.

Outsourcing: In managers' opinions, the most effective application of outsourcing is in the area of new application system development. Although new application system development was the highest rated area, only 32 percent of all respondents expressed the opinion that consultants are effective in this role. On the other hand, 46 percent of senior managers, who are often key decision makers, regarded outsourcing of new development efforts to be effective. In the future, 44 percent of all respondents expect their organizations to be using consultants in this manner. Consultants were also found to rate high in technical knowledge and skills. About 59 percent of respondents considered consultants to be very knowledgeable or extremely knowledgeable in technical areas.

Methodology: Usage of application development methodologies remains extremely low with only 20 percent of respondents indicating extensive use. At best, organizations' ability to use methodologies is only somewhat effective even with customization.

Standards: Standards are more widely used for naming conventions, production control and computer operations than they are for systems analysis, documentation, and quality control.

Computer-Aided Software Engineering (CASE): From the results of the survey, it would appear that CASE has a bright future. Senior managers in State government envision using CASE for new development projects in the future. State IS managers believe that CASE facilitates the development of better information systems. Departments considering the investment in a CASE tool should not expect an immediate pay-back from improved staff productivity or speedier completion of projects. Staff productivity gains will tend to be slow in coming.

Application Development and Maintenance: Seventy percent of applications development staff time is spent on maintenance and enhancement of existing systems while only 21 percent is spent on new development. Our customers are more satisfied with the quality of our systems than with the timeliness of the development efforts. The use of prototyping, Joint Application Development (JAD), Rapid Application Development (RAD) techniques contributes to more effective application development.

End-User Computing: Despite IS organizations' lukewarm support for end-user computing, more than one-fourth of the survey respondents felt end-user computing was likely to increase dramatically during the next several years, with another one-half anticipating a moderate increase.

Technical Trends: The survey results indicate that State agencies are actively involved in the use of new technologies. Local Area Network (LAN) management, client-server and relational database management systems (RDBMS) are a few of the newer technologies already being used in production by a large number of respondents. Client-server, downsizing, distributed database management systems (DBMS), object-oriented development, business re-engineering and multi-media are some new technologies being evaluated or planned for by numerous survey respondents.

For the members of Data Processing Managers' Academy V, creating, developing, and completing this report and our class project provided valuable experience in management, organization and team-building as well as the opportunity to network with other IS professionals. We hope this report provides State IS professionals with valuable decision-making information for today and the future.

INTRODUCTION

In 1990, the State EDP Education Program (SEEP) established the State Data Processing Managers' Academy (DPMA) to provide advanced training to junior-level information systems (IS) managers. One requirement of each DPMA class is to select and complete a substantive project. The objective of the class project is to 1) utilize skills acquired as part of the Academy training, 2) promote 'networking', 3) promote the exchange of information among State data processing professionals, and 4) 'market' the DPMA within State government. To meet these objectives, members of Academy V identified three deliverables: (1) a DPMA Resource Book, (2) an assessment of the DPMA program itself, and (3) an assessment of issues and trends important to State IS professionals. To create these deliverables, Academy V chose to conduct a comprehensive survey of IS professionals in areas relating to the DPMA in general and issues and trends in particular. This report represents the analysis and interpretation of results of the issues and trends area of the survey.

Survey of Information Technology Trends and Issues

The rapid rate of technological evolution challenges IS professionals to keep abreast of changes that occur. The end result is that IS professionals are inundated with information about information technology related to:

- The latest developments in hardware and software technology;
- Industry efforts toward standardization;
- Vendors' strategic directions;
- Technical specifications and product comparisons; and
- Management techniques.

Executive managers look to their IS Professionals to make sense of this ever-changing array of technological options and opportunities. At the same time, sophisticated end-users demand new capabilities and increasing levels of support. IS professionals who are not prepared to meet these challenges cannot effectively participate in the decision making process, but they will be charged with responsibility for implementing the course of action decided upon.

The members of Academy V chose to focus their survey on issues and trends of importance to State IS managers and leaders. While many publications provide information regarding the industry as a whole, this information usually is based on a relatively small sample of contacts, targeted toward specific technologies, and fails to differentiate between public and private sector organizations. While public and private sector organizations certainly are more alike than different, there are important ways in which cost constraints and the procurement process affect the use of technology in the public sector.

Vehicles (DMV) and the Employment Development Department (EDD), account for 25 percent of all respondents.

DATA CENTERS AND OTHERS	LARGE AGENCIES (IMAP I)	MEDIUM AGENCIES (IMAP II)	SMALL AGENCIES (IMAP III)	NUMBER OF RESPONSES
18%	60%	19%	3%	468

Job Classification

Respondents were asked to identify the classification of their current position from a list of the thirteen different job classifications. The breakdown of the individual classifications is shown in Table 2. Summarizing across job types, approximately four percent of the respondents indicated they were employed in Career Executive Assignments (CEA), 47 percent worked in the classification of Data Processing Manager (DPM), 35 percent were senior- or staff-level analysts at the supervisory and specialist level, and 15 percent were System Software Specialists (SSS). For the purposes of comparison of responses between junior- and senior-level management, the CEA positions and the DPM III and DPM IV positions were classified as 'senior management' and all others were classified as 'junior managers'. By this classification scheme, 12 percent of the survey respondents were senior managers with the remaining 88 percent being junior managers.

INFO SYSTEMS/ PROGRAMMER ANALYSTS		SYSTEM SOFTWARE SPECIALISTS			DATA PROCESSING MANAGERS				CAREER EXECUTIVE ASSIGNMENT			NUMBER OF RESPONSES
Staff	Senior	I	II	III	I	II	III	IV	I	II	III	
28%	7%	8%	5%	2%	22%	17%	8%	<1%	1%	2%	<1%	494

Data Processing Experience

The survey included several questions designed to assess respondents' data processing experience. Tables 3 and 5 provide a breakdown of responses by number of years of experience in data processing and number of years working for the State. Clearly, the survey respondents were experienced data processing professionals as indicated by the fact that three-fourths had greater than ten years experience in data processing, and more than half had sixteen or more years of experience.

In an accompanying question designed to assess the extent of private sector experience among these State data processing professionals, 38 percent indicated at least some of their data processing experience had been acquired outside state service, while 62 percent indicated all their IS experience had been with the State. To some degree, the extent of this non-State experience can be inferred by comparing the *years of experience* versus *years of State employment* information presented in tables 3 and 5. At least on the surface, it appears that persons with 6 to

15 years of data processing experience are more likely to have acquired some significant amount of that experience in the private sector.

Table 3² NUMBER OF YEARS OF EXPERIENCE IN DATA PROCESSING

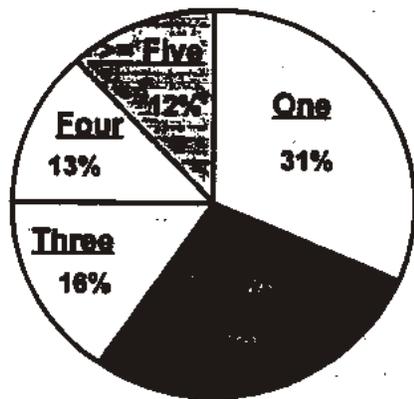
1 TO 5 YEARS	6 TO 10 YEARS	11 TO 15 YEARS	16 TO 20 YEARS	> 20 YEARS	NUMBER OF RESPONSES
4%	14%	26%	16%	40%	493

Table 5 NUMBER OF YEARS OF EMPLOYMENT WITH THE STATE OF CALIFORNIA

1 TO 5 YEARS	6 TO 10 YEARS	11 TO 15 YEARS	16 TO 20 YEARS	> 20 YEARS	NUMBER OF RESPONSES
4%	9%	18%	22%	47%	495

However, it is important to point out that some persons may have extensive State experience but minimal data processing experience as a result of a recent career change, while others may have extensive data processing experience but minimal experience working for the State. This cannot be directly interpreted from information.

Figure A1:
Number of Agencies or Departments Worked at During DP Career



To provide some indication of the breadth of respondents' experience in multiple data processing organizations versus experience based primarily upon a single data processing organization, respondents were asked to indicate the number of State agencies or departments they had been employed by since beginning their IS career. As indicated in Figure 1 to the left and Table 6 below, more than half or 59 percent of the survey respondents had experience limited to just one or two departments. However, it is worthwhile to point out that the 60 percent of survey respondents employed by the larger State organizations as shown in Table 1 may receive a broad range of experience within their organization due to the complex computing environments of these large organizations *even though* they may have limited experience outside their organization.

Table 6 NUMBER OF AGENCIES OR DEPARTMENTS WORKED AT DURING IS CAREER

(1)	(2)	(3)	(4)	(5 OR MORE)	NUMBER OF RESPONSES
31%	28%	16%	13%	12%	493

² Table number 4 intentionally not used.

Areas of Responsibility

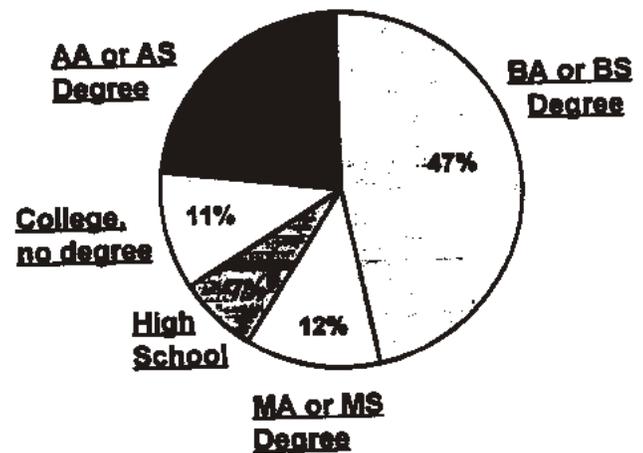
In the complex field of information systems, there are a number of areas of specialization. Of course, the extent to which an organization incorporates these specializations depends upon the size of the organization and the types of processing performed. To provide some assessment of this specialization, respondents were asked to indicate which of nine data processing functions they were responsible for as depicted in Table 7. Respondents were encouraged to identify all areas for which they were responsible. Consequently, the sum of percentages significantly exceeds one hundred with most persons indicating several areas of responsibility. This information was also used in subsequent analyses to separate respondents into groups to, for example, compare the responses of applications development managers to those of managers with responsibilities in other areas.

Area of Responsibility	Percentage	Area of Responsibility	Percentage
APPLICATION DEVELOPMENT	54%	APPLICATION MAINTENANCE	45%
TECHNICAL SUPPORT	48%	EXECUTIVE MANAGEMENT	10%
ADMINISTRATION	22%	COMPUTER OPERATIONS	18%
NETWORK CONTROL	16%	TELECOMMUNICATIONS	21%
OTHER	8%		

Educational Background

Two questions were included on the survey to assess the educational background of the survey respondents. The results are shown in Figure A2 and Tables 8 and 9. Somewhat surprisingly, 59 percent of the survey respondents had completed either undergraduate or graduate level studies. Correspondingly, 44 percent of the respondents reported their education was one of the factors that led them to pursue a career in data processing. Also, a relatively large number of respondents indicated they began their career in data processing as a result of a training and development assignment.

Figure A2: Educational Level



HIGH SCHOOL	COLLEGE, NO DEGREE	AA OR AS DEGREE	BA OR BS DEGREE	MA OR MS DEGREE	NUMBER OF RESPONSES
7%	11%	23%	47%	12%	494

Table 9 HOW DID YOU GET INTO DATA PROCESSING? (CHECK ALL THAT APPLY) (N=495)

TRAINING & DEVELOPMENT ASSIGNMENT	29%	EDUCATION	44%
APPRENTICESHIP	6%	PRIVATE SECTOR	16%
DP ENTRY LEVEL POSITION	5%	CIVIL SERVICE EXAMINATION	4%
MILITARY EXPERIENCE	4%	RECLASSIFIED	1%
STUDENT ASSISTANT	2%	TRANSFERRED	4%
MOVED FROM USER AREA	2%	OTHER	7%

Familiarity with the DPMA

Because the survey was conducted as part of the project for DPMA V, respondents were asked to indicate their level of knowledge regarding the DPMA and whether they had ever applied and been accepted into the Academy. It is interesting to note that the full survey included seventeen Academy Assessment questions in addition to the fifty-five information technology trends questions. The analysis of these 17 questions comprises another of the three components of the Academy V class project.³ These additional questions were completed by 82 respondents out of the total 495 who were alumni of the DPMA.

Table 10 WAS RESPONDENT AWARE OF THE DPMA PRIOR TO RECEIVING THE SURVEY? (CHECK ALL THAT APPLY) (NUMBER OF RESPONSES = 495)

YES, KNEW ABOUT THE DPMA.	87%	NO, NOT AWARE OF THE DPMA	13%
IF YES, HEARD ABOUT DPMA FROM:			
SUPERVISOR OR MANAGER	53%	DPMA ALUMNI	6%
INFORMATIONAL BULLETINS	32%	SEEP - STATE EDP EDUC. PROGRAM	1%
FRIENDS AND COWORKERS	32%	OTHER	3%

Table 11 EVER APPLIED TO PARTICIPATE IN THE DATA PROCESSING MANAGERS ACADEMY? (NUMBER OF RESPONSES = 487)

YES, APPLIED TO DPMA	27%	NO, HAVEN'T APPLIED	73%
IF YES, WERE YOU ACCEPTED? (NUMBER OF RESPONSES = 127)			
YES, ACCEPTED INTO DPMA.	66%	NO, NOT ACCEPTED.	37%

Tables 10 and 11 summarize the responses to the questions related to knowledge of and participation in the DPMA. A more complete analysis of this information is included in the DPMA Assessment report.⁴

³The report on the assessment of the DPMA, titled 'Evaluation of the State of California's Data Processing Managers' Academy' was completed in April 1994 and copies may be requested from SEEP.

⁴See report referenced in Footnote #3.

Value of Management Skills

Table 16 depicts the survey responses to the question regarding assessment of the value of various management skills for an IS manager. Here again, we see clear trends emerging with both interpersonal skills and communication being considered extremely valuable by almost two-thirds of the respondents.

Conclusion

Based upon the background information reported above, the survey respondents represent a broad cross-section of State departments and data processing job classifications, more than half of whom have earned an undergraduate college degree, with a significant number of years of employment with the State and experience in data processing. Clearly, this group of individuals possess the experience and expertise to provide valuable insight into the information technology trends and issues of importance to State data processing managers. The following pages contain analysis and discussion of survey responses in each of ten categories of technology trends and issues.

STRATEGIC PLANNING

Introduction

Data processing professionals have long understood the need for information technology planning. The organization must have a clear, concise long range automation plan in order to best utilize resources and technologies for project development. In the past, agencies were required to report their automation goals to the Office of Information Technology through the IMAP. In 1994, OIT instituted a new policy requiring departments to submit an Agency Information Management Strategy (AIMS). As a result, most agencies have begun creating their Information Systems Strategic Plan. (ISSP). The purpose of the ISSP is to:

- support and expedite implementation of a department's overall Strategic Plan;
- ensure the department's investment in technology achieves the maximum possible results;
- clearly communicates the department's future technology direction;
- solidify top management, middle management, and staff commitment to the technology direction;
- ensure coordination and, where appropriate, integration of existing and future technology projects;
- design a technology architecture that supports departmental operations as well as management decision making; and
- lay out a path for implementation of the plan including commitment of resources so that the technology direction will be accomplished through a unified, department-wide effort over the coming years.

The strategic planning survey questions were designed to have data processing professionals assess their own knowledge of their organization's IS related strategic planning efforts, how effectively the organization has implemented their ISSP, and how beneficial strategic planning has been to the organization.

Question 17 - Almost all organizations have developed either a formal or informal strategic plan, e.g., OIT-required ITSP. How knowledgeable are you regarding the IS-related portions of your organization's Strategic Plan?

Respondents were asked to indicate to what extent they were knowledgeable on a scale from 1 to 5 where 1 meant they had little or no knowledge and 5 meant they were extremely knowledgeable. Many agencies are in the process of completing or have recently completed their strategic plan. As the survey included responses from both junior and senior managers, Academy Group V wanted to assess the knowledge of strategic planning among the two groups as well as overall.

Interpretation of Results

The results of this survey question are presented in tables 17-1 and 17-2. Table 17-1 presents results of the survey group as a whole, while Table 17-2 shows the comparison of knowledge between junior and senior managers.

Seventy-one percent of the survey respondents rated themselves as somewhat to very knowledgeable about the strategic planning efforts in their organizations; however, when broken down by senior versus junior managers, 67 percent of the junior managers were somewhat to very knowledgeable about strategic planning compared to 98 percent of senior managers.

Typically, senior managers look at the organization's information technology efforts from the 'big picture' perspective in terms of the overall benefit to the organization while junior managers tend to be more focused on individual or groups of projects they are responsible for managing. As expected, the survey results confirm that senior managers have more knowledge about their organization's strategic planning efforts. However, the fact that one-third of the junior managers surveyed had little knowledge of their organization's IS related strategic planning indicates senior managers should strive to clearly communicate to their junior managers the importance of the ISSP as it relates to the goals of the organization.

Table 17-1 Knowledge of Strategic Planning					
(1) Little or No Knowledge	(2)	(3)	(4)	(5) Extremely Knowledgeable	Number of Responses
14%	15%	25%	28%	18%	482

Table 17-2 Knowledge of Strategic Planning by Management Level					
(1) Little or No Knowledge	(2)	(3)	(4)	(5) Extremely Knowledgeable	Number of Responses
Junior Managers					
16%	17%	27%	27%	13%	424
Senior Managers					
0%	2%	9%	35%	54%	57

Question 18 - How effective do you feel your organization has been in implementing those portions of the Strategic Plan related to IS?

Respondents were asked to indicate their organization's effectiveness on a scale from 1 to 5 with 1 indicating completely ineffective and 5 indicating extremely effective. As with Question 17, we were again interested in the overall survey response as well as comparisons between junior and senior managers. Additionally, we wanted to compare various departments based on their size according to the IMAP categories.

Interpretation of Results

The results of this survey question are presented in tables 18-1, 18-2 and 18-3. Table 18-1 presents results of the survey group as a whole, while Table 18-2 shows the comparison of effectiveness between junior and senior managers. Table 18-3 shows the comparison of effectiveness for junior and senior managers by department size.

Only 22 percent of the respondents rated their organizations very effective in implementing the IS portion of the strategic plan. Junior and senior managers held similar views with 36 percent of senior managers rating their organizations very effective compared to 21 percent of junior managers. Interestingly, when the same responses were further broken down by IMAP categories, a higher percentage of junior and senior managers from small departments rated their organizations very effective in implementing their ISSP, 31 percent and 100 percent respectively, compared to other size departments. The lowest overall effectiveness ratings came from junior and senior managers from large departments, 15 percent and 22 percent respectively. Respondents from departments in the other IMAP categories fell between the two extremes.

Large departments do not seem to be as effective in implementing their strategic plans as smaller departments. Smaller departments have less bureaucracy and fewer number of systems to support and probably had an easier time identifying and planning for future technology projects.

(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
10%	26%	42%	18%	4%	439

(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Junior Managers					
11%	27%	41%	17%	4%	385
Senior Managers					
6%	13%	45%	32%	4%	53

Table 19-3		Benefit of Strategic Planning to the Organization Management Level by IMAP Category				
	(1) Little or No Benefit	(2)	(3)	(4)	(5) Extremely Beneficial	Number of Responses
			Small			
Junior	0%	8%	38%	31%	23%	13
Senior	0%	0%	0%	50%	50%	2
			Medium			
Junior	13%	22%	23%	27%	15%	69
Senior	0%	0%	46%	36%	18%	11
			Large			
Junior	13%	21%	40%	20%	6%	219
Senior	4%	13%	35%	26%	22%	23
			Data Centers			
Junior	18%	20%	28%	23%	11%	61
Senior	0%	8%	17%	67%	8%	18
Total Responses:						416

PROJECT MANAGEMENT

Introduction

Data processing professionals have long been aware of the importance of developing high quality systems and have spent much time and effort evaluating emerging technologies when designing systems. Project management has rarely received the attention it deserves. It has been overshadowed by the battles within the technological arena such as development language versus development language, operating system versus operating system, and mainframe versus microcomputer. One of the reasons good project management has been such a lasting and critical problem is that the answers are so simple to articulate and understand, yet complex to implement.

Some organizations have adopted a methodology allowing the use of automated tools to track task schedules and employee hours per task and to identify potential problems related to projects being completed on time. Other departments rely on the abilities of their managers to properly manage projects based on their past project management experience.

This series of survey questions was designed to gather information about organizations' use of a structured project management methodology, automated project management tools and function points for project management and to assess the effectiveness of these tools and techniques.

Question 20 - Overall, how effective do you feel your IS division is in planning and managing IS projects?

Respondents were asked to indicate their organization's effectiveness on a scale from 1 to 5 where 1 meant completely ineffective and 5 meant extremely effective.

Interpretation of Results

Survey question results are presented in tables 20-1 and 20-2. Table 20-1 presents results of the survey group as a whole, while Table 20-2 shows junior and senior managers' assessment of the effectiveness of their IS organization in managing projects.

Sixty-nine percent of the survey respondents felt their organizations were somewhat to very effective in planning and managing projects. However, 66 percent of junior managers held this view while 89 percent of senior managers felt their organizations were successful. Approximately three times as many junior managers, 34 percent, as senior managers, 11 percent, felt their organizations were very ineffective in planning and managing projects.

Overall, the results were similar related to the success of managing projects for all department sizes. However, smaller departments tend to rate themselves very effective in managing projects at least 50 percent of the time while all other organizations rate themselves very effective less than one-third of the time.

(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
7%	24%	42%	23%	4%	483

(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Junior Managers					
8%	26%	42%	20%	4%	426
Senior Managers					
2%	9%	39%	41%	9%	56

Question 21 - To what extent does your organization adhere to a structured project management methodology?

Respondents were asked to indicate their organization’s structured project management methodology use on a scale from 1 to 5 where 1 indicated little or no use and 5 indicated extensive use.

Interpretation of Results

The results of this survey question are presented in tables 21-1 and 21-2. Table 21-1 presents results of the overall survey group. Table 21-2 presents the respondents’ rating of the effectiveness of planning and managing projects where the respondents indicated that their organizations used a structured project management methodology.

As we expected, of the respondents indicating that their organizations use a structured project management methodology extensively, 86 percent rated their organizations very effective in planning and managing projects. Fifty-five percent of all respondents who indicated their organizations were using a structured project management methodology at least some of the time also rated themselves very successful in planning and managing projects. This leaves 45 percent of the respondents who do not use a structured project management methodology. One has to ask the question how are these IS organizations planning and managing their projects? Those respondents in organizations not using a structured project management methodology also rated their organizations as ineffective in managing projects a high percentage of the time.

Table 21-1 Organization's Use of a Structured Project Management Methodology					
(1) Not Used at All	(2)	(3)	(4)	(5) Used Extensively	Number of Responses
13%	32%	36%	16%	3%	475

Table 21-2 Effectiveness of Project Management as Indicated by Respondents Using a Structured Project Management Methodology, Extent of Use by Extent of Effectiveness					
	(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective
(1) Not Used at All	32%	37%	27%	3%	1%
(2)	5%	41%	45%	8%	1%
(3)	2%	15%	55%	23%	5%
(4)	3%	3%	24%	60%	10%
(5) Used Extensively	0%	7%	7%	72%	14%
Total Responses:					474

Question 22 - To what extent does your organization use automated tools for project planning and management?

Respondents were asked to indicate their organization's use of automated project management tools on a scale from 1 to 5 where 1 indicated little or no use and 5 indicated extensive use.

Interpretation of Results

The results of this survey question are presented in tables 22-1 and 22-2. Table 22-1 presents results of the overall survey group. Table 22-2 presents the respondents' rating of the effectiveness of planning and managing projects where the respondents indicated their organizations used automated project management tools.

Only twenty-one percent of the survey respondents indicated extensive use of automated project management tools to plan and manage projects. In contrast to the use of structured project management methodology, use of automated project management tools do not appear to contribute as dramatically to an organization's success in managing projects. Sixty-three percent of the respondents whose departments use automated project management tools extensively rated

their organizations extremely effective at planning and managing projects. However, only 10 percent of the respondents using automated project management tools extensively found them completely ineffective. These results tend to indicate some value in using automated project tools but the time and effort involved in keeping the software current probably contributes to their limited success.

(1) Not Used at All	(2)	(3)	(4)	(5) Used Extensively	Number of Responses
11%	39%	29%	17%	4%	477

	(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective
(1) Not Used At All	20%	46%	28%	6%	0%
(2)	9%	28%	48%	13%	2%
(3)	3%	20%	41%	32%	4%
(4)	1%	14%	41%	37%	7%
(5) Used Extensively	5%	5%	27%	42%	21%
Total Responses:					476

Question 23 - To what extent does your organization use metrics, e.g., function points, lines of code, to assess project resource requirements, track projects, etc.?

Respondents were asked to indicate their organization's use of metrics on a scale from 1 to 5 where 1 indicated little or no use and 5 indicated extensive use.

Interpretation of Results

The results of this survey question are presented in tables 23-1 and 23-2. Table 23-1 presents results of the overall survey group. Table 23-2 presents the respondents' rating of the effectiveness of planning and managing projects where the respondents indicated their organizations used metrics for project management.

Eighty-two percent of respondents indicated little or no use of metrics for planning and managing projects. However, as expected, of the respondents using metrics extensively for planning and managing projects, 100 percent indicated their use was extremely effective.

Project Management Conclusions

The survey results confirm our assumptions that the use of structured project management methodologies, automated project tools, and metrics contribute to an organizations' success in managing projects. At least half of all respondents that used these tools rated their departments moderately to extremely successful in managing projects.

Additionally, survey participants from medium and large departments and data centers rated themselves less successful in managing projects than small departments. The ratings are probably directly related to the larger and more complex systems required by large organizations. With the increased demand for services from state data processing organizations, good project management is critical to the success of any project no matter how large or small.

Table 23-1 Organization's Use of Metrics for Project Management					
(1) Not Used at All	(2)	(3)	(4)	(5) Used Extensively	Number of Responses
50%	32%	15%	3%	0%	451

TABLE 23-2 Effectiveness of Project Management as Indicated by Respondents Using Metrics for Project Management, Extent of Use by Extent of Effectiveness					
	(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective
(1) Not Used at All	10%	29%	39%	17%	5%
(2)	6%	19%	46%	27%	3%
(3)	0%	14%	55%	32%	0%
(4)	0%	13%	33%	47%	7%
(5) Used Extensively	0%	0%	0%	50%	50%
Total Responses:					451



ORGANIZATION

Introduction

The backbone of a successful business enterprise is its organizational structure. Nowhere is this more true than in the IS field. What separates successful from less successful organizations is how the business is organized and the methodologies and techniques used within the business. How many organizations feel they are operating at peak efficiency? How have these organizations implemented tools that aid in the operating environment? This series of survey questions were designed to evaluate the effectiveness of their IS organizational structure and the extent to which their organization uses Total Quality Management (TQM) principles.

Question 24 - How effective is your IS organizational structure for meeting the requirements of IS processing and development within your organization?

Respondents were asked to rate the effectiveness of their IS organizational structure on a scale from 1 to 5 where 1 indicated completely ineffective and 5 indicated extremely effective.

Interpretation of Results

The results of this survey question are presented in Table 24-1 and Table 24-2. Table 24-1 represents all survey respondents while Table 24-2 represents the comparison between junior and senior managers.

Twenty-eight percent of respondents feel their IS structure is ineffective, while 72 percent indicated their organizational structure was somewhat to very effective. Junior and senior management had opposite views of this issue. Thirty-one percent of junior managers rated their IS organizational structure ineffective, while only 23 percent felt their organizational structure was very effective in meeting the requirements of the organization. On the other hand, only 9 percent of senior management respondents rated their organizational structure ineffective, and 53 percent said their organizational structure was very effective in meeting the requirements of the organization. Senior level managers tend to look at their IS organizations from the perspective of its place in the overall organization, whereas junior managers are focused on the day-in and day-out business of running the IS organization. As a result, junior managers perceive minor organizational problems as much more critical than they may actually be.

(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
3%	25%	35%	24%	3%	478

Table 24-2 Effectiveness of Organizational Structure - Junior Managers versus Senior Managers					
(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Junior Managers					
4%	27%	46%	21%	2%	422
Senior Managers					
0%	9%	38%	44%	9%	55
Total Responses:					477

Question 25 - To what extent has your IS organization effectively implemented TQM techniques?

Many managers often espouse the terms 'Employee Empowerment' and 'Total Quality Management' and believe their employees are empowered. Some state agencies have chosen to adopt TQM techniques to improve their IS organization's ability to serve their customers. Academy V was interested in assessing how many organizations are actually using TQM techniques. This survey question asked respondents to rate their organization's use of TQM techniques on a scale from 1 to 5 where 1 indicates little or no use and 5 indicates extensive use.

Interpretation of Results

The results of this survey question are presented in Table 25-1 which represents all respondents. Sixty-two percent of the respondents indicated at least some use of TQM techniques, while only twenty-eight percent indicated little or no use of TQM techniques. The fact that more than half of the respondents are using TQM techniques at least some of the time is encouraging and indicates TQM techniques are proving to be effective. Successfully implementing TQM takes a commitment of time and effort by both management and employees, and the 27 percent of respondents indicating little use of TQM probably work for agencies that are not prepared to make the commitment to TQM.

Table 25-1 Use of TQM Techniques					
(1) Not Used at All	(2)	(3)	(4)	(5) Used Extensively	Number of Responses
3%	25%	35%	24%	3%	470

Question 26 - Does your information systems organization exist as a separate division within your agency, i.e., not under Administration or other division?

This survey question asked respondents if their IS organization was an independent division or part of a larger division.

Interpretation of Results

Thirty eight percent of respondents indicated their organization functioned as part of a larger organization, while sixty-two percent stated that their IS organization operated as a separate division. On the surface it appears most IS organizations exist as separate divisions, but we must remember that a large percentage of the respondents work in large agencies thereby skewing the results.

Organization Conclusions

With the trend toward flattening organizational structures, the challenge for many IS managers is a paradigm shift to focus on the 'team approach'. Additionally, we must also practice the principles of employee empowerment allowing employees to have the authority to make decisions as well as responsibility for their actions.



OUTSOURCING

Introduction

State government faces increasing budgetary problems. Permanent work force salaries and benefits form a large portion of the budget. One potential alternative to continually increasing the size of the permanent work force consists of using outside consultants or contract personnel that could be hired to perform a specific function for a specific period of time and then leave. The cost of the service can then be associated directly with the function performed, and the size of the permanent staff does not have to continually increase.

State agencies use outsourcing in many ways to assist permanent staff. Some of these areas were addressed in this survey to provide information to those considering the use of outside sources to augment their staff. The questions deal with how frequently each type of service has been used, how effective the service has been, and to what extent agencies plan to make use of these services in the future.

Question 27 - Please indicate the extent to which your organization *currently uses* outside vendors, e.g., consultants, for any of the following services. Also, indicate your assessment of the value or *effectiveness* of the services provided, and your estimate of *future use* of these types of 'outsourcing' services by your organization:

- a. Assist with feasibility studies, needs analyses, and strategic plans;
- b. Development of new application systems;
- c. Maintenance or enhancement of existing systems; and
- d. Data center/network operations excluding State Data Centers.

The answer to this question could assist agencies in determining whether to use State personnel or outsource these tasks. Respondents were asked to estimate the extent their organization currently uses outside vendors in each area of IS on a scale from 1 to 5 where 1 meant not used at all and 5 meant extensive use. Respondents were asked to indicate their assessment of the effectiveness of outsourcing services on a scale from 1 to 5 where 1 meant ineffective and 5 meant extremely effective. Respondents were also asked to indicate their estimate of the future use of these types of services by their organization on a scale from 1 to 5 where 1 meant outsourcing will not be used and 5 meant they will use it extensively.

Interpretation of Results

The results of this survey question are presented in tables 27-1, 27-2, and 27-3. Table 27-1 shows the extent of current use of outsourcing in each area. Table 27-2 presents the respondents' assessment of the effectiveness of outsourcing for each area, and Table 27-3 shows the expected future use of outsourcing in each area.

Outsourcing for Feasibility Studies and Strategic Planning

Overall, 38 percent of respondents expressed the opinion that outsourcing for Feasibility Study Reports (FSRs) and strategic planning had limited effectiveness. Only 24 percent indicated that outsourcing was an effective tool in handling these types of activities. A slight difference of opinion existed between junior and senior management. Thirty-nine percent of junior management found outsourcing for this purpose had little effectiveness while 23 percent found outsourcing to be an effective technique. Of senior managers, 28 percent believe outsourcing to be ineffective while 33 percent found the service to be effective. None of the senior management respondents found outsourcing for this purpose to be extremely effective.

Thirty-one percent of all respondents expected their organization to use outsourcing in the future for FSRs and strategic planning while 35 percent did not foresee using outsourcing for this purpose in the future. Forty-six percent of senior managers foresee little use of outsourcing in this area in the future compared to 24 percent who expect extensive use of outsourcing in the future. Thirty-four percent of junior management foresee little use of outsourcing in the future while 32 percent expect frequent outsourcing for this purpose in the future. Outsourcing for feasibility studies, needs analyses, and strategic plans appears to have yielded ineffective results. That fact is borne out by the relatively low percentage of management who plan to make use of outsourcing for these types of activities in the future.

Outsourcing for the Development of New Systems

Overall, 31 percent of respondents indicated an opinion that outsourcing for new application development had limited effectiveness while 32 percent believed that outsourcing for this purpose is effective. There was a difference of opinion between junior management and senior management. Thirty-three percent of junior management found outsourcing for this purpose to have little effectiveness while 31 percent found outsourcing to be very effective. Fifteen percent of senior management respondents found outsourcing in this area to be ineffective while 46 percent found the service to be very effective.

Of all respondents, 44 percent foresee their organization frequently using outsourcing for new application development in the future while 22 percent expect little future use of outsourcing for this purpose. Of senior managers, 55 percent foresee frequent use of outsourcing in the future while 23 percent expect infrequent or no use of outsourcing in the future. Twenty-three percent of junior management estimate little use of outsourcing in the future while 43 percent expect frequent use of this type of service.

A large proportion of senior managers believe that outsourcing development projects is effective. Senior management holds a more favorable view of the effectiveness of this type of outsourcing than junior management. Both management levels rated the effectiveness of outsourcing of development work higher than the other areas. Both groups indicate an inclination to make frequent use of this service in the future.

Outsourcing for Maintenance or Enhancements

Sixty-one percent of respondents make little use of outsourcing currently to maintain or enhance existing systems. Only 14 percent use outsourcing frequently for maintenance. Thirty-nine percent of respondents expressed an opinion that outsourcing for this purpose was not effective. Only 22 percent indicated that outsourcing in this area was very effective. Both junior and senior management seemed to agree on the limited effectiveness of this type of outsourcing. Over 80 percent of managers feel they will make moderate to no use of outsourcing in this area in the future.

Outsourcing for Data Center and Network Operations

Sixty-nine percent of respondents make little use of outsourcing for data center or network operations. Only 14 percent use this type of outsourcing frequently. Fifty-five percent of respondents expressed the opinion that outsourcing for data center or network operations was ineffective. Only 20 percent indicated that outsourcing for this purpose was effective. Both junior and senior management seemed to agree on the limited effectiveness of this type of outsourcing. Over 65 percent of both management groups feel they will make little use of outsourcing for this purpose in the future. Overall, respondents of the survey indicated very little use of this type of outsourcing and do not foresee an increase in the use of outsourcing in this area.

Area of IS	(1) Not Used at All	(2)	(3)	(4)	(5) Extensive Use	Number of Responses
FSRs and Strategic Planning	9%	30%	32%	19%	10%	380
Development of New Systems	7%	23%	29%	26%	15%	398
Maintenance or Enhancements	20%	41%	25%	10%	4%	344
Data Center and Network Operations	40%	29%	17%	7%	7%	270

Area of IS	(1) No Value; Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
FSRs and Strategic Planning	13%	25%	38%	22%	2%	380
Development of New Systems	11%	20%	37%	25%	7%	398
Maintenance or Enhancements	18%	21%	39%	16%	6%	344
Data Centers and Network Operations	38%	18%	24%	13%	7%	270

Area of IS	(1) Will Not Be Used	(2)	(3)	(4)	(5) Will Use Extensively	Number of Responses
FSRs and Strategic Planning	10%	25%	34%	22%	9%	391
Development of New Systems	7%	15%	33%	28%	16%	401
Maintenance or Enhancements	24%	28%	30%	13%	5%	377
Data Center and Network Operations	45%	18%	21%	9%	7%	332

Question 28 - Overall, how would you rate consultants and other 'outsourcing' personnel in the following categories:

- a. Business knowledge;**
- b. Transfer of knowledge;**
- c. Technical knowledge/skills;**
- d. Quality of service or product;**
- e. Knowledge of State processes; and**
- f. Meeting deadlines.**

One of the primary justifications for using consultants is supposedly they possess skills permanent staff lack and can be immediately productive for an organization. The purpose of assessing managers' rating of consultants on business knowledge, technical knowledge and skills, and State process knowledge was to determine whether in fact consultants possessed the necessary knowledge or skills to assist agencies immediately. The purpose of determining managers' opinions of consultants in the other categories was to assess consultants' ability to

provide quality services or products, to transfer knowledge to State employees, and to meet deadlines.

Interpretation of Results

The results of this question are presented in tables 28-1, 28-2, and 28-3. Table 28-1 shows the respondents ratings of consultants in three knowledge areas: business knowledge; technical knowledge and skills; and knowledge of State processes. Table 28-2 presents the managers' assessment of consultants' ability to transfer knowledge to State staff. Table 28-3 shows the rating of the quality of service or product provided by consultants. Table 28-4 presents the managers' ratings of consultants' ability to meet deadlines.

Thirty-seven percent of respondents rated consultants as having little business knowledge while only twenty-eight percent rated consultants as very knowledgeable. Surprisingly, business knowledge was not found to be a strength of consultants.

Of all respondents, 59 percent rated consultants high on technical knowledge and skills. Only 11 percent of managers rated consultants unfavorably in this category. State IS managers seem to believe consultants possess sufficient technical skills and expertise to perform the technical assignments they are given. The survey results indicate technical knowledge and skills are strengths for consultants.

Fifty-three percent of respondents found consultants to possess little knowledge of State processes while only 14 percent thought consultants were very knowledgeable about State processes. The results indicate a lack of knowledge regarding State processes as a weakness for consultants.

Forty-five percent of respondents found consultants' lacking the ability to transfer knowledge to State staff, 37 percent indicated a moderate ability to transfer knowledge, while only 18 percent found consultants' ability to transfer knowledge was high. The survey results indicate the poor ability to transfer knowledge to State employees as another weakness for consultants..

Forty-six percent of respondents rated the quality of consultants' services or products as average. Twenty-nine percent of respondents indicated consultants provided high quality products or services while 25 percent of respondents found the quality to be poor. Generally, the quality of services or products delivered by consultants was not viewed as particularly strong or weak. Junior managers and senior managers had widely diverse opinions on this subject. Twenty-seven percent of junior managers found consultants' services or products to be poor in quality while 29 percent rated the quality as high. Only 12 percent of senior managers felt consultants delivered poor quality services or products while 27 percent found consultants' services to be of high quality.

Forty-one percent of respondents rated consultants' ability to meet deadlines as average, 33 percent found consultants to be very effective at meeting deadlines, and 27 percent found consultants to be ineffective in this category. Generally, consultants' ability to meet deadlines was not viewed as a particularly strong or weak trait of consultants.

Outsourcing Conclusions

In the respondents' opinion overall, outsourcing was not overwhelmingly effective in any of the four areas queried. The largest proportion of managers expressed a lukewarm view of the effectiveness of outsourcing. In managers' opinions, the most effective application of outsourcing is in the area of new application system development. Although new application system development was the highest rated area, only 32 percent of all respondents expressed the opinion that consultants are effective in this role. On the other hand, 46 percent of senior managers, who are often key decision makers, regarded outsourcing of new development efforts to be effective. In the future, 44 percent of all respondents expect their organizations to be using consultants in this manner. Consultants were also found to rate high in technical knowledge and skills. About 59 percent of respondents considered consultants to be very knowledgeable or extremely knowledgeable in technical areas.

Table 28-1 Rating of Consultants' Business Knowledge, Technical Knowledge and Skills, and Knowledge of State Processes						
Category	(1) Little or no Knowledge	(2)	(3)	(4)	(5) Extremely Knowledgeable	Number of Responses
Business Knowledge	13%	24%	35%	23%	5%	428
Technical Knowledge and Skills	2%	9%	30%	47%	12%	436
Knowledge of State Processes	17%	36%	34%	13%	1%	432

Table 28-2 Rating of Consultants' Ability to Transfer Knowledge to State Staff						
Category	(1) Little or No Transfer	(2)	(3)	(4)	(5) Extensive Transfer	Number of Responses
Transfer of Knowledge	15%	30%	37%	16%	2%	432

Table 28-3 Rating of the Quality of Service or Product Provided by Consultants						
Category	(1) Extremely Poor Quality	(2)	(3)	(4)	(5) Extremely High Quality	Number of Responses
Quality of Service Provided	5%	20%	46%	26%	3%	430

Table 28-4 Rating of Consultants' Ability to Meet Deadlines						
Category	(1) Completely Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Ability to Meet Deadlines	6%	21%	41%	27%	6%	422



METHODOLOGY

Introduction

Methodologies were created to assist developers with the difficulties and complexities of application development. A system development methodology defines a process of development. It identifies tasks that must be accomplished, how they are done and how they relate to one another. For each task, it should show the inputs and deliverables. It also provides guidelines in the accomplishment of each task.

Webster's New World Dictionary (Copyright 1988) defines a methodology as 1) the science of method, a way of doing anything, or orderly arrangement; specifically, the branch of logic concerned with the application of the principles of reasoning to scientific and philosophical inquiry, and 2) methodologies in particular as a system of methods, as in any particular science.

Formal methodologies have been in existence for some time now. They have been presented to hundreds of organizations and thousands of students. These methodologies have been refined over the years, some effectively, some resulting in nothing more than documents stored on a shelf. Most IS shops use a methodology to train and guide developers. With experience, the best techniques are documented and steadily improved upon.

In the past, methodologies have been 'paper-driven', whereas today they should be in computerized form. Regardless, to effectively meet today's needs, methods selected should be a help not a hindrance.

Question 29 - To what extent does your organization adhere to a shop-standard application development methodology?

Respondents were asked to indicate level of usage on a scale from 1 to 5 where 1 meant a methodology was not used at all and 5 meant extensive use.

Interpretation of Results

The results of the survey question are presented in Table 29-1. Table 29-1 shows the percentages of respondents who always utilize a shop standard methodology at one extreme to those who never use one.

Not surprisingly, use of shop standard methodologies remain low. Only 20 percent of all respondents reported extensive use. Thirty percent of the respondents gave a mid-range response possibly indicating only marginal use. The remaining 50 percent of respondents indicated little or no use.

The results indicate that the use of methodologies in State government seems relatively low. Many questions are raised as to why this is so. Have the methodologies failed to produce expected benefits? Do we expect too much from development methodologies by seeking

'cookbook' approaches when they are inappropriate? Or do we simply struggle due to conflicts with personal taste? Whatever the case may be, IS professionals appear to be challenged in the application of standard methodologies.

(1) Little or no use	(2)	(3)	(4)	(5) Used extensively	Number of Responses
21%	29%	30%	15%	5%	329

Question 30 - How would you assess your organization's ability, knowledge, and skill to use the application development methodology you've adopted?

The best methodology in the world will not be successful if the IS organization does not possess the ability, knowledge, and skill to use it. The objective of this question was to assess the adequacy of organizations' ability, knowledge, and skill to use the application development methodology they have adopted. Respondents were asked to indicate the degree of capability on a scale from 1 to 5 where 1 meant completely inadequate and 5 meant fully adequate.

Interpretation of Results

The results of the survey question are presented in Table 30-1. The table shows the percentages of respondents who believe their organization to fully possess the capability to apply their methodology, at one extreme, to those who believe their organization is not capable of this task. It should be noted that approximately 21 percent of the respondents to Question 29 did not answer this question indicating they did not use a methodology at all.

A large proportion of respondents, 40 percent, believe their organization possesses a moderate ability to use their methodology. Another 40 percent of respondents believed their organization's capability to apply a methodology was low or inadequate. Only 20 percent of respondents indicated their organization's ability to use a methodology was high. Given the vast amount of information which methodologies require staff to understand, a mid-range response to this question would be expected. Considering that IS professionals are required to learn business applications as well as stay abreast of the latest in development tools, survey results indicate that, in general, State IS organizations possess just a moderate level of knowledge and skills needed to apply methodologies.

Table 30-1 Ability to Use Applications Development Methodology Adopted by the Organization					
(1) Completely Inadequate	(2)	(3)	(4)	(5) Fully Adequate	Number of Responses
8%	32%	40%	16%	4%	260

Question 31 - To what extent have you 'customized' the methodology to satisfy the specific requirements of your organization?

In many IS shops, the purchase of a standard application development methodology (ADM) has resulted in eventual customization according to need. This customization is due to a variety of reasons, from an organization's infrastructure to individual preferences. The objective of the question was to assess to what degree customization had occurred.

Interpretation of Results

The results of the survey are presented in Table 31-1. The table shows the percentages of respondents who modified their methodology extensively, at one extreme, to those who had not made any changes. It should be noted that approximately 21 percent of the respondents to Question 29 did not answer this question indicating they did not use a methodology at all.

As expected, most agencies found it necessary to modify their methodology of choice. Only eight percent indicated that no modifications had been made. Interestingly, with 92 percent indicating some degree of modification to meet specific requirements, about 80 percent of respondents as indicated for the previous question were apprehensive about their organization's ability to use it! Could it be, even with modifications, the methodology of choice remains too complex for staff to apply? Or are the modifications ignoring the real needs of those asked to apply the methodology?

Table 31-1 Extent of Customization of Standard Application Development Methodology					
(1) Not Changed at All	(2)	(3)	(4)	(5) Changed Extensively	Number of Responses
8%	23%	39%	22%	8%	251

Question 32 - Please indicate the extent to which your organization *currently uses* a methodology and the *effectiveness* of that methodology for each of the following types of application development projects:

- a. Large projects and/or large systems implementations;**
- b. Small projects and/or small systems implementations;**
- c. New development; and**
- d. Maintenance or enhancements to existing systems.**

The objective of this question was to assess the extent organizations used an ADM for different application development projects. No definition was provided in the survey to define the difference between maintenance, enhancements, or new development or what constituted a large or small project.

Interpretation of Results

The results of this survey question are presented in tables 32-1 and 32-2. Table 32-1 presents the extent of current use of methodologies broken down into the four project categories as indicated above. Table 32-2 shows the effectiveness of methodologies in each category as reported by the respondents.

Not surprisingly, a large proportion, 52 percent, of respondents indicated frequent use of methodologies for large projects as well as new development efforts. A smaller proportion of respondents, 30 percent, said that methodologies were used frequently for small projects while only 17 percent stated that methodologies were often used for maintenance or enhancement efforts.

Of the four types of project, the largest proportion of responses, 47 percent, indicated that methodologies were most effective for new application development while 40 percent responded that methodologies were effective for large projects. For maintenance and enhancement of existing systems, the opposite seems to be the case. Here, 44 percent of respondents asserted that methodologies were not effective for maintenance or enhancement efforts and only 22 percent stated that they were effective. This could be due in part to methodologies being geared more toward new development efforts with only the promise for ease of use in maintenance. Obviously, attempts to apply a methodology with existing or previously designed systems has not fared well.

Methodology Conclusions

Clearly, use of application development methodologies continues to be a challenge to IS professionals in state government, both in usage and implementation. As indicated by the survey, usage remains extremely low and at best the ability to use a methodology is only somewhat effective even with customization.

IS professionals have long argued that application development is a science or engineering discipline rather than an art. However, in state government at least, we have yet to realize the discipline and standardization recognized as important in other engineering professions. If we are to meet the challenge of consistently producing quality systems, we must resolve this problem. Maybe it's time to question and change our approach.

Table 32-1 Extent of Current Use of Application Development Methodology by Type of Project

Type of Application Development Project	(1) Not Used At All	(2)	(3)	(4)	(5) Used Extensively	Number of Responses
Large Projects and/or Small Systems	4%	15%	29%	34%	18%	245
Small Projects and/or Small System Implementations	9%	32%	29%	25%	5%	245
New Development	3%	14%	31%	34%	18%	250
Maintenance or Enhancements to Existing Systems	26%	32%	25%	14%	3%	238

Table 32-2 Extent of Effectiveness of Application Development Methodology by Project Type

Type of Application Development Project	(1) No Value; Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Large Projects and/or Small Systems	5%	17%	38%	31%	9%	245
Small Projects and/or Small System Implementations	7%	20%	38%	28%	7%	245
New Development	5%	12%	36%	34%	13%	250
Maintenance or Enhancements to Existing Systems	22%	22%	34%	18%	4%	238



STANDARDS

Introduction

Standards are the rules which analysts, programmers, operators, and other personnel in an Information Systems organization should follow. One purpose of standards is to measure the quantity or quality of work. Standards vary from organization to organization. It is essential that complete and current standards exist and be understood. Some reasons for having standards are:

- The work of everyone in an organization is understood by others;
- New employees can be trained and become more effective sooner;
- Flexibility in staff movement is better realized; and
- Changes can be implemented more easily when existing standards are used as references.

However, for many IS organizations, standards constitute nothing more than a set of binders occupying a foot or more of shelf space, outlining a rigid set of rules. The rules are often complex and difficult to understand. Training is difficult and enforcement practically impossible.

Question 33 - Please assess your organization's use of standards and the effectiveness and benefits of those standards in each of the following areas:

- a. **Systems analysis standards;**
- b. **Programming and coding standards;**
- c. **Naming conventions;**
- d. **Documentation standards;**
- e. **Change control and configuration management standards;**
- f. **Testing standards;**
- g. **Quality control and/or quality assurance standards; and**
- h. **Production control and computer operations standards.**

The objective of this question was to determine to what extent standards were actually being used and how effective respondents found them to be. Respondents were asked to indicate current use on a scale from 1 to 5 where 1 meant no use at all and 5 meant extensive use. For effectiveness, the same scale was used where 1 meant no value or ineffective and 5 meant extremely effective.

Interpretation of Results

The results of this survey question are presented in tables 33-1 and 33-2. Table 33-1 presents the extent of the current use of standards in each area as reported by the respondents while Table 33-2 shows the respondents' ratings of the effectiveness of the use of standards.

As indicated by the results, very few apply standards consistently in all areas. Standards seem to be more widely used for the more tangible and routine types of work. The survey results indicate that standards are more widely used for naming conventions, production control and computer operations than they are for systems analysis, documentation, and quality control. In all areas of use, approximately one-third of respondents indicated a moderate level of use of standards. To be effective, standards must be used consistently not just when it is convenient. Only moderate use of standards inhibits their effectiveness and value.

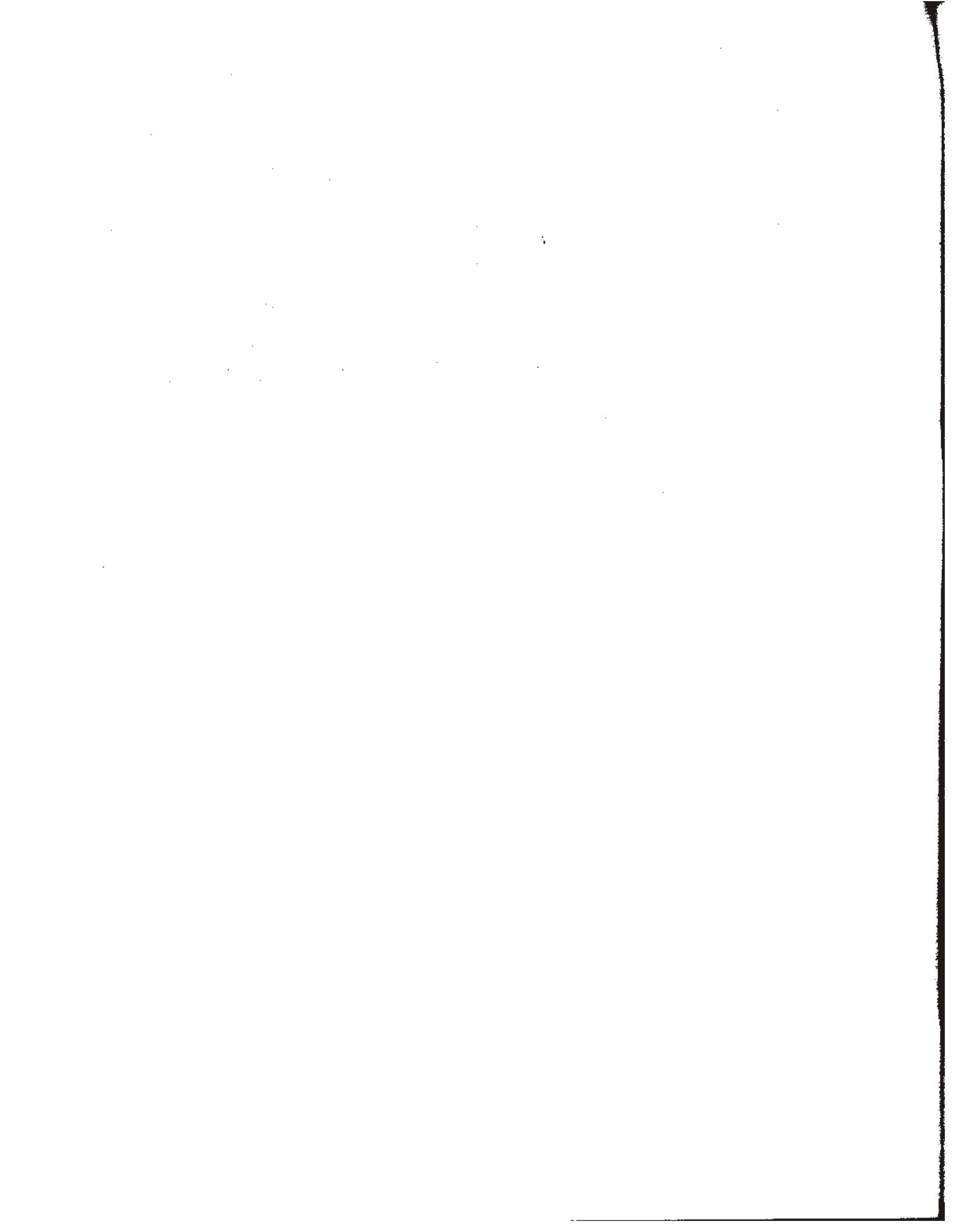
The survey responses regarding the effectiveness of standards seem to closely match the responses regarding the level of current use. This may reflect a situation where those who have made a commitment to using standards extensively are also the ones who believe they are effective for their intended purpose. Respondents indicated that standards are most effective for naming conventions, production control, and computer operations than they are for systems analysis, documentation, and quality control.

Standards Conclusions

Standards should confer many benefits to an IS organization. However, they often fail in practice as indicated by the survey results. Areas in which standards are vulnerable include credibility, enforcement, use, and modification. Similar to the situation with methodologies, this problem must be addressed. Maybe the areas of vulnerability themselves indicate a solution lies in the computer implementation of standards such as a CASE system. It could possibly help overcome the problems of practical deployment.

Area of Standard Use	(1) Not Used at All	(2)	(3)	(4)	(5) Extensive Use	Number of Responses
Systems Analysis	13%	31%	35%	17%	4%	365
Programming/Coding	8%	23%	37%	25%	7%	395
Naming Conventions	5%	15%	31%	32%	17%	413
Documentation	9%	28%	37%	19%	7%	406
Change Control/ Configuration Mgmt.	7%	22%	32%	26%	12%	405
Testing	10%	28%	33%	21%	8%	407
Quality Control/ Assurance	15%	30%	32%	19%	4%	388
Production/Computer Operations	7%	10%	35%	35%	13%	382

Area of Standard Use	(1) No Value; Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
Systems Analysis	13%	24%	37%	20%	6%	365
Programming/Coding	7%	22%	38%	25%	8%	395
Naming Conventions	6%	11%	30%	38%	15%	413
Documentation	11%	27%	38%	18%	6%	406
Change Control/ Configuration Mgmt.	9%	21%	34%	26%	10%	405
Testing	10%	24%	36%	22%	8%	407
Quality Control/ Assurance	18%	26%	35%	16%	5%	388
Production/Computer Operations	7%	12%	37%	33%	11%	382



COMPUTER-AIDED SOFTWARE ENGINEERING

Introduction

CASE represents the introduction of engineering methods and disciplines to the activity of building business information systems. CASE became a commercial reality in the late 1980's and has begun to be actively used in State information system organizations in recent years. We were interested in determining the extent of CASE use in State organizations and the views of State information technology managers on the effectiveness of this new tool.

CASE software is used in any and all phases of the development of information systems including analysis, design, and programming. CASE tools provide automated methods for designing and documenting information systems using structured analysis and design techniques. The goal of CASE is to provide a method for describing the overall system that is sufficient to generate the necessary computer programs.

A great deal of information must be collected and organized during the development of any business application. CASE provides a method for managing this information throughout the development process. CASE is used to record a wide range of useful information about system requirements based on the analysis of both information and functions.

Question 34 -Please indicate the extent to which CASE tools are *currently being used* for the types of project development listed below. Also indicate anticipated *future use* of CASE for each of these development areas:

- a. Development of new systems;
- b. Re-engineering of existing systems to develop new systems;
- c. Redeveloping or reverse engineering of existing systems; and
- d. Maintaining existing systems.

This question asked respondents to assess the extent of their use of CASE for different types of development projects. In addition to new development projects where CASE is often used, the question was intended to determine whether CASE is being used for re-engineering or reverse engineering projects. Additionally, the question tried to assess whether State data processing leaders expected to increase their use of CASE in the future. In the questionnaire, respondents were asked to indicate the extent of their CASE usage on a scale from 1 to 5 where 1 meant CASE was not used at all and 5 meant extensive use.

At this time, CASE is primarily associated with new development projects. The use of CASE for re-engineering, reverse engineering, or maintenance projects is relatively new and still in its infancy. Therefore, we expected a moderate amount of current use of CASE for new development projects and relatively little use of CASE for re-engineering, reverse engineering, and maintenance projects. Because CASE is an up-and-coming technology, we also expected the anticipated future CASE use would be higher than the current use of CASE.

Interpretation of Results

The results of this survey question are presented in tables 34-1 and 34-2. Table 34-1 presents the current and anticipated future use of CASE reported by all respondents including both junior and seniors managers while Table 34-2 shows the current and anticipated future use of CASE for only those respondents classified as senior managers. Respondents indicated their usage of CASE on a scale from 1 to 5 ranging from 'not used at all' to 'extensive use'.

As expected, the current use of CASE for new development projects was much higher than the other types of development projects. Almost one-quarter of all respondents, 22 percent, reported they were currently using CASE frequently for new development. Only 11 percent of all respondents reported they were currently using CASE frequently for re-engineering projects and six percent indicated a frequent use of CASE for reverse engineering. The results indicate that the use of CASE for re-engineering or reverse engineering is still very low.

Project Development Area	(1) Not Used at All	(2)	(3)	(4)	(5) Extensive Use	Number of Responses
Use of CASE for developing new systems						
Current Use	28%	31%	19%	15%	7%	341
Future Use	9%	13%	27%	33%	18%	341
Use of CASE for re-engineering systems						
Current Use	51%	25%	13%	8%	3%	324
Future Use	17%	22%	29%	21%	11%	324
Use of CASE for reverse engineering						
Current Use	61%	21%	12%	5%	1%	311
Future Use	27%	22%	29%	13%	9%	311
Use of CASE for maintaining systems						
Current Use	70%	14%	9%	4%	3%	316
Future Use	32%	23%	29%	9%	7%	316

Also as expected, the anticipated future use of CASE was higher than current use for all development project types. About one-half of all respondents, 51 percent, expected to be using CASE frequently for future new development. About 32 percent of all respondents expected to use CASE frequently for future re-engineering projects while 22 percent expected to use CASE frequently for future reverse engineering projects. Of particular interest is that about two-thirds, 67 percent, of senior managers surveyed expected to use CASE frequently for future new development projects. This is important because senior managers are key decision makers regarding the adoption and implementation of new technologies

Table 34-2 Extent of Current and Future Use of Case by Project Development Area as Indicated by Senior Managers

Project Development Area	(1) Will Not be Used	(2)	(3)	(4)	(5) Will Use Extensively	Number of Responses
Use of CASE for new development						
Current Use	21%	30%	16%	19%	14%	43
Future Use	5%	12%	16%	39%	28%	43
Use of CASE for re-engineering systems						
Current Use	43%	23%	14%	10%	10%	42
Future Use	8%	22%	22%	26%	22%	42
Use of CASE for reverse engineering						
Current Use	58%	20%	5%	12%	5%	40
Future Use	20%	32%	13%	20%	15%	40
Use of CASE for maintaining systems						
Current Use	62%	22%	12%	4%	0%	42
Future Use	26%	22%	31%	14%	7%	42

Question 35 - Based upon your general knowledge of CASE tools, or your organization's experience using CASE tools, indicate the extent to which you agree or disagree with these characterizations of CASE technology:

- a. CASE facilitates definition and understanding of user needs;
- b. CASE facilitates use of standard development methods and procedures;
- c. CASE provides automated support for development methodology;
- d. CASE improves coordination and communication among work group;
- e. CASE results in more well-documented application systems;
- f. CASE results in the development of higher quality application systems;
- g. CASE improves overall productivity of development staff;
- h. CASE speeds development and completion of projects;
- i. CASE provides cost/beneficial alternative to standard development process;
- j. CASE reduces maintenance support requirements.

In the questionnaire, respondents were asked to indicate the extent of their agreement on a scale of 1 to 5 where 1 meant they strongly disagreed with the statement and 5 meant they strongly agreed with the statement.

Because the use of CASE in the data processing industry is spreading, we expected a generally positive view of CASE among data processing managers. We were also interested in assessing the opinion of respondents who are currently using CASE. Obviously, those actively using the

tool would have some real experience upon which to base their opinions. After some experiences with CASE, we were interested in learning whether the CASE users were still favorable regarding the technology.

Interpretation of Results

The results of our survey are presented in tables 35-1 and 35-2. Table 35-1 shows the degree of agreement or disagreement of all respondents to each statement about CASE. The statements about CASE are listed in the left column and grouped into three general categories. Table 35-2 presents the degree of agreement or disagreement to the statements about CASE by those respondents who said they were currently using CASE to some extent for new development projects, i.e., respondents who marked 3, 4, or 5 on the prior question in the survey. On the survey, respondents indicated the degree of their agreement on a scale from 1, to 5 ranging from 'strongly disagree' to 'strongly agree'.

As expected, in general, State IS managers and leaders have a favorable opinion of CASE. The percentage of all respondents agreeing with the first six characterizations was significantly larger than the percent who disagreed or were indifferent. However, State data processing leaders were not convinced that CASE speeds the development of systems. Only 30 to 40 percent of all respondents agreed that CASE speeds development of systems, improves staff productivity or is a cost/beneficial alternative for systems development. Over 40 percent of respondents neither agreed nor disagreed that CASE speeds development or improves staff productivity.

The respondents actively using CASE expressed a positive opinion of CASE as a tool that facilitates the development of better systems. A majority of respondents currently using CASE tools agreed CASE facilitates the systems development process in all four characterizations in this area. Additionally, a majority of these respondents agreed that CASE results in higher quality systems, 56 percent, that are better documented, 66 percent. Only 11 percent of those using CASE disagreed that using CASE tools results in the development of higher quality application systems.

The majority of respondents currently using CASE did not agree that CASE speeds development or is cost/beneficial. Only 34 to 41 percent of respondents currently using CASE agreed that it speeds development of systems, improves staff productivity or is a cost/beneficial alternative for systems development. The largest percent of respondents neither agreed nor disagreed with these characterizations. Of particular note, 25 percent of respondents now using CASE disagreed with the characterization that CASE speeds the development and completion of projects. This was the greatest level of disagreement among all the characterizations.

The reason for the lack of agreement about whether CASE improves staff productivity or speeds systems development may reflect the fact that CASE is a relatively new technology to State data processing organizations. State data processing organizations may not have gained enough experience with the tools to be improving their productivity. The lack of agreement with the characterization that CASE is a cost/beneficial alternative may also reflect the relatively high cost of the CASE software products themselves compared to traditional development methods which were typically not supported by automated analysis tools.

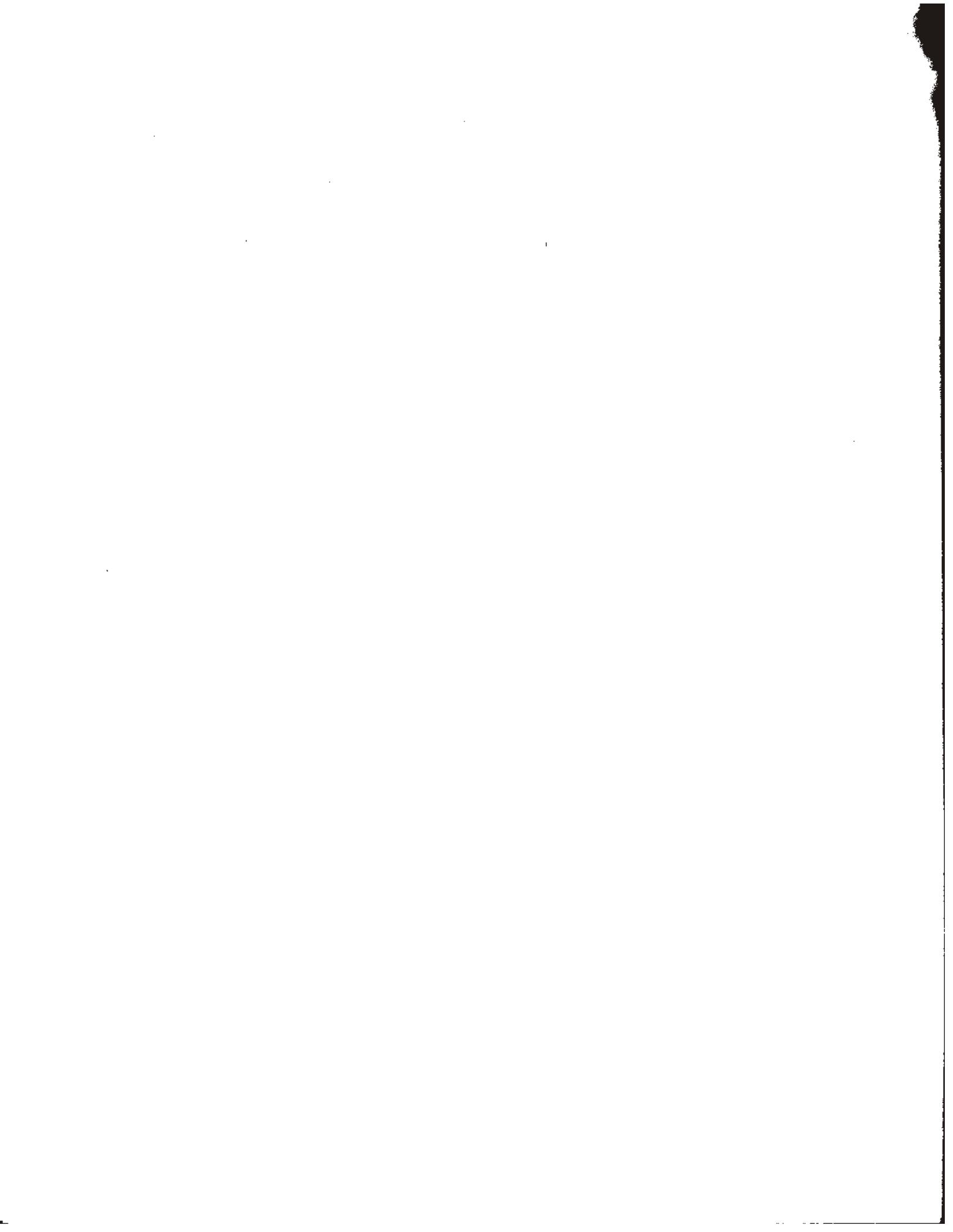
Statement about CASE	(1) Strongly Disagree	(2)	(3)	(4)	(5) Strongly Agree	Number of Responses
CASE facilitates the systems development process						
Facilitates definition and understanding of user needs	4%	12%	35%	33%	16%	363
Facilitates use of standard development methods and procedures	2%	3%	20%	48%	27%	361
Provides automated support for development methodology	2%	7%	24%	46%	21%	359
Improves coordination and communication among work group	3%	15%	36%	35%	11%	358
CASE results in better systems						
Results in more well-documented application systems	1%	8%	27%	40%	24%	357
Results in the development of higher quality application systems	4%	11%	37%	36%	12%	358
CASE produces systems in less time and cost						
Improves overall productivity of development staff	5%	15%	40%	29%	10%	358
Speeds development and completion of projects	8%	18%	42%	23%	9%	357
Provides cost/beneficial alternative to standard development process	5%	19%	46%	24%	7%	348
Reduces maintenance support requirements	6%	16%	43%	27%	8%	351

Statement about CASE	(1) Strongly Disagree	(2)	(3)	(4)	(5) Strongly Agree	Number of Responses
CASE facilitates the systems development process						
Facilitates definition and understanding of user needs	1%	7%	34%	39%	19%	140
Facilitates use of standard development methods and procedures	2%	0%	18%	53%	27%	139
Provides automated support for development methodology	1%	5%	23%	49%	22%	139
Improves coordination and communication among work group	2%	14%	33%	41%	10%	138
CASE results in better systems						
Results in more well-documented application systems	2%	5%	27%	43%	23%	136
Results in the development of higher quality application systems	2%	9%	33%	43%	13%	137
CASE produces systems in less time and cost						
Improves overall productivity of development staff	3%	12%	44%	30%	11%	137
Speeds development and completion of projects	8%	17%	41%	27%	7%	137
Provides cost/beneficial alternative to standard development process	3%	13%	49%	28%	7%	134
Reduces maintenance support requirements	5%	14%	41%	30%	10%	134

CASE Conclusions

From the results of the survey, it would appear that CASE has a bright future. Senior managers in State government envision using CASE for new development projects in the future. State IS managers believe that CASE facilitates the development of better information systems. This indicates that CASE is a viable technology that is worthy of serious consideration by Departments currently not using CASE but contemplating making an investment in this technology. State IS organizations should be planning for the future application of CASE for new development projects.

Departments considering the investment in a CASE tool should not expect an immediate pay-back from improved staff productivity or speedier completion of projects. Staff productivity gains will tend to be slow in coming. This leads to the conclusion that serious planning should be done before the implementation of CASE to ensure that development staff are provided substantial training in the tool in order to achieve productivity gains within a reasonable time frame.



APPLICATION DEVELOPMENT AND MAINTENANCE

Introduction

Application development and maintenance has long been the primary function of IS organizations. But with the trends toward client-server technology and the proliferation of vendor-developed software, many IS organizations are shifting from a customer service to a customer partnership role, providing the guidance and expertise to assist customers in assessing automation needs while increasing user input and responsibility for new automation efforts. However, there will always be a need for some form of ongoing application development and maintenance to support legacy systems and provide custom application development for users.

This series of survey questions asked respondents to identify the size and structure of their application development and maintenance group and about customer relations. The first two questions address the size of the respondent's IS organization and how they split their time between development, maintenance, enhancement and other activities. The next three questions explore the respondent organization's use of customer liaisons, user groups, and user project managers. The last set of questions deal with the quality and timeliness of systems development efforts and the factors that might contribute to delays in implementation. The final question asks about various evolving techniques in project development and their estimated use and effectiveness.

Question 36 - How large is the application development and maintenance group within your IS organization, i.e., number of persons, including consultant personnel?

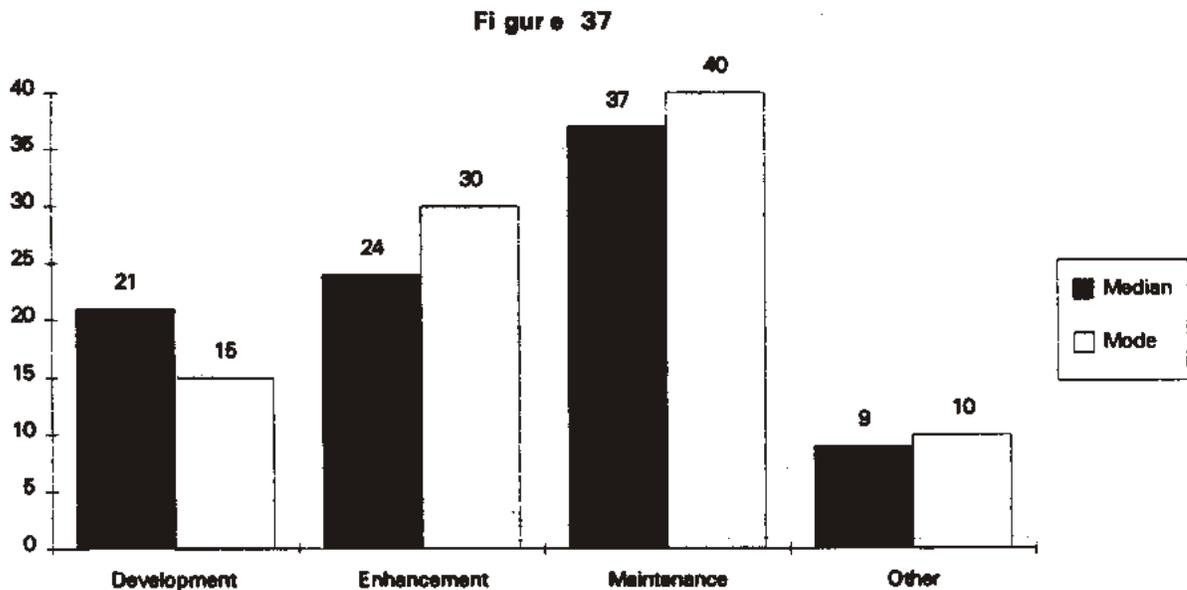
Number of Staff	Percentage of Responses	Number of Responses
0 to 10 persons	14%	62
11 to 25 persons	14%	65
26-50 persons	15%	66
51 to 100 persons	22%	101
101 to 200 persons	18%	80
> 200 persons	18%	80
Total	100%	454

Question 37 - Among your applications and development staff, please provide your estimate of the percent of time spent performing the following functions:

- a. **Developing new applications;**
- b. **Enhancing existing systems;**
- c. **Maintaining existing systems; and**
- d. **Other functions.**

Interpretation of Results

Figure 37 is a graphic representation of the data for all categories. The maintenance category had the highest response rate with a mode or highest frequency of 40 percent and a median of 37 percent.



Maintenance is the largest activity for most organizations followed by enhancement. Between these two categories, most organizations spend sixty to seventy percent of their resources. New development is the third rated activity with the median response of 21 percent indicating that the average organization spends only about one fifth of its time developing new systems.

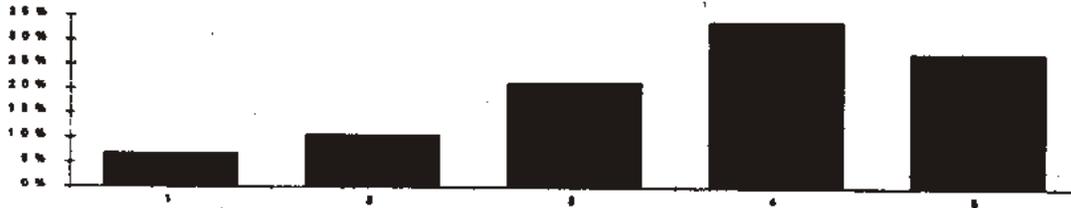
Question 38 - Do you have designated liaison person(s) from the user group representing user needs for production systems?

This question was asked because customer commitment of time and resources in the form of user liaisons is critical to giving IS staff clear direction in the development and maintenance process.

The responses showed heavy involvement of customers through designated liaisons. Using a scale where 1 indicated no user representation and 5 indicated extensive representation, the mean

response was a very high 3.6. There was no significant difference in the responses between junior and senior management, but applications development managers recognized liaison persons at a slightly higher rate than other managers. The mean response for applications development managers was 3.8 compared to 3.5 for other managers. The distribution of responses for all managers is found in Table 38-1 and is presented graphically in Chart 38 below.

Chart 38



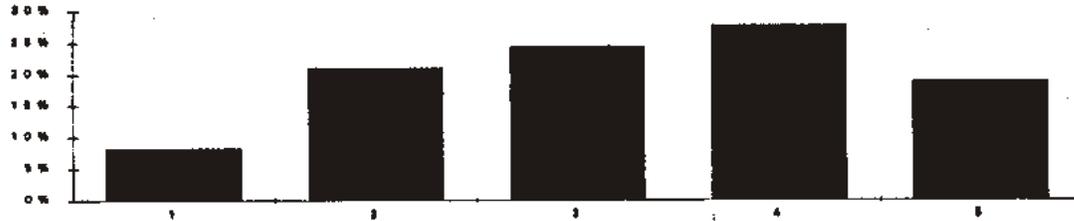
(1) Never, Not at All	(2)	(3)	(4)	(5) Always, Used Extensively	Number of Responses
7%	11%	21%	34%	27%	445

Question 39 - Do you have staff member(s) from the IS group that act as customer representatives and liaisons to the user community?

This question asked respondents if their IS organization had committed resources for reaching out to the user community. The commitment to customer communication is an important component in maintaining relations with our customers and is an indicator of how much importance we place on customer service. Since most IS organizations are striving to provide improved customer service, we anticipated a high percentage of involvement by IS representatives with customer groups.

Seventy-one percent of respondents indicated they had at least some IS staff acting as customer representatives to the user community. This clearly supports our expectation that IS organizations are recognizing the importance of keeping open lines of communications with customers. On a scale where 1 indicated no representation and 5 indicated extensive representation, the mean of the responses was 3.3. Senior managers with a mean of 3.4 indicated there were customer representatives more frequently than junior managers with a mean 3.3. The distribution of responses for all managers is found in Table 39-1 and is presented graphically in Chart 39 below.

Chart 39



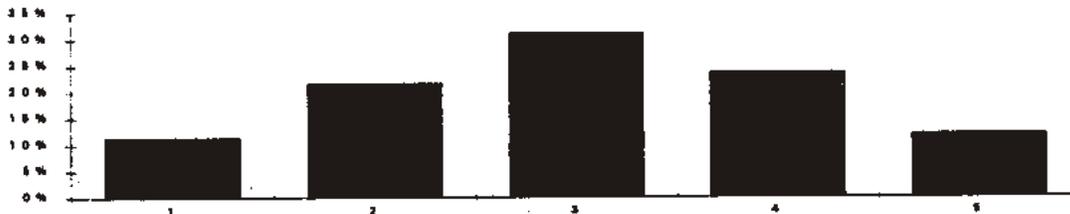
(1) Never, Not at All	(2)	(3)	(4)	(5) Always, Used Extensively	Number of Responses
8%	21%	24%	28%	19%	452

Question 40 - Are user managers assigned significant responsibilities in the management of application development projects, e.g., project leader?

The question was designed to determine if the survey respondents' organizations considered the users as customers of a service or partners in the development of a system. In the past, the roles of the customers and the IS organizations have varied greatly and the survey question was included at least partly to see how this relationship is viewed today.

The responses showed no clear pattern. On a scale where 1 meant no use and 5 meant extensive use, the mean of the responses was a very middle-of-the-road 3.03. There were no significant differences among the responding groups and a chart is included only to show the normalcy of the distribution.

Chart 40



The results of the three questions on user group representatives, IS customer representatives and user roles in the management of application development projects paint a picture of inconsistency and hint of a dangerous passivity. It is easy to look at the overall numbers and say that different organizations do things differently, but when viewed at the extremes it is possible

to read these numbers very negatively. Eight percent of the respondents never have IS staff act as customer representatives while 27 percent always had user group liaisons. The customers appear to be more aggressive in coordinating their needs than we are in selling our services. It is true that nineteen percent of respondents always provide representatives to our customers, but only 12 percent always assign customers significant roles in application development projects. Eleven percent never assign customers significant roles.

Although the results of these questions are not clear-cut, it appears that the average IS organization is provided a user group liaison more frequently than it provides a representative to the customer. The customer is generally not sought out to play a lead role in the management of application development projects.

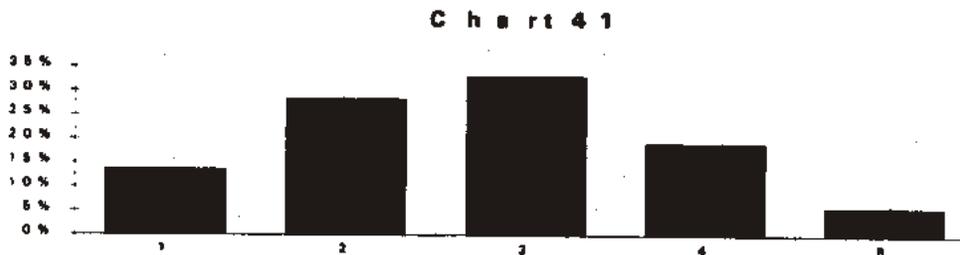
(1) Never, not at all	(2)	(3)	(4)	(5) Always, on Every Project	Number of Responses
11%	22%	31%	24%	12%	442

Question 41 - Does your organization use peer review throughout the application development process?

This purpose of this question was to have respondents assess their organization's use of peer review throughout application development. Since peer review is available to all organizations, requires no additional software, hardware or training and has been urged for years as a simple way to increase quality, it was selected as an indicator of whether organizations were responding to concerns about quality. The question may have been confusing since it specified the use of peer review 'throughout' the development process and some organizations may use it only in specific phases. But, using the 'never-always' range of options, it was hoped that intermediate answers would be used to indicate some use of peer review during application development phases as well as use some of the time.

Interpretation of Results

The mean of all responses was a relatively low 2.8 with little variation between junior and senior management. In all groups, the responses indicating no use outnumbered the responses of extensive use. The largest single group was the middle group.



Peer review has not been widely adopted as a means of improving quality in the application development process. It is not clear whether this is because the process is viewed as ineffective or simply too costly, but these results, combined with the results of the following question, bring into focus the whole issue of quality in State IS organizations.

(1) Not at all, never used	(2)	(3)	(4)	(5) Always, used extensively	Number of Responses
1%	28%	33%	19%	6%	432

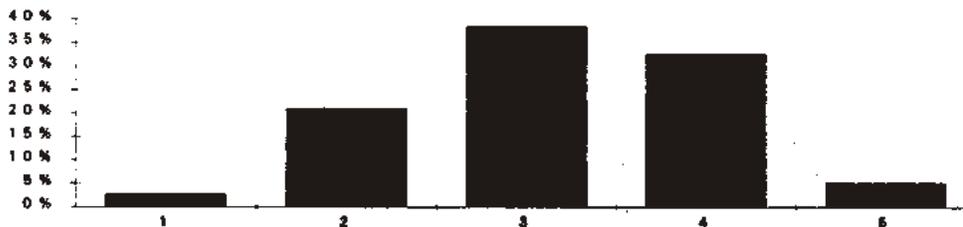
Question 42 - How satisfied do you feel your users are with the quality of the systems you deliver to them?

If IS managers believe customers are satisfied, then we are succeeding in communicating realistic expectations and delivering functional systems. If we believe our customers are dissatisfied, we must believe their expectations are unrealistic or that we are not delivering the systems they need today.

Interpretation of Results

There were few who believed customers were either extremely satisfied or dissatisfied. More were mildly optimistic than pessimistic, but the largest group consisting of 38 percent of respondents was neutral. The numerical mean of all responses was a slightly positive 3.2. Senior managers were more positive than junior managers. In fact, no senior managers believed the customers were extremely dissatisfied and the mean of the responses for senior managers was 3.4 compared to 3.1 for junior managers.

Chart 42



The results present neither a wholehearted endorsement of the current situation nor a justification for a major overhauling of the current practices. It would be interesting to compare this assessment of our customers' satisfaction with a direct survey of the customers. Given only the data from this survey, we appear to believe we are doing an adequate job of developing quality systems. However, the large group of neutral responses holds the potential of hiding serious

problems. The responses to this question are more interesting when combined with the responses to the following question on the timeliness of our delivery of systems.

(1) Extremely Dissatisfied	(2)	(3)	(4)	(5) Extremely Satisfied	Number of Responses
3%	21%	38%	33%	5%	447

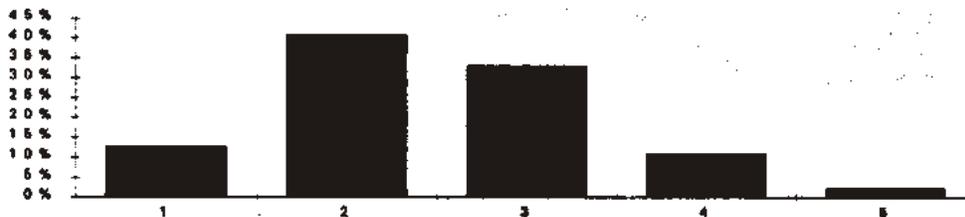
Question 43 - How satisfied do you feel your users are with IS's timeliness in delivering completed systems to them?

Academy V wanted to compare respondents perception of customer satisfaction with quality as reported for question 42 to their perception of customer satisfaction with the speed of development. Since quality and speed of development are two of the main concerns of application development, these questions were posed to give state IS managers a chance to acknowledge our customers concerns.

Interpretation of Results

Only two percent of all managers felt customers were extremely satisfied while 13 percent felt customers were extremely dissatisfied; the mean of all responses was a low 2.5 and represents the most negative response in this group of questions. Once again, senior managers had a more positive view of the situation with a mean response of 2.7. Eight percent of senior managers selected extremely satisfied and 11 percent indicated extremely dissatisfied.

Chart 43



The responses to this question acknowledged a significant problem area for the IS community. Managers clearly believe customers are not satisfied with the time it takes to deliver applications while the previous question showed we believe the customers are satisfied with the quality once the systems are in place. The gap between the perceptions of junior and senior management is not so large as to make us question the validity of the responses, but its consistency is cause for some concern. Are junior and senior management talking to the same customers? Are customers pulling their punches with senior management and telling junior managers the full truth? Or are

customers overstating the problems to junior managers? A direct survey of customers might provide insight to this discrepancy in perceptions.

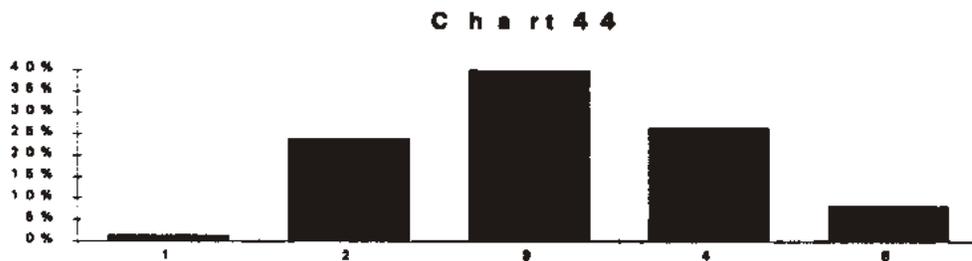
(1) Extremely Dissatisfied	(2)	(3)	(4)	(5) Extremely Satisfied	Number of Responses
13%	41%	33%	11%	2%	447

Question 44 - How capable are your application development staff with regard to possessing the skills and abilities to respond to the current and future needs of customers?

The purpose of this question was to determine if managers had reservations about their staff's abilities to construct the systems of the future.

Interpretation of Results

Eight percent of the respondents rated their staff as extremely capable and only one percent rated them as not at all capable; the rest of the results were very moderate with an overall mean of 3.16 and 40 percent of the responses in the middle category. Again, senior managers were more positive with a mean of 3.37 versus a mean of 3.14 for junior managers.



The extreme moderation of the answers probably reflects the diversity of staff in application development organizations. Some staff will be ready to build the new applications demanded by customers, but others will not.

Since the answers to the previous questions showed that managers perceived customers as lukewarm in their view of system quality and dissatisfied with system timeliness, a strong endorsement of staff skills would have implied other serious problems in the application development process. The moderate responses to this question make the following question even more important.

(1) Not at all Capable	(2)	(3)	(4)	(5) Extremely capable	Number of Responses
1%	24%	40%	26%	8%	438

Question 45 - Please assess the importance of each of the factors listed below in contributing toward project delays:

- a. **Changing requirements from customer or management;**
- b. **Technical complexities and technical problems;**
- c. **Insufficient contingency planning;**
- d. **Resource availability (personnel or equipment);**
- e. **Unrealistic project plan and schedule;**
- f. **Unqualified or inexperienced personnel;**
- g. **Poor project scope estimates and feasibility assessment; and**
- h. **Inadequate project tracking and problem identification.**

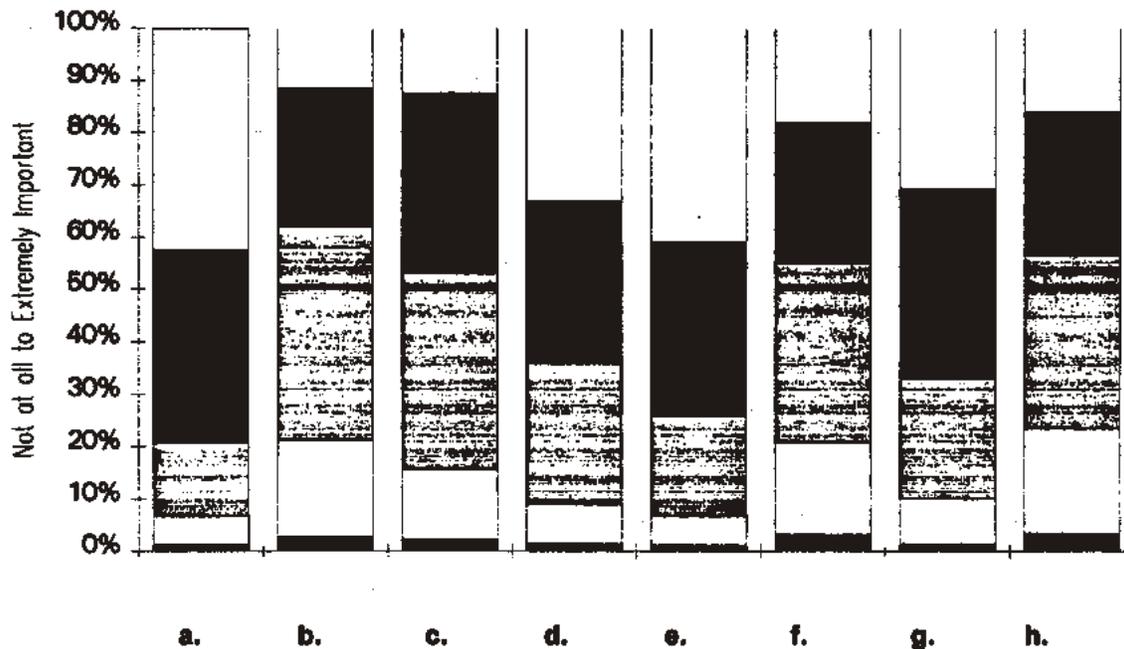
In other words, managers could blame customers, staff, or management for the delays in projects.

Interpretation of Results

All eight of the factors listed received mean scores above three. Therefore, all can be considered to have a positive correlation with project delays. 'Changing requirements' received the highest score with a mean of 4.1, while 'Unrealistic plan and schedule' was close behind with 4.1. 'Resource availability' and 'Poor project scope estimates' both had means of 3.9, while the remaining four categories had means from 3.2 to 3.4. The following chart shows the eight categories from left to right with the percentage of responses from 'Not at all important' at the bottom to 'Extremely important' at the top.

Although all of the categories were identified as factors contributing to project delays, the factors outside the control of the application developers were rated as the most important. Those factors for which application development staff were most responsible such as technical complexity, contingency planning, unqualified personnel, and project tracking received the lowest scores. Given that few organizations use customers in key roles in project management as indicated by the results of question 40, these results indicate a high level of frustration and finger-pointing in the application development community when it comes to meeting project schedules.

Chart 45



Again, it would be interesting to interview the customers to see if their ranking of factors was similar to or the exact opposite of this survey's respondents. It can be inferred from the existing data that the scope definition and scheduling of application development projects has some fundamental flaws. The fact that 43 percent of respondents identified changing requirements and 41 percent identified unrealistic plans as extremely important factors in project delays shows that managers are all too familiar with project delays and have strong opinions as to the source. Assuming that our customers are no more desirous than we are of delaying projects, we must conclude that the current process for identifying, justifying and estimating projects is ineffective.

Factors	(1) Not at all Important	(2)	(3)	(4)	(5) Extremely Important	Number of Responses by Factor
Changing Requirements	1%	6%	14%	37%	43%	448
Technical Complexity	3%	19%	41%	26%	11%	446
Contingency Planning	2%	13%	37%	35%	12%	446
Resource Availability	1%	8%	27%	31%	33%	446
Unrealistic Schedule	1%	6%	19%	33%	41%	447
Unqualified Staff	3%	18%	34%	27%	18%	445
Poor Project Scope	1%	9%	23%	36%	31%	446
Inadequate Project Tracking	3%	20%	33%	27%	16%	446

Question 46 - Please indicate the extent to your organization currently uses the following development techniques and the effectiveness of these techniques for your organization:

- a. Prototyping;
- b. JAD or RAD;
- c. Formal project charters or contracts; and
- d. Code generators and fourth generation languages.

Academy V wanted to identify which development techniques are currently being used and their effectiveness. The respondents indicated their usage of the technique ranging from not used to used extensively and the effectiveness of the technique ranging from ineffective to extremely effective.

Interpretation of Results

Tables 46-1 through 46-5 are representation of the data collected for the various development techniques. The survey confirmed that, given any of the development techniques, the more it is used the greater the effectiveness it has on project development.

Application Development and Maintenance Conclusions

The questions in this chapter covered a broad range of subjects and the findings were quite diverse. The major findings were:

- The median size applications and development organization has between 51 and 100 staff;
- On the average, sixty to seventy percent of our efforts are spent on maintaining and enhancing existing applications;
- Customers are more apt to provide user group liaisons than IS shops provide customer representatives;
- Our customers are more satisfied with the quality of our systems than with the timeliness of the development efforts;
- The most important factors contributing to project delays are changing requirements and unrealistic project schedules; and
- The more that organizations use new techniques such as prototyping and JAD/RAD, the more effective we think they are.

Table 46-1 Effectiveness of Prototyping by Current Use

Effectiveness	(1) Not used at all	(2)	(3)	(4)	(5) Used Extensively	Number of Responses by Value
No Value	57%	3%	0%	1%	0%	22
Not very effective	20%	23%	5%	1%	0%	41
Moderately effective	7%	40%	51%	10%	10%	119
Very effective	13%	26%	34%	66%	10%	125
Extremely effective	3%	8%	10%	22%	80%	61
Total Responses	30	120	116	73	29	368

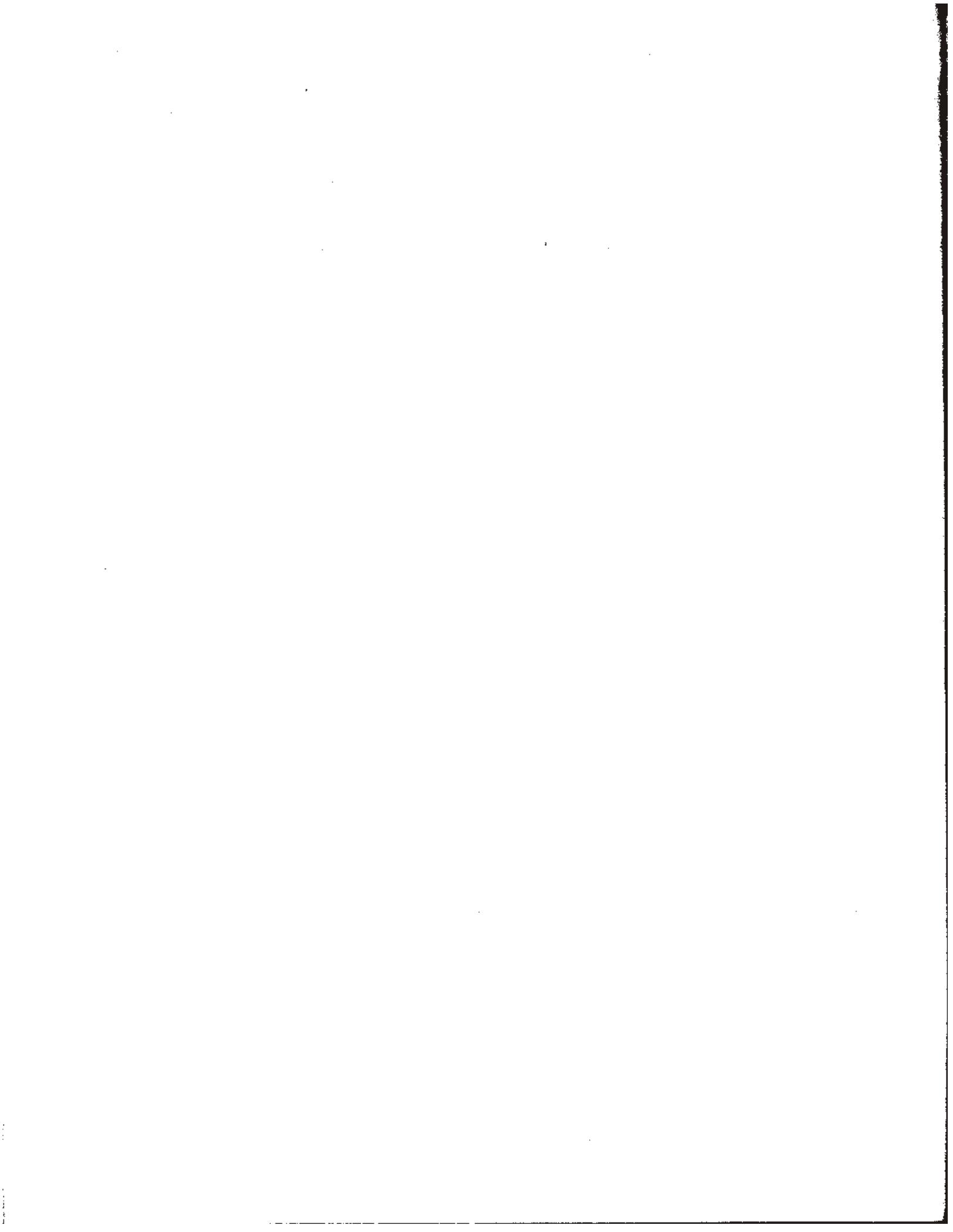
Table 46-2 Effectiveness of JAD/RAD by Current Use

Effectiveness	(1) Not used at all	(2)	(3)	(4)	(5) Used Extensively	Number of Responses by Value
No Value	70%	2%	0%	4%	0%	50
Not very effective	12%	22%	7%	0%	0%	37
Moderately effective	12%	40%	51%	10%	0%	100
Very effective	3%	26%	32%	57%	10%	88
Extremely effective	3%	9%	9%	29%	90%	52
Total Responses	66	98	94	49	20	327

Table 46-3 Effectiveness of Charters/Contracts by Current Use

Effectiveness	(1) Not used at all	(2)	(3)	(4)	(5) Used Extensively	Number of Responses by Value
No Value	58%	3%	1%	0%	0%	43
Not very effective	25%	36%	12%	4%	9%	64
Moderately effective	12%	37%	51%	15%	17%	102
Very effective	2%	21%	25%	60%	22%	77
Extremely effective	3%	2%	10%	21%	52%	36
Total Responses	67	86	99	47	23	322

Effectiveness	(1) Not used at all	(2)	(3)	(4)	(5) Used Extensively	Number of Responses by Value
No Value	55%	3%	1%	0%	0%	20
Not very effective	24%	28%	5%	1%	2%	45
Moderately effective	17%	44%	57%	15%	5%	125
Very effective	3%	21%	33%	57%	22%	110
Extremely effective	0%	4%	5%	27%	71%	59
Total Responses	29	110	104	47	75	359



END-USER COMPUTING

Introduction

During the past decade, the installed base of desktop computers in American businesses has increased dramatically, as have the storage and computing power of these systems. Perhaps even more significant has been the vast improvements in the capabilities and scope of the software developed to run on these systems. Many desktop systems now provide graphical operating environments with extensive integration and interoperability among a suite of feature-laden business processing applications such as word processing, spreadsheet, graphics, etc.

In contrast to the 'interactive' mainframe computing of years past, most of the applications running on these desktop systems have been purchased rather than developed in-house, and many contain powerful tools for developing 'macros' to meet specialized business needs. As a simple example, a user may develop 'macros' which will take information contained in a spreadsheet, sort it by a different key value, delete items not meeting certain criteria, change the formatting of the data, and then send the output to a laser printer. The quandary for IS professionals is that at the same time that we must make every effort to provide powerful computing tools to our end-users, we must also deal with the consequences of the inappropriate or incorrect use of these tools. While IS application development personnel are trained and experienced in the discipline of computer programming, many end-users using these powerful desktop computing tools to develop complex application macros, spreadsheets, and data bases have not had even the most basic training in the principles of application design.

The intent of this portion of the survey was to assess the extent to which end-user computing is being practiced and supported in State organizations, to provide some characterization of problems due to end-user computing such as those related to data integrity and security, and to estimate the growth of end-user computing during the next several years. For the purpose of the questionnaire, 'end-user computing' is defined to be the design and development of applications by end-users rather than by IS personnel, using tools such as PC-based spreadsheets, data base management systems, and word processing programs.

Question 47 - How involved are the non-IS members of your agency in end-user computing?

Respondents were asked to estimate on a scale from one to five, where one represented 'Not involved at all' and five represented 'Extensively involved', the extent to which the members of their organizations, excluding IS personnel, were involved in 'end-user computing.'

Interpretation of Results

The survey results for Question 47 are presented in Table 47-1. Clearly, there is a very significant amount of end-user computing taking place with almost half of the respondents indicating frequent (4) or extensive (5) involvement in end-user computing. In contrast, only

four percent of the 451 respondents indicated their organization is not involved at all in end-user computing.

(1) Not Involved at All	(2)	(3)	(4)	(5) Extensively Involved	Number of Responses
4%	20%	28%	27%	20%	451

The survey results indicate a high level of involvement in end-user computing. It is clearly an established practice and not a trend. The four percent of the respondents who reported that their organizations were not involved in end-user computing may well represent the shrinking percentage of organizations limited to character-based terminals accessing mainframe computing systems. Of course, at least some of that four percent may also represent IS professionals who are not aware of the extent to which end-user computing is taking place within their organizations! These persons would be well-advised to contact user groups within their organizations to better assess this established 'practice.'

Question 48 - To what extent does your IS organization encourage and facilitate end-user computing for development of small systems?

Question 48 asked respondents to indicate on a scale from one to five, with one being 'Strongly discourage' and five being 'Strongly encourage', the extent to which their IS organizations encouraged and facilitated end-user computing. Whereas the previous question sought to assess the extent to which end-user computing was taking place, the objective of this question was to assess the extent to which IS organizations were supporting the practice. Many IS organizations are still recovering from their failure to adequately support the PC computing 'revolution' of the 1980's, and DPMA Academy members were interested in the extent to which the same pattern could be recurring with regard to end-user computing.

Interpretation of Results

From the results presented in Table 48-1, it is clear that IS organizations' support for end-user computing is lukewarm. The predominant response category (3) may be loosely interpreted as 'no strong position' with regard to support and encouragement for this practice. While there were slightly more organizations reportedly 'strongly encouraging' end-user computing compared to those 'strongly discouraging' it, the combined percentages of those supporting the practice and those not supporting the practice were identical at 33 percent.

(1) Strongly Discourage	(2)	(3)	(4)	(5) Strongly Encourage	Number of Responses
5%	28%	35%	25%	8%	447

The results of Question 48, in comparison to the results of Question 47, bear out concerns that IS professionals may be behind the curve with regard to end-user computing. While almost half of the respondents, 47 percent, indicated frequent or extensive involvement in end-user computing in their organizations, only one-third reported that their organizations encouraged end-user computing. Moreover, focusing on the most extreme responses, 20 percent of the respondents to Question 47 indicated that their organization was extensively involved in end-user computing, but only eight percent of the respondents to Question 48 reported that the practice was strongly encouraged in their organization.

This discrepancy between the extent of end-user computing and the reported level of support by IS organizations is cause for concern. IS managers are cautioned to recall the many IS organization debacles regarding the deployment of PCs in the 1980's. Increasingly sophisticated end-users will proceed with or without the support of IS organizations. However, it is clearly in the best interests of both users and IS organizations if the IS organizations can ally themselves with their end-user community and support them in appropriately exploiting the integral application development capabilities of the newest generation of windows-based application programs.

As noted by an experienced IS professional, if IS is of no help to the users, then they are of no help to the organization. This is a good point for IS professionals to keep in mind when considering the extent to which their organizations facilitate and support end-user computing.

Question 49 - How knowledgeable do you feel your end-users are in basic data processing principles and PC-based software products?

To attempt to assess IS professionals' perception of the competence of their end-users in developing applications, respondents were asked to indicate how knowledgeable they felt their end-users were in basic data processing principles. Responses ranged from one meaning little or no knowledge to five meaning extremely knowledgeable.

Interpretation of Results

The results for Question 49 are depicted in Table 49-1. Almost half the respondents, 47 percent, felt that their end-users had 'Little or no knowledge' or were at least not very knowledgeable. Only 3 percent considered their end-users to be 'Extremely knowledgeable' in data processing principles and PC software products.

(1) Little or no Knowledge	(2)	(3)	(4)	(5) Extremely Knowledgeable	Number of Responses
13%	34%	36%	14%	3%	456

Two additional breakdowns of the responses to Question 49 were analyzed in an attempt to determine if there were any differences in responses between junior and senior managers and between IS professionals involved in application development in comparison to those who were not. The results of these analyses are depicted in Table 49-1 and Table 49-2. Table 49-1 represents all respondents and Table 49-2 represents the breakdown of junior managers versus senior managers and application developers versus non-application developers. As might be expected, IS professionals who are probably most involved in supporting end-users, i.e., junior managers rather than senior managers, have a somewhat less favorable opinion of end-users' skills and abilities in data processing. However, IS professionals with responsibility for application development and presumably greater knowledge of the skills required to develop applications somewhat surprisingly had a more positive assessment of the data processing skills of end-users than did their counterparts without responsibility for application development.

	(1) Little or no Knowledge	(2)	(3)	(4)	(5) Extremely Knowledgeable	Number of Responses
Junior	13%	34%	36%	14%	2%	402
Senior	9%	30%	32%	15%	13%	53
Appl. Developers	9%	29%	44%	15%	3%	154
Non-Appl. Developers	16%	38%	30%	14%	3%	271

In general, respondents reported that end-users were not highly skilled or knowledgeable in data processing principles and products. This is not surprising since end-users are not data processing professionals and presumably have greater levels of expertise in other areas. However, perhaps the most knowledgeable IS professionals regarding the process of application development are

those persons currently assigned responsibility for this function. And those persons who identified themselves as having responsibility within their organization for application development or maintenance -- approximately one-third of the respondents -- provided a comparatively favorable assessment of the 'data processing' skills of end-users.

For IS professionals, the conclusion which can be drawn is that, despite the fact that most users are not as well-trained as IS personnel in data processing principles, there are many who nevertheless are highly competent and certainly capable of developing effective end-user computing 'applications'. IS professionals must begin to understand the needs of those persons performing end-user computing and play an active role in facilitating their efforts. In addition, IS professionals must resist every temptation to adopt parochial attitudes such as restricting all 'development' to IS professional staff. Many end-users have developed a successful track record in developing 'applications' within the scope of their job duties and consistent with their skills and abilities, and they will not be receptive to IS attempts to constrain their initiatives in this area.

Question 50 - Overall, how would you characterize your end-users level of satisfaction with the systems they have developed?

As a follow on to earlier questions regarding the extent of end-user computing, Question 50 sought to assess IS professionals opinions regarding end-users' level of satisfaction with the 'systems' end-users have developed for their own use. Presumably, if end-users were very satisfied with systems they have developed, then IS professionals could find out what made these projects successful, and then seek to apply that knowledge to the development of future systems.

Interpretation of Results

The results of the analysis of Question 50 are presented in Table 50-1. Overall, it is assumed that end-users have no strong opinion regarding the systems they have developed, with 50 percent of the respondents selecting the middle response category. However, a combined total of 32 percent selected categories 4 and 5 indicating that almost one-third of the respondents felt that end-users were either moderately or extremely satisfied with the systems they have developed.

(1) Extremely Dissatisfied	(2)	(3)	(4)	(5) Extremely Satisfied	Number of Responses
3%	15%	50%	28%	4%	421

IS professionals estimated that only 4 percent of the end-users were 'extremely satisfied' with the systems the end-users had developed. An interesting comparison can be made with Question 42 in which IS professionals were asked to provide their estimate of end-users' satisfaction with the 'quality' of the systems developed by IS professionals. Overall, the pattern of responses for the

two questions are similar, with the exception that more respondents to Question 42 felt that end-users had stronger sentiments regarding the 'quality' of systems developed by IS professionals -- with equivalent increases in the number of satisfied and dissatisfied responses -- in comparison to systems developed by end-users.

Question 51 - In your organization, is end-user computing likely to increase or decrease during the next several years?

Of obvious importance is the assessment of whether end-user computing is likely to increase or decrease. It was assumed that most respondents would consider end-user computing to be on the increase. If that were the case, then IS organizations would need to look long and hard at the extent to which they are facilitating and supporting end-user computing in their organizations. Conversely, if end-user computing were waning, then this may be a less important issue in the coming years.

Interpretation of Results

This survey results for Question 51 are presented in Table 51-1. It is immediately obvious that most survey respondents anticipate that end-user computing in their organizations will increase substantially during the next several years. More than a quarter of the respondents expect a dramatic increase in end-user computing, with another half estimating a moderate increase. Only five percent felt that end-user computing was likely to decrease in their organizations.

(1) Decrease Dramatically	(2)	(3)	(4)	(5) Increase Dramatically	Number of Responses
2%	3%	20%	48%	27%	453

The results of Question 51 clearly spell out that end-user computing is anticipated to increase during the next several years. At the same time, the responses to Question 48 indicate that IS organizations are lukewarm in their support for this emerging trend. This dissonance between current practice and anticipated need does not bode well for IS organizations!

Question 52 - End-user computing presents challenges in the context of the IS organization's responsibility to ensure the accuracy and integrity of the information delivered to the end user. How significant are the following problems for your organization?

- a. Documentation
- b. Data security
- c. Maintenance and support
- d. Adherence to policies and standards
- e. Data integrity and accuracy.

The final question in this section sought to assess the significance of several factors that can arise as a result of the development of systems by end-users rather than by professional programming staff. By knowing which issues are considered to be the most significant, IS professionals could more effectively utilize resources to address the most significant problems.

Interpretation of Results

This survey results are presented in Table 52-1. The distribution of responses across the various problem areas were reasonably similar. In all cases, more than half of the survey respondents felt that the identified issue was a significant or serious problem, responses 4 or 5. Documentation, maintenance and support of end-user applications were seen as more serious problems than data security, integrity, and accuracy.

	(1) Not a Problem	(2)	(3)	(4)	(5) Serious Problem	Number of Responses
Documentation	2%	7%	25%	35%	31%	427
Data Security	7%	13%	24%	29%	27%	429
Maintenance/Support	2%	7%	23%	39%	29%	427
Policies & Standards	4%	12%	26%	32%	27%	425
Integrity & Accuracy	4%	14%	25%	31%	26%	421
Other	7%	3%	21%	14%	55%	29

The survey results reveal real concerns on the part of survey respondents to the identified end-user computing 'problem' areas. At the same time, there is the aforementioned dissonance between their concerns and their efforts toward addressing these issues. More than half of the respondents felt that the identified problems were significant or serious problems, but only a third indicated that their organizations encouraged or strongly encouraged and facilitated end-user computing.

Under the assumption that IS professionals' assessment of these issues is accurate, this tells us that steps need to be taken to inform and coach end-users in their development of systems to ensure that these issues are adequately addressed. Of course, this will require a high level of communication and facilitation between end-users and IS professionals. In addition, it will require accurate assessment of the extent to which each of these issues must be addressed in each individual case. How many end-users have taken to developing their own systems after receiving an estimate from their IS professionals of over 360 hours to meet a simple, one-time computing requirement? IS professionals are rightly concerned that many one-time 'needs' turn into legacy systems in very short order, but there is still the need to provide a realistic, non-bureaucratic assessment of the requirements of the system and the extent to which the issues identified above must be addressed.

IS organizations should take the initiative to involve departmental managers in establishing end-user guidelines and policies, and to encourage compliance with established IS policies, procedures and standards. This must be supplemented with end-user training and support to facilitate the development and use of automated systems.

End-User Computing Conclusions

The conclusions to be drawn from this portion of the survey are inescapable.

- Forty-seven percent indicated that their customers were frequently or extensively involved in end-user computing, in contrast to 24 percent who reported infrequent or no involvement.
- IS organizations' encouragement and support for end-user computing is lukewarm: one-third discourage or strongly discourage end-user computing; one-third straddle the fence; and one-third encourage or strongly encourage it. The discrepancy between the incidence of end-user computing and IS professionals' support for that practice spells trouble for many organizations.
- While almost half of the survey respondents felt that end-users were not very knowledgeable regarding IS principles and PC software products, almost a third felt that end-users were moderately or extremely satisfied with the systems they had developed themselves, and only 18 percent felt they were dissatisfied. These figures were fairly similar to estimates of end-user satisfaction with the quality of systems developed by IS professionals.
- Despite IS organizations lukewarm support for end-user computing, more than one-fourth of the survey respondents felt that it was likely to increase dramatically during the next several years, with another one-half anticipating a moderate increase. IS organizations are to be cautioned that end-users will not wait for and will not support IS organizations that are slow to respond to their needs.

Clearly, end-user computing will increase during the next several years, being strongly supported by a vast array of products appearing from vendors. IS professionals are close to the crossroads on this issue, just as they were with their response to the 'PC' revolution in the 1980's. IS professionals are advised to carefully consider the impact of end-user computing in their organization and to support and encourage this trend where appropriate.

It is certain that IS no longer 'controls' a computing kingdom. Computing power is becoming increasingly decentralized. Organizations that fail to grasp the significance of end-user computing will not be able to effectively leverage those distributed computing resources or the significant knowledge base of increasingly sophisticated end-users. But they might be left holding the bag, just as they were in the 1980's when they tried to 'control' the PC revolution.

TECHNICAL TRENDS

Introduction

This section of the survey was designed to gauge the extent to which organizations were evaluating or using some of the more recently introduced technologies. In recent years, an increasing number of State departments have looked to new technology to enable them to respond to an increasing demand for services while their budget continues to decrease. One of the responsibilities of IS professionals is to monitor new technologies and assess their value in satisfying existing or future needs for their organization. One of the difficulties in performing this task is to gain an accurate perception of the extent to which the technology is currently in use. This is especially important for State IS professionals due to 'in use' requirements for procurement. Obviously, vendors are inclined to overstate the actual use of the new technologies they offer.

The intent of this section of the survey was to try to get some realistic assessment from IS professionals of the extent to which newer technologies were actually being used or tested by various State organizations. There were two accompanying questions that dealt with the use and effectiveness of advanced technology units to assess newer technologies. The results of the analysis of these questions are described below.

Question 53 - Indicate the extent to which your organization is evaluating or using some of the more recently introduced technologies listed below:

- a. Client-server;
- b. Downsizing;
- c. Hand-held computing;
- d. Interactive voice response;
- e. Relational database management systems;
- f. Distributed database management systems;
- g. LAN management;
- h. Object-oriented development;
- i. Expert or knowledge-based systems;
- j. Business re-engineering;
- k. Multimedia;
- l. Information kiosks;
- m. Electronic data interchange or electronic commerce;
- n. Geographic information systems;
- o. Executive information systems; and
- p. Imaging and document management systems.

Respondents were asked to indicate the extent to which their organization was using or evaluating each of these technologies by checking one of six response options: (1) No Activity, (2) Planning Stages, (3) Evaluating, (4) Testing or Piloting, (5) Project Underway, or (6) In Production.

A response category of 'Don't Know' was provided for those instances in which respondents simply did not have enough knowledge to definitively state the extent of their organization's involvement with the use of the technology listed.

Interpretation of Results

The results of this survey question are presented in Table 53-1. The project team expected a moderate to heavy involvement in technologies that have been available and in-use for some time, examples of which are RDBMS's and LAN management. For both these technologies, approximately three-fourths of the respondents indicated that their organization either had a project underway or in production. The next tier of technologies included Information Kiosks, Client-Server, Imaging and Document Management Systems, and Distributed DBMS with approximately 30 to 40 percent of the respondents indicating projects underway or in production in their organization. Approximately 20 to 30 percent of the respondents indicated Interactive Voice Response (IVR), Electronic Data Interchange (EDI), and Geographical Information Systems (GIS) projects were underway or in production in their organization.

While RDBMS's and LAN management were the 'technical trends' with the highest reported levels of use, Hand-Held Computing and Interactive Voice Response (IVR) topped the list of technologies for which respondents indicated there was no activity or merely project planning underway in their organizations. Other technologies for which there was high levels of 'no activity' or 'planning stages' were Geographical Information Systems (GIS), Information Kiosks, Expert or Knowledge-based Systems, Object-Oriented Development, and Downsizing.

As expected, the more mature technologies tend to show the highest percentages for the categories of testing or piloting, project underway, and in production. For example, RDBMS's and LAN management are technologies that most organizations probably should be using. The 10 to 15 percent of organizations that indicate no activity or planning stages for these technologies should ask themselves whether this represents an appropriate position based upon their technical environment and business requirements or whether it represents an organizational stodginess and aversion to new technologies.

One 'mature' technology that showed very moderate levels of use were Executive Information Systems (EIS). Despite much hoopla associated with these products several years ago, this information appears to indicate that EIS's as a separate technology is dead or dying. In fact, this technology for 'executives' also received the highest percentage of 'don't know' responses from the respondents who were themselves senior IS staff, managers and executives!

Some technologies such as GIS and Information Kiosks show both relatively high levels of activity and inactivity, presumably reflecting that this technology, and others like it, are appropriate for some organizations, e.g., GIS for agencies associated with environmental resources, but not for others. Other technologies such as Object-Oriented Development and Downsizing that showed a similar disparity between activity and inactivity could probably be implemented in virtually any organization, so this difference for these technologies probably reflects undue cautiousness on the part of some organizations. Another technology for which

there was relatively low reported use was Interactive Voice Response (IVR). In light of the fact that this is a well-tested and relatively low-cost technology, organizations not using this technology should probably take a close look for potential applications within their organizations. It is difficult to imagine an organization that does not have a telephone number for general information that could not benefit from IVR.

Technology Category	No Activity	Planning Stages	Evaluating	Testing Piloting	Project Underway	In Production	Don't Know	Number of Responses
Client/Server	7%	17%	16%	11%	22%	21%	6%	477
Downsizing	26%	13%	12%	4%	13%	10%	23%	467
Hand-Held Computing	46%	5%	8%	3%	4%	4%	30%	474
Interactive Voice Response	38%	6%	6%	7%	8%	17%	18%	474
Relational DBMS	3%	6%	7%	5%	20%	53%	7%	472
Distributed DBMS	20%	11%	10%	5%	14%	19%	22%	466
LAN Management	2%	6%	5%	5%	15%	64%	4%	481
Object-Oriented Development	27%	10%	15%	7%	8%	6%	28%	467
Expert/Knowledge-based System	30%	11%	8%	10%	5%	12%	24%	474
Business Reengineering	22%	16%	10%	5%	20%	3%	25%	469
Multimedia	26%	12%	12%	10%	10%	9%	21%	467
Information Kiosks	30%	11%	7%	6%	8%	24%	14%	475
EDI/Electronic Commerce	21%	9%	9%	6%	9%	17%	30%	470
Geo Information Systems	33%	6%	6%	5%	8%	16%	27%	473
Executive Information Systems	22%	12%	7%	5%	9%	9%	35%	468
Imaging/Document Mgt Systems	13%	13%	13%	10%	16%	20%	15%	477

Question 54 - Does your organization have a specific group or unit assigned to evaluate new technologies?

There were two accompanying questions that dealt with the use and effectiveness of advanced technology units to assess newer technologies. The results of the analysis of these questions are described below. The purpose of Question 54 was to assess the number of organizations that had a specific group or unit assigned to evaluate new technologies.

Interpretation of Results

IS divisions have the responsibility for evaluating new technologies for potential application in their organizations. Many IS groups have experienced problems of redundant evaluation efforts or incompatible technologies that can result if such efforts are distributed throughout the

organization. Several years ago, there was a distinct trend toward establishing 'new technology' units to focus efforts within organizations. As shown in the table below, approximately 60 percent of the respondents indicated that their organizations had established new technology units.

Table 54-1	Does your organization have a unit to evaluate new technologies?	No	Yes	Number of Responses
		40%	60%	460

About 60 percent of the respondents indicated that their organization has a unit to evaluate new technology. This appears to indicate that a majority of organizations consider the evaluation of new technology important enough to justify this commitment of resources. At the same time, there has been a recent trend reported in industry publications toward some organizations dismantling these types of units because they have become somewhat slow to react in assessing newer technologies.

Question 55 - If you answered yes to question 54, then how effective has this group been in correctly assessing -- in a timely manner -- the value of these technologies for your organization?

The 60 percent of respondents who had answered 'Yes' to Question 54 were asked in this question to provide their assessment of the effectiveness of the 'technology assessment unit' in their organizations. Respondents were asked to indicate their response ranging from 1 for 'No value' to 5 for 'Extremely effective'.

Interpretation of Results

As shown in Table 55-1, most respondents marked (3) on this question, implying no strong sentiments regarding the effectiveness or ineffectiveness of 'technology assessment units' in their organizations. However, if we compare the combined '1' and '2' responses of 32 percent to the combined '4' and '5' responses of 26 percent, the overall assessment of the respondents appears to be slightly negative regarding the value of these units in their organizations.

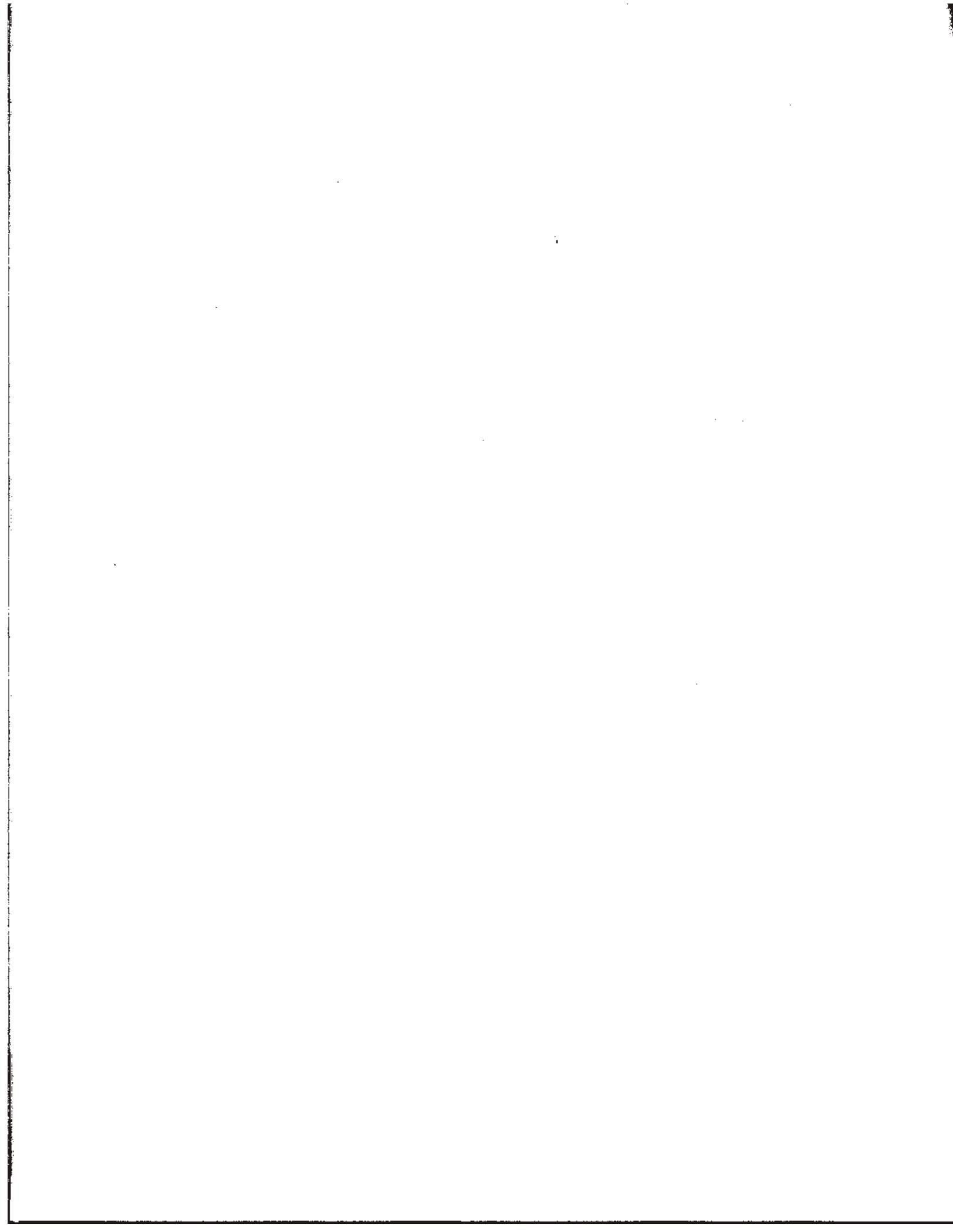
Table 55-1		Effectiveness of Unit to Evaluate New Technologies			
(1) No Value; Ineffective	(2)	(3)	(4)	(5) Extremely Effective	Number of Responses
6%	26%	42%	19%	7%	253

As indicated above, only about 26 percent of the respondents felt that the technology evaluation unit was very effective. This response may indicate that these units are not being used to benefit the organization, at least from the respondent's viewpoint, or that these units lack direction or focus to produce results that can be viewed as beneficial to the organization. Organizations that

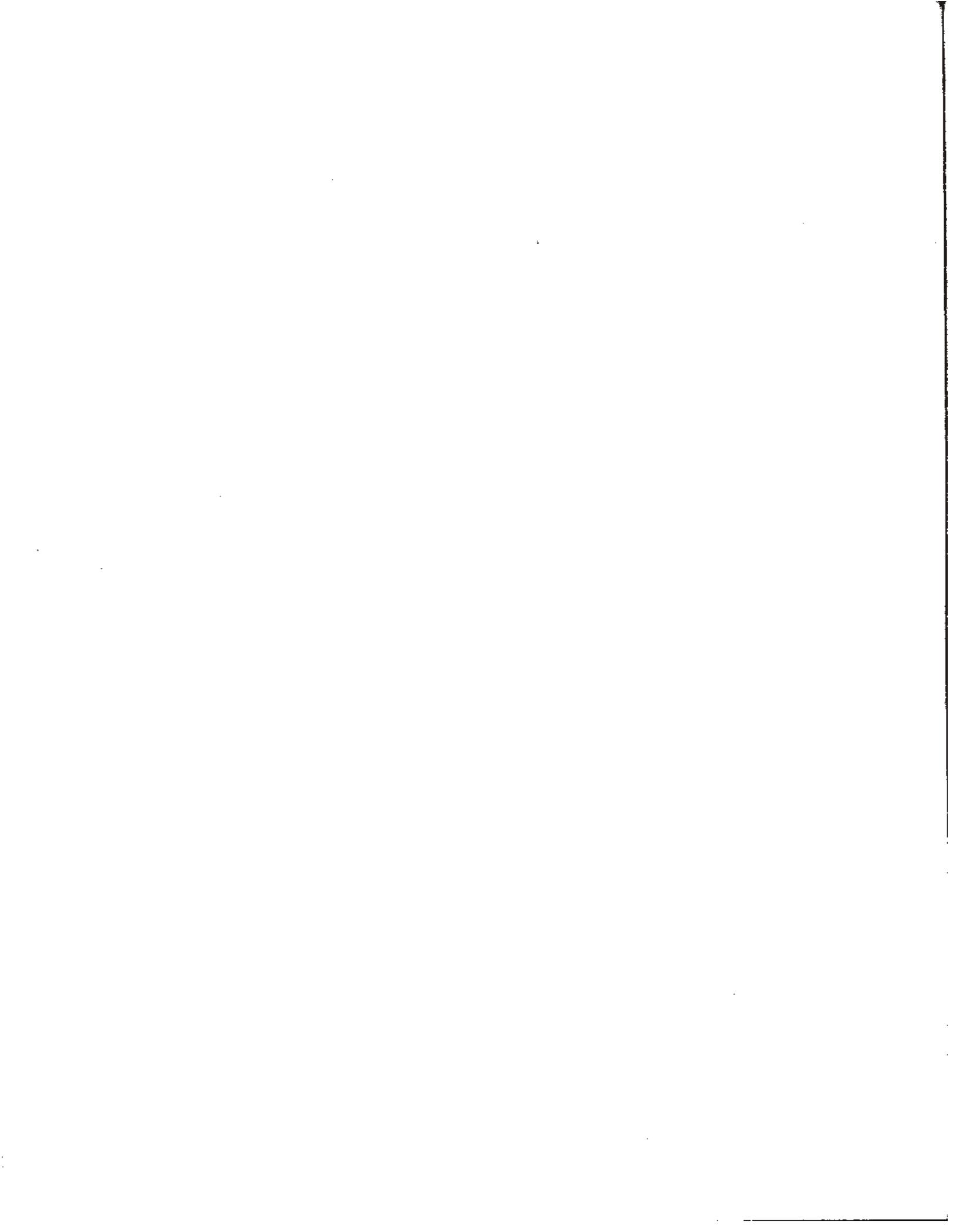
have technology evaluation units would be advised to evaluate these units to determine ways in which it might be possible to improve their effectiveness. Alternatively, some organizations might conclude to abolish these units and distribute their responsibilities among the various IS units.

Technical Trends Conclusions

The survey results indicate that State agencies are actively involved in the use of new technologies. The specific technologies in greatest use as reflected by projects underway or systems in production have been identified. Careful review of the technical trends reported in Table 53-1 could serve as a barometer for organizations to assess their own use of new technologies. Obviously, there are significant differences among organizations, but there are clear trends that emerge from review of these survey results. For example, multimedia has become a much-hyped technology in search of a business application. While this technology has distinct potential for some applications, less than a third of the respondents indicated that their organizations were at or beyond the stage of testing or piloting this technology. Hopefully, this information can be of value to IS professionals attempting to deploy limited resources to their greatest benefit.



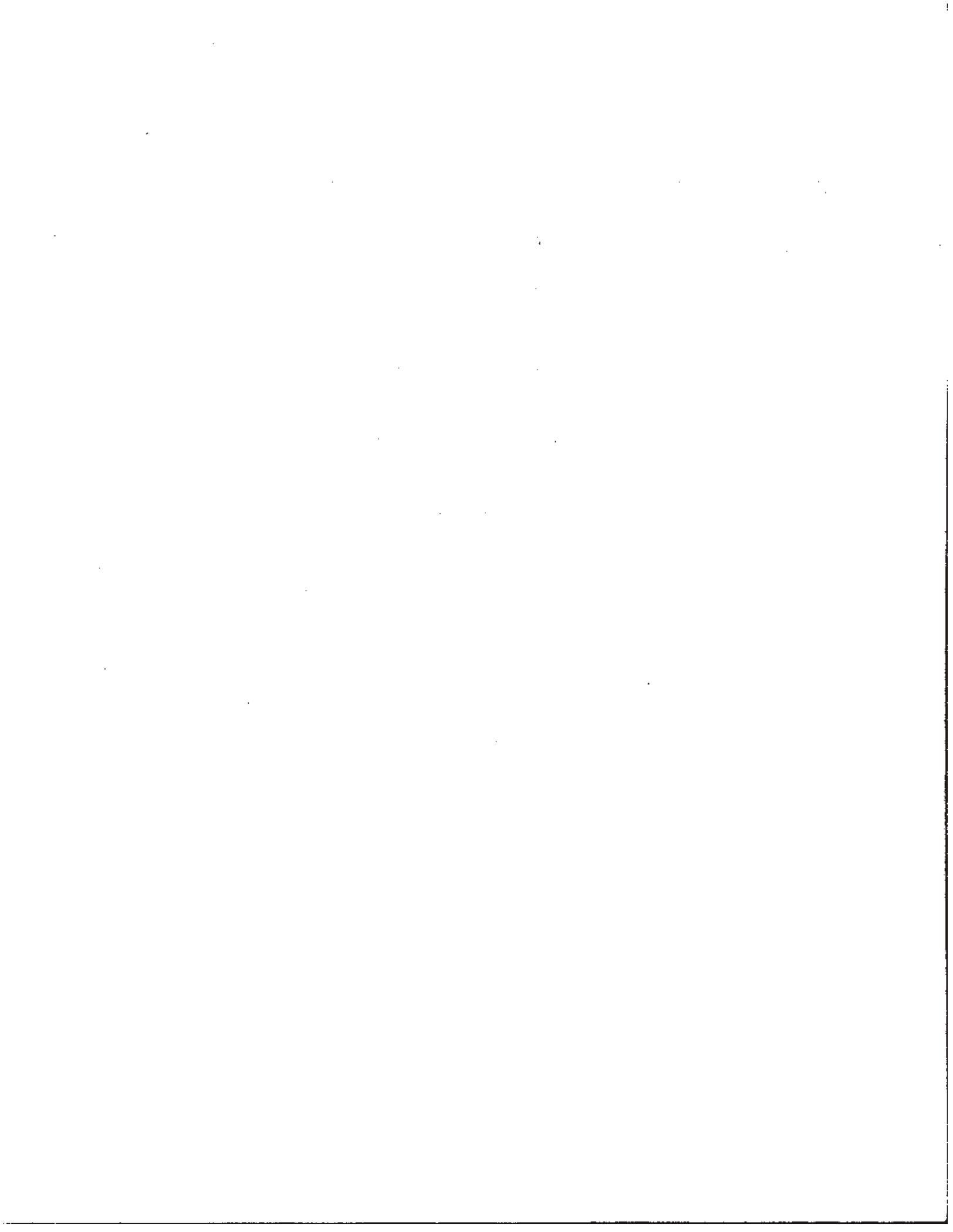
APPENDIX A
MEMBERS OF DATA PROCESSING MANAGERS' ACADEMY V



Members of Data Processing Managers' Academy V

Arstein-Kerslake, Gary*	Integrated Waste Management Board
Bays, Donna	Department of Social Services
Blackston, Ronald K.	Department of Justice
Farr, Russell*	Department of Rehabilitation
Fink, Penelope	Department of Health Services
Hayes, Melody*	California Department of Corrections
Jones, Alice	Department of General Services
Jordan, Peggy	Department of Justice
King, Kenneth	Employment Development Department
Klutz, Richard K.*	California Highway Patrol
Lembi, George*	California Department of Corrections
Lum, Donna	Department of Toxic Substances Control
McPherson, Lowell*	State Teachers' Retirement System
Meriano, Robin	State Controller's Office
Ota, Ardeana	Department of Transportation
Overholt, Champ*	Department of Consumer Affairs
Papailias, George*	State Controller's Office
Riley, Judith	Secretary of State's Office
Santiallnes, Patricia	Public Employees Retirement System
Smith, Tom	Employment Development Department
Troyer, Ron	Department of Toxic Substances Control
Wagner, Micheal	Franchise Tax Board
Walker, Janice	Employment Development Department
Wehe, Eleanor	Department of Motor Vehicles

*** Member of Information Technology Trends and Issues Report team**



APPENDIX B
SURVEY QUESTIONS





Survey of State Information Systems Managers

This questionnaire has been prepared by the members of the State Data Processing Managers Academy for the purpose of assessing issues and trends of importance to State data processing managers. Thank you in advance for taking the time to provide honest and insightful answers to the questions listed below. *Individual responses to this questionnaire will be completely confidential.*

INSTRUCTIONS: Please take the time to complete the questionnaire yourself. Check the appropriate box or, for items with a response scale, circle ①②③④⑤, slash ①/②③④⑤, or fill-in ①②③④⑤ the appropriate value. If there are questions that you truly feel you can't answer, or for which you have not formed an opinion, please leave the question blank (or enter *Don't know* if an option).

GENERAL BACKGROUND INFORMATION

1. Please enter the name of the department or agency you are employed by: _____
2. Job classification: DPM I DPM II DPM III DPM IV Staff ISA/PA Sr. ISA/PA
 SSS I SSS II SSS III CEA I CEA II CEA III CEA IV
3. Number of years in Data Processing (DP): 1 to 5 6 to 10 11 to 15 16 to 20 > 20
4. Has all of your DP experience been with the State? Yes No
5. Number of years working for the State: 1 to 5 6 to 10 11 to 15 16 to 20 > 20
6. How many Departments have you worked at since beginning your DP career? 1 2 3 4 5 or more
7. What areas of DP are you currently responsible for? (Check all that apply.)
 a. Application Development b. Application Maintenance c. Technical Support
 d. Executive Management e. Administration (procurement, etc.) f. Computer Operations
 g. Network Control Center/Support h. Data Comm / Telecommunications i. Other _____
8. Please indicate the highest educational level you've achieved, and college major, if applicable:
 a. High School b. College ... Degree: AA AS BA BS MA MS PhD
 ... Major: _____
9. How did you get into Data Processing? (check all that apply)
 a. Training/Development Assignment b. Education c. Apprenticeship Program
 d. Private Sector e. Other _____ f. Other _____
10. Prior to receiving this survey, were you aware of the Data Processing Managers Academy (DPMA)?
 Either... a. Didn't know DPMA existed,
 Or..... Heard about DPMA from... b. Informational Bulletins c. Friends/Coworkers
 d. Supervisors/Management e. Other _____
11. Have you ever applied to participate in the Data Processing Managers Academy?
 Yes If so, were you accepted? Yes, Academy # _____ No
 No What were the reasons why you did not apply? _____
12. How satisfied are you in your current job? (Mark through or circle # on scale)
 Extremely dissatisfied ① ② ③ ④ ⑤ Extremely satisfied



13. How important are each of the following factors in contributing to your job satisfaction or dissatisfaction?

- | | | | | | | | |
|--------------------------------|----------------------|-------|---------------------|-----------------------------|----------------------|-------|---------------------|
| a. Management support | Not at all important | ①②③④⑤ | Extremely important | b. Training | Not at all important | ①②③④⑤ | Extremely important |
| c. Authority to make decisions | Not at all important | ①②③④⑤ | Extremely important | d. Environment / facilities | Not at all important | ①②③④⑤ | Extremely important |
| e. Flexible work hours | Not at all important | ①②③④⑤ | Extremely important | f. Telecommuting | Not at all important | ①②③④⑤ | Extremely important |
| g. Technical challenges | Not at all important | ①②③④⑤ | Extremely important | h. Other _____ | Not at all important | ①②③④⑤ | Extremely important |

14. How many years have you been a manager/supervisor? 1 to 5 6 to 10 11 to 15 16 to 20 > 20

15. How many people do you directly supervise/manage? 1 to 5 6 to 10 11 to 15 16 to 20 > 20

16. What is your perception of the value of each of the following skills for an information systems (IS) manager?

- | | | | | | | | |
|-------------------------|---------------------|-------|--------------------|---------------------------|---------------------|-------|--------------------|
| a. Communication | Not at all valuable | ①②③④⑤ | Extremely valuable | b. Tech. Knowledge/Skills | Not at all valuable | ①②③④⑤ | Extremely valuable |
| c. Enthusiasm | Not at all valuable | ①②③④⑤ | Extremely valuable | d. Business Knowledge | Not at all valuable | ①②③④⑤ | Extremely valuable |
| e. Interpersonal Skills | Not at all valuable | ①②③④⑤ | Extremely valuable | f. Organizational Skills | Not at all valuable | ①②③④⑤ | Extremely valuable |
| g. Other _____ | Not at all valuable | ①②③④⑤ | Extremely valuable | h. Other _____ | Not at all valuable | ①②③④⑤ | Extremely valuable |

STRATEGIC PLANNING

17. Almost all organizations have developed either a formal or informal strategic plan (e.g., OIT-required SISP). How knowledgeable are you regarding the I/S-related portions of your organization's Strategic Plan?
 Little or no knowledge ①②③④⑤ Extremely knowledgeable
18. How effective do you feel your organization has been in implementing those portions of the Strategic Plan related to I/S?
 Completely ineffective ①②③④⑤ Extremely effective
19. Overall, do you feel that I/S-related Strategic Planning has been beneficial for your organization?
 Little or no benefit ①②③④⑤ Extremely beneficial

PROJECT MANAGEMENT

20. Overall, how effective do you feel your I/S division is in planning and managing I/S projects?
 Completely ineffective ①②③④⑤ Extremely effective
21. To what extent does your organization adhere to a structured project management methodology?
 Not used at all ①②③④⑤ Used extensively
22. To what extent does your organization use automated tools for project planning and management?
 Not used at all ①②③④⑤ Used extensively
23. To what extent does your organization use metrics (e.g., Function Points, Lines Of Code) to assess project resource requirements, track projects, etc.?
 Not used at all ①②③④⑤ Used extensively

ORGANIZATION

24. How effective is your I/S organizational structure for meeting the requirements of I/S processing and development within your organization?
 Completely ineffective ①②③④⑤ Extremely effective
25. To what extent has your IS organization effectively implemented Total Quality Management (TQM) techniques.
 Not used at all ①②③④⑤ Used extensively
26. Does your Information Systems organization exist as a separate division within your agency? Yes No
 (i.e., not under Administration or other division)



OUTSOURCING

27. Please indicate the extent to which your organization *currently uses* outside vendors (e.g., consultants, ...) for any of the following services. Also, indicate your assessment of the value or *effectiveness* of the services provided, and your estimate of the *future use* of these types of 'outsourcing' services by your organization:

	Current Use			Effectiveness			Future Use		
a. Assist w/ feasibility studies, needs analyses, strategic plans?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective	Will not be used at all	①②③④⑤	Will use extensively
b. Development of new application systems?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective	Will not be used at all	①②③④⑤	Will use extensively
c. Maintenance or enhancements to existing systems?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective	Will not be used at all	①②③④⑤	Will use extensively
d. Data center/network operations (excluding State Data Centers)?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective	Will not be used at all	①②③④⑤	Will use extensively

28. Overall, how would you rate consultants and other 'outsourcing' personnel in the following categories:

a. Business knowledge	Little or no knowledge	①②③④⑤	Extremely knowledgeable	b. Transfer of knowledge	Little or no transfer	①②③④⑤	Extensive transfer
c. Technical knowledge/skills	Little or no knowledge	①②③④⑤	Extremely knowledgeable	d. Quality of service or product	Extremely poor	①②③④⑤	Extremely high quality
e. Knowledge of State processes	Little or no knowledge	①②③④⑤	Extremely knowledgeable	f. Meeting deadlines	Completely ineffective	①②③④⑤	Extremely effective

METHODOLOGY

29. To what extent does your organization adhere to a shop-standard application development methodology? (If you don't use a methodology, proceed to question #33)
30. How would you assess your organization's ability, knowledge, and skill to use the application development methodology you've adopted?
31. To what extent have you 'customized' the methodology to satisfy the specific requirements of your organization?
32. Please indicate the extent to which your organization *currently uses* a methodology, and the *effectiveness* of that methodology, for each of the following types of application development projects:

	Current Use			Effectiveness		
a. Large projects and/or large systems implementations?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective
b. Small projects and/or small systems implementations?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective
c. New development?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective
d. Maintenance or enhancements to existing systems?	Not used at all	①②③④⑤	Extensive Use	No value; ineffective	①②③④⑤	Extremely effective



STANDARDS

33. Please assess your organization's use of standards, and the effectiveness and benefits of those standards in each of the following areas.

	<i>Current Use</i>					Extensive Use	<i>Effectiveness</i>					Extremely effective	
	Not used at all	1	2	3	4		5	No value; ineffective	1	2	3		4
a. Systems Analysis standards?													
b. Programming and coding standards?													
c. Naming conventions?													
d. Documentation standards?													
e. Change control and configuration management standards?													
f. Testing standards (Unit, Integration, System, etc.)?													
g. Quality control and/or quality assurance?													
h. Production control and computer operations?													

COMPUTER-AIDED SOFTWARE ENGINEERING (CASE)

34. Please indicate the extent to which CASE tools are *currently being used* for the types of project development listed below. Also, indicate anticipated *future use* of CASE for each of these development areas:

	<i>Current Use</i>					Extensive Use	Will not be used at all	<i>Future Use</i>					Will use extensively
	Not used at all	1	2	3	4			5	1	2	3	4	
a. Development of New systems.													
b. Re-engineering current systems to develop New systems.													
c. Redeveloping or Reverse Engineering existing systems.													
d. Maintaining existing, aging legacy systems													

35. Based upon your general knowledge of CASE tools, or your organization's experience using CASE tools, indicate the extent to which you agree or disagree with these characterizations of CASE technology:

	<i>Agree or Disagree</i>					Strongly Agree
	Strongly disagree	1	2	3	4	
a. Facilitates definition and understanding of user needs.						
b. Facilitates use of standard development methods and procedures.						
c. Provides automated support for development methodology.						
d. Improves coordination and communication among work group.						
e. Results in more well-documented application systems.						
f. Results in the development of higher quality application systems.						
g. Improves overall productivity of development staff.						
h. Speeds development and completion of projects.						
i. Reduces maintenance support requirements.						
j. Provides cost/beneficial alternative to standard development process.						
k. Other _____						



APPLICATION DEVELOPMENT AND MAINTENANCE

36. How large is the application development and maintenance group within your I/S organization (# persons, including consultant personnel)?
 0 to 10 11 to 25 26 to 50 51 to 100 101 to 200 > 200

37. Among your applications and development staff, please provide your estimate of the percent of time spent performing the following functions (total should sum to 100%):

- | | |
|--|---|
| <p>a. Developing new applications _____ %</p> <p>c. Maintaining existing systems (e.g., fixing production problems, maintenance changes, etc.) _____ %</p> | <p>b. Enhancing existing systems (e.g., adding new functionality) _____ %</p> <p>d. Other functions _____ _____ %</p> |
|--|---|

- | | |
|--|---|
| 38. Do you have designated liaison person(s) from the user group representing user needs for production systems? | Never, not at all ① ② ③ ④ ⑤ Always, used extensively |
| 39. Do you have staff member(s) from the I/S group that act as customer representatives and liaisons to the user community? | Never, not at all ① ② ③ ④ ⑤ Always, used extensively |
| 40. Are user managers assigned significant responsibilities in the management of application development projects (e.g., project leader)? | Never, not at all ① ② ③ ④ ⑤ Always, on every project |
| 41. Does your organization use peer review throughout the application development process? | Not at all, never used ① ② ③ ④ ⑤ Always, used extensively |
| 42. How satisfied do you feel your users are with the quality of the systems you deliver to them? | Extremely dissatisfied ① ② ③ ④ ⑤ Extremely satisfied |
| 43. How satisfied do you feel your users are with I/S's timeliness in delivering completed systems to them? | Extremely dissatisfied ① ② ③ ④ ⑤ Extremely satisfied |
| 44. How capable are your application development staff with regard to possessing the skills and abilities to respond to the current and future needs of customers? | No at all capable ① ② ③ ④ ⑤ Extremely capable |

45. Please assess the importance of each of the factors listed below in contributing toward project delays:

- | | |
|---|--|
| <p>a. Changing requirements from customer or management Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>c. Insufficient contingency planning Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>e. Unrealistic project plan and schedule Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>g. Poor project scope estimates and feasibility assessment Not at all important ① ② ③ ④ ⑤ Extremely important</p> | <p>b. Technical complexities and technical problems Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>d. Resource availability (personnel or equipment) Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>f. Unqualified or inexperienced personnel Not at all important ① ② ③ ④ ⑤ Extremely important</p> <p>h. Inadequate project tracking and problem identification Not at all important ① ② ③ ④ ⑤ Extremely important</p> |
|---|--|

46. Please indicate the extent to which your organization *currently uses* the following development techniques, and the *effectiveness* of these techniques for your organization:

	Current Use					Effectiveness								
	Not used at all	①	②	③	④	⑤	Extensive Use	Will not be used at all	①	②	③	④	⑤	Will use extensively
a. Prototyping.														
b. JAD or RAD sessions.														
c. Formal project charters or contracts.														
d. Code generators and fourth generation languages.														
e. Other _____														



END-USER COMPUTING

End-user computing is defined as the design and development of applications by end-users, rather than by IS personnel, typically performed using PC-based spreadsheet, DBMS, and word processing software.

47. How involved are the non-IS members of your agency in end-user computing? Not involved at all ①②③④⑤ Extensively involved
48. To what extent does your IS organization encourage and facilitate end-user computing for development of small systems? Strongly discourage ①②③④⑤ Strongly encourage
49. How knowledgeable do you feel your end-users are in basic data processing principles and PC-based software products? Little or no knowledge ①②③④⑤ Extremely knowledgeable
50. Overall, how would you characterize your end-users level of satisfaction with the systems they've developed? Extremely dissatisfied ①②③④⑤ Extremely satisfied
51. In your organization, is end-user computing likely to increase or decrease during the next several years? Decrease dramatically ①②③④⑤ Increase dramatically
52. End-user computing presents 'challenges' in the context of the IS organization's responsibility to ensure the accuracy and integrity of the information delivered to the end user. How significant are these problems for your organization?
- | | | | | | | | |
|--------------------------------|---------------|-------|-----------------|---------------------------------|---------------|-------|-----------------|
| a. Documentation | Not a problem | ①②③④⑤ | Serious problem | b. Data security | Not a problem | ①②③④⑤ | Serious problem |
| c. Maintenance and support | Not a problem | ①②③④⑤ | Serious problem | d. Adherence to policies & std. | Not a problem | ①②③④⑤ | Serious problem |
| e. Data integrity and accuracy | Not a problem | ①②③④⑤ | Serious problem | f. Other _____ | Not a problem | ①②③④⑤ | Serious problem |

TECHNICAL TRENDS

53. Indicate the extent to which your organization is evaluating or using some of the more recently introduced technologies listed below:

	No Activity	Planning Stages	Evaluating	Testing or Piloting	Project Underway	In Production	Don't Know
a. Client/Server	<input type="checkbox"/>						
b. Downsizing	<input type="checkbox"/>						
c. Hand-Held Computing	<input type="checkbox"/>						
d. Interactive Voice Response	<input type="checkbox"/>						
e. Relational DBMS	<input type="checkbox"/>						
f. Distributed DBMS	<input type="checkbox"/>						
g. LAN Management	<input type="checkbox"/>						
h. Object-Oriented Development	<input type="checkbox"/>						
i. Expert or Knowledge-based Systems	<input type="checkbox"/>						
j. Business Reengineering	<input type="checkbox"/>						
k. Multimedia	<input type="checkbox"/>						
l. Information Kiosks	<input type="checkbox"/>						
m. Electronic Data Interchange (EDI)/Electronic Commerce	<input type="checkbox"/>						
n. Geographical Information Systems (GIS)	<input type="checkbox"/>						
o. Executive Information Systems (EIS)	<input type="checkbox"/>						
p. Imaging and Document Management Systems	<input type="checkbox"/>						
q. Other _____	<input type="checkbox"/>						

54. Does your organization have a specific group or unit assigned to evaluate new technologies? Yes No

55. If you answered Yes to question #54, then how effective has this group been in correctly assessing --in a timely manner-- the value of these technologies for your organization? No value; ineffective ①②③④⑤ Extremely effective



ASSESSMENT OF THE DATA PROCESSING MANAGERS ACADEMY

Answers to the following questions from members of the Data Processing Managers Academies I through V will form the basis for an assessment of the Academy program. Based upon the analysis of survey responses, recommendations will be made for improving the timing, organization and content of future Academies. This assessment can be instrumental in further strengthening a program that is already largely successful.

The State EDP Education Program (SEEP) is particularly interested in the survey results since they'll provide some indication of the value of the Academy training in the months and years following the completion of the actual training courses. Consequently, each response is important and will contribute to the value of any recommendation toward improving the Academy. Your thoughtful and timely responses to the next set of questions will be truly appreciated. *If you are not a member or alumnus of the Data Processing Managers Academy, please skip this portion of the survey.*

GENERAL ACADEMY

56. Did the information you received in advance of the Academy give you an accurate picture of what actually happened in terms of the following (check all that apply):

- | | | | | | |
|----------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|
| a. Course content | <input type="checkbox"/> Yes | <input type="checkbox"/> No | b. Networking opportunities | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| c. Time requirements | <input type="checkbox"/> Yes | <input type="checkbox"/> No | d. Overall value | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| e. Other _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | f. Other _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

57. Would you recommend the Academy to other managers?

- Strongly recommend Mildly recommend Not recommend

Why? _____

58. Are you attending the Advanced Academy?

- Yes
 No Do you plan to apply? Yes No

59. Was your management/department supportive of your Academy participation?

- Very supportive Somewhat supportive Not supportive

ACADEMY CLASSES

60. What do you feel about the amount of time spent in Academy classes?

- Too much About right Not enough

61. Which of the classes you attended during the Academy provided the greatest value?

Class Title: _____

Why? _____

62. If you could have **added** one class to the Academy, what would it have been?

- No change Add (class title) _____

Why? _____



63. If you could have *dropped* one class from the Academy, what would it have been?

- No change
- Drop (class title) _____
- Why? _____

NETWORKING

64. How valuable have the 'networking' and personal contacts you made during the Academy been for you in your work?

- Very valuable
- Somewhat valuable
- Not valuable

65. Do you continue to 'network' with other members of your Academy class?

- Frequently
- Occasionally
- Never

CAREER DEVELOPMENT

66. Do you feel you are a better manager as a result of having attended the Academy?

- Yes If yes, in what areas (check all that apply):
 - More flexible and adaptable
 - Increased communication skills
 - Increased knowledge
- Increased leadership skills
- Increased self-confidence
- Other _____
- No If not, why? _____

67. Do you feel the Academy prepared you for senior management positions?

- Yes, very much
- Yes, somewhat
- No, not at all

68. Have you received a position or assignment of greater responsibility since attending the Academy?

- Yes If yes, do you feel it was attributable to the Academy:
 - Very much so
 - Somewhat
 - No, not at all
- No

CLASS PROJECT

69. Did you see value in the *product(s)* of your class project?

- Yes What? _____
- No Why? _____

70. Did you see value in the *process* of developing the project's product(s)?

- Yes What? _____
- No Why? _____

71. What is your opinion of the amount of time required to be spent on the Academy project?

- Too much
- About right
- Not enough

SUMMARY STATEMENT

72. What could SEEP, Class Managers, and Sponsors do to improve the Academy?
